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POLITICAL SCIENCE ■

Understanding the Links between Inequalities and Poverty (LIP)

Lin Yang

The net effect of housing- related costs and advantages on the relationship between inequality and poverty

CASEpaper212 / LIPpaper 9

ISSN 1460-5023



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CASE/212
November 2018

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Editorial note

Lin Yang is a Research Officer at CASE.

This paper is part of the Improving the Evidence Base for Understanding the Links between Inequalities and Poverty programme funded by the Joseph Rowntree Foundation. The views expressed are those of the author and not necessarily those of the funder.

Data for the Family Resources Survey (FRS) and Households Below Average Income (HBAI) were made available by the UK Data Service. The FRS and HBAI are Crown copyright, reproduced with the permission of the Controller of HMSO and the Queen's Printer for Scotland.

The author would like to thank John Hills for providing generous guidance on numerous aspects of the paper, Abigail McKnight for valuable advice on the paper's development, and other members of the research team (Eleni Karagiannaki, Aaron Reeves, Polly Vizard, Tania Burchardt), Polina Obolenskaya, Bert Provan and members of the Advisory Group for the Joseph Rowntree Foundation programme for their valuable comments and suggestions. All errors and ambiguities remain the author's responsibility.

Abstract

This paper examines how inequality from the interaction of income and housing circumstances changes the relative position of households in the income distribution, and influences the incidence and socio-demographic profile of those in housing-induced poverty. Three measures of income are used – the standard Before Housing Costs (BHC) measure, and the After Housing Costs (AHC) and With Housing Income (WHI) measures which adjust for housing in two different ways – to analyse the net effect of housing costs and advantages on poverty and inequality, and the underlying distributional changes linking the two.

Key words: Poverty, inequality, housing costs, imputed rent, measurement

JEL number: I30, I32, D31, D60, I38

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1 Introduction

So far, this programme of research has explored the theoretical and empirical relationships between income inequality and several concepts of poverty, and the mechanisms that might generate them. Earlier papers in Part 2 of the research programme have found positive empirical relationships between levels of cross-country income inequality and various definitions of poverty, and in the evolution of income inequality and income poverty over time (Karagiannaki, 2017; Yang and Vizard, 2017). Part 1 reviewed theoretical mechanisms and the empirical evidence for them in economic, political and socio-cultural domains that might explain these observed positive net relationships, as well as some potential countervailing mechanisms.

The focus of this part of the research programme is on analysing evidence for the specific mechanism of housing, by examining how inequality from the interaction of income and housing circumstances may influence the incidence and socio-demographic profile of those in housing-induced poverty. This is important because some households have a low income but low housing costs, for example, whereas other households face very high housing costs relative to their income. In this respect, measures of income and income inequality that account for differences in cost of living, of which housing is a key determining factor, are important for policy because they are arguably better measures of differences in standard of living than standard before housing cost (BHC) measures. Although BHC measures of income, income inequality and poverty rates are the standard for international comparisons, they fail to take into account the fact that different income groups face different cost-of-living patterns.

In this paper, we therefore ask: How are inequality, poverty, and the relationship between the two affected by the net effect of housing costs and advantages, and what is their impact on standards of living? We re-examine how inequality and poverty across socio-demographic groups and regions of the UK are measured and interpreted once costs and advantages associated with housing are taken into account. UK income statistics from the Family Resources Survey, published by the Department for Work and Pensions, include measures before and after housing costs have been deducted, allowing the effect of housing costs on the distribution of income to be analysed. Building on the work of Hills (1998), we also make income distribution comparisons using a measure that accounts for housing income (including imputed income to capture the benefits of being a homeowner

and subsidised rents to social tenants), and additionally consider actual realised housing income for second homeowners. Making these distinctions will allow us to draw more nuanced conclusions about the net effect of housing on the relationship between income inequality and poverty.

We conduct an empirical analysis using the Family Resources Survey and its complementary Households Below Average Income dataset to profile the effects that housing-related costs and advantages have for different portions of the population. These effects are not taken account of in the standard BHC measure of disposable income, which is typically used for cross-country poverty and inequality analysis. As mentioned, we specifically investigate two alternative measures incorporating housing-related costs and benefits:

- 1) The After Housing Costs (AHC) measure produced by the Department for Work and Pensions, which deducts the value of housing-related costs from BHC disposable income such as rent and mortgage interest payments, and
- 2) The With Housing Income (WHI) measure proposed by Hills (1998), which adds the value of in-kind advantages from housing to BHC disposable income.

We profile these effects from several different perspectives. These include an examination of which types of households find themselves in substantially different positions in the income distribution AHC and WHI compared to BHC. In particular, we are interested in which of these households find themselves worse off, and which of these are re-ranked to positions of relative poverty once housing-related factors are accounted for. We investigate how factoring in housing-related costs and advantages changes the profile of the income distribution by region, tenure type, family type, and BHC income quintile. We also attempt to assess the extent to which realised rental income for second homeowners contributes towards inequality from diverging incomes between private landlords and tenants, though this is constrained by the extent to which rental income is accurately reported in the data. We focus on three years in the 10-year period from 2006 to 2016. These are 2006-7, covering the year just before the financial crisis, the aftermath of the crisis and implementation of Housing Benefit reform in 2011-12, and the most recent available year of data covering 2015-16.

The rest of the paper is laid out as follows. Section 2 first reviews the literature on how housing costs and advantages could shape the relationship between inequality and poverty, and changes in recent Housing Benefit policy that could affect this relationship. Section 3 describes the AHC income measure, and the rationale and methodological issues of constructing the WHI measure and our empirical strategy for doing so. The empirical analysis of the distributional effects of housing costs and income on inequality and poverty measures is then presented using micro data for the UK in Section 4. Section 5 summarises

2 Review of the effects of housing circumstances on income inequality and poverty

When assessing differences in income across the population, we are usually interested in differences in standard of living across households. Similarly, when identifying the income-poor, we are also usually interested in focusing on groups with a low living standard. The distribution of living standards is affected by the housing system, housing costs, and the benefits in kind which people derive from housing, which are unlikely to be distributed in proportion to standard measures of disposable income across the population. Factoring in these considerations therefore affects the analysis of income distribution and poverty, both in terms of making cross-sectional evaluations and making comparisons over time. Because most comparisons are made between disposable incomes, excluding some or all forms of housing costs or advantages, these may not provide an accurate reflection of living standards. For instance, those with high incomes may be more likely to be owner-occupiers (with significant imputed rents contributing to their standard of living) than those with low incomes, or conversely those with the lowest incomes may be more likely to occupy subsidised social housing, where gross rents are below those which would be charged in the private rental market.

As mentioned, we will examine two alternative measures incorporating housing-related costs and advantages, the AHC and WHI measures introduced above. Existing evidence of the effects of housing as a mechanism influencing inequality and poverty tend to focus on either the AHC measure or on imputed rents (which are used in the WHI measure). Examples of exceptions are Hills (1998), which examines the effects of allowing for housing costs *and* housing income on poverty measurement for the UK and France in the 1980s, Stephens and van Steen (2011), which conducts distributional analysis of income measures incorporating housing costs and housing income for the UK and Netherlands, and Maestri (2015), which found in a cross-country study of 2010 EU data that including imputed rents in the income concept reduces inequality and poverty on average, while deducting housing costs from disposable income has the opposite effect.

In the remainder of this section, we separately review evidence on the effects of housing costs and housing income on poverty and inequality, focusing on the UK, and briefly summarise recent changes to UK Housing

Benefit that impacts these housing-related effects. We first turn to housing costs.

2.1 Housing costs

There has been a trend of significant increases in housing costs relative to income over the last sixty years or so (Corlett and Judge, 2017). In 1961, the average family spent 6 percent of their income on housing costs, whereas today this has tripled to 18 percent. While increases have been recorded across most tenures, a striking disparity has opened up in the scale of these increases between those who own property and those who rent. Housing cost-to-income ratios have increased several times more for renters compared to homeowners. Private renters today spend on average 36 percent of their income on housing, whereas for homeowners without a mortgage this is just 5 percent. Coupled with the fact that renters and those in the lowest income quintile BHC are most likely to be spending over half their net income on housing (Gardiner, 2014), this means the disparity in housing costs that magnifies inequality between renters at the bottom of the distribution and homeowners at the top also further drives down the living standards of those in poverty.

In addition, while the rise in house prices from the 1990s to 2000s benefited homeowners who may have been able to improve their standard of living by cashing in some of the value of their home, the same cannot be said for renters. While rising house prices are good for those who own property (often the older generation), for those trying to get on the property ladder a higher percentage of their income is required to save for a deposit and pay a mortgage. Those who cannot afford to buy must rent, and therefore face higher housing costs of renting in a high-rent low-interest environment (Corlett and Judge, 2017) and entrench their positions of financial disadvantage. This means that the increase in inequality due to the interaction between rising house prices and the homeownership divide also exacerbates AHC poverty for those on the “wrong” side of this divide. Those who continue to rent will also face greater poverty in their retirement when they have to continue paying rent.

On average, the evidence is that older people tend to spend less and younger people tend to spend more on housing because a much larger proportion of older individuals own their homes outright, or have a small outstanding mortgage and therefore face low interest payments (Cribb et al., 2017). The amount spent on housing also varies across other socio-economic groups. In recent years, housing cost trends have been very

different for low and high-income groups. Housing costs have risen for low-income households relative to high-income ones on average as higher-earning households who tend to be owner-occupiers have benefited from sharp falls in mortgage interest rates (Belfield et al., 2015). The distinction between BHC and AHC measures has therefore become particularly important, as this increase in housing cost inequality has weakened the relative positions of poor households.

A positive relationship has been found between the poverty rate and the home-ownership rate across eleven EU countries, and it has been suggested that home-ownership is being used as a supplement to state pensions (Watson and Webb, 2009). Kemeny (1995) and Castles (2004) have argued that less generous welfare systems, including less generous pension systems, are associated with countries with higher rates of home-ownership. These findings imply that unequal incomes and high poverty are associated with high national homeownership, although association does not necessarily imply causation.

The UK welfare system provides social housing at below-market rents for a minority of the population, and these rents remain relatively low as a household's income increases. This avoids the disincentives that are implied by means-tested systems of assistance. In the UK case, with very steep rates of withdrawal of Housing Benefit as incomes increase, the higher someone's rent is, the steeper the "poverty trap" they face. Their net gains from working more will often be greater, however, if they pay a lower rent. This effect has the most potential to impact high-demand and high-cost areas. The poverty trap facing private tenants on Housing Benefit is far wider in London than in the North of England, for example (Hills, 2007).

There is also no evidence of a systematic relationship between housing costs relative to income and the quality and size of housing, and so it cannot be assumed that those people with higher housing costs relative to income also generally live in better quality or larger accommodation (Eurostat, 2016). For example, IFS analysis of detailed data on housing characteristics in England show that, for the most part, increases in private rents paid since the early 2000s are not explained by improvements in the quality of property in the private rented sector. Rather, people generally seem to be paying more for similar properties (Joyce et al., 2017).

Households in poverty as measured by BHC income are not necessarily the same as those in poverty as measured AHC income. For example, whilst

Northern Ireland has a relatively high proportion in relative income poverty (below 60 per cent of median income) using the BHC measure, its low housing costs mean that it has a below-average proportion in income poverty using the AHC measure. Conversely, whilst London has a below-average proportion in low income using the BHC measure, its high housing costs mean that it is the region with the highest proportion in low income using the AHC measure (McKnight et al., 2017).

Particularly in London, the inflow of property investment from overseas to the most desirable locations has led to disproportionate house price growth in comparison to the rest of the country. While in 2017, £500,000 would typically buy a two-bedroom flat in London, in Merseyside this could buy a six-bedroom house (Christie, 2017). We observe that “billionaires displace multi-millionaires from the top addresses, so they in their turn displace millionaires ... and so housing wealth and the prime (real estate) effect spread” (Savills Research, 2011a). Analysis by the BBC has shown that of 27,835 properties in the UK registered to overseas companies whose most recent sale prices are known, the total price paid was just over £55 billion (Verity and Stylianou, 2018) – just under £2 million per property on average. With this internationally driven increase in inequality through the housing market, we have also seen an increase in the inequality of residential floor space (Hills, 2016), as a relatively smaller number of upper and middle class households displace a relatively large number of poorer households. The effect of this is to drive up the housing costs and drive down the quality of housing that these displaced households would otherwise have been able to enjoy. Income AHC at the 10th percentile has fallen by 19 percent in London from 2007 to 2013 – a larger fall than at other points in the distribution and elsewhere in the country (Vizard et al., 2015).

Figure 1 shows the level of income inequality across regions, as measured by the percentage difference between median income in that region and in Great Britain as a whole using the most recent years of data from the FRS (both before and after housing costs are deducted). On a BHC basis, there are three distinct groups, though accounting for housing costs changes some of the details in important ways:

- For the North, the Midlands and Wales, median BHC incomes are below the GB average. However, lower-than-average housing costs mean the gap between regional median income and overall median income is smaller on an AHC basis.

- Scotland, East Anglia and the South West have median BHC income around the same level as the GB average, while Scotland's low housing costs mean that median AHC income in Scotland is higher than the GB median.
- London and the South East have median BHC income higher than the GB median. However, the relative position of London changes dramatically after housing costs, with median AHC income in London dropping to 1 per cent below the GB median. This is not just the result of housing being more expensive in London – it also reflects differences in the mix of renting versus owner-occupation (including outright homeownership, where there are no mortgage payments). For example, while half of those in London live in rented accommodation, the figure is only 30% for the South East.

Figure 1. Percentage difference between median income in regions of the UK and overall median income, 2013-14 to 2015-16.

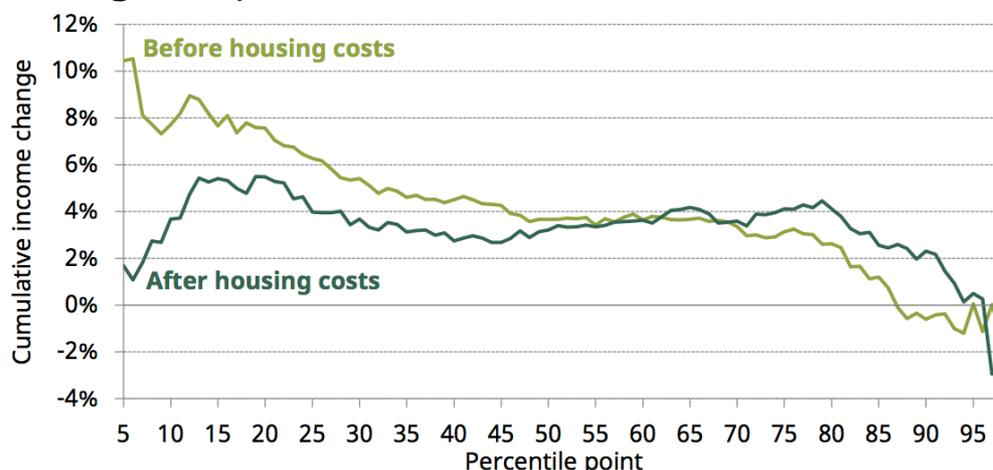


Source: Cribb et al. (2017)

Housing costs have also changed very differently for different kinds of households in recent years. This has affected inequality in the incomes that households have left over to spend on everything else. In particular, the sharp falls in mortgage interest costs between 2007-8 and 2009-10 led to a large reduction in the housing costs of owner-occupiers, and these tend to be relatively high-income households. Figure 2 illustrates how different trends are for incomes after housing costs are deducted (AHC), by plotting the change in income at each percentile point between 2007-8 and 2015-

16 for both income measures. This shows that, although AHC income inequality has also fallen since the recession, it has fallen by far less than BHC income inequality (Cribb et al., 2017).

Figure 2. Real income growth by income percentile before and after housing costs, 2007-8 to 2015-16.



Source: Cribb et al. (2017)

The impacts on poverty of increasing inequalities in housing costs and housing wealth are not confined to the current generation. Those who stand to inherit property are also made better off, so that rising house prices may increase inter-generational wealth inequality. High house prices mean that there will be greater wealth inequality transmitted to the younger generation, dividing the population into those who inherit property from their parents and those who do not. Particularly if the rate of return on owning property, as measured by rental and imputed rental income, is greater than the rate of economic growth, this inequality is likely to widen (Piketty, 2014). With a widening of absolute differences in wealth, those with no or low wealth are left further behind (Hills et al., 2013).

2.2 Housing-related advantages

It has been argued that in-kind receipts of goods and services from all sources, not only employment, should be considered as part of people's flows of income (OECD, 2011). According to this "comprehensive income" definition, the provision of social housing by government or free or reduced-rent housing by family and friends would therefore be counted as income for those who benefit from them. Indeed, all types of housing provide a flow of benefits to residents, whether through ownership, tenancy or informal agreement, which means they avoid incurring other housing costs. The value of these benefits can be priced and considered as housing income (Hills, 1998). For example, some employers provide their employees with

free or low-cost housing as part of their compensation agreement. For owner-occupiers, the advantage of living in their homes can be calculated by imputing the rent that would have been charged and paid if the owners and occupiers were separate entities in the private rental market. Imputed rents are included as national income in the UK national accounts, and until the 1960s seen not only as a theoretical form of household income but taxed as such, under 'Schedule A' (Figari et al., 2012). Imputed rents are currently taxed in Greece and the Netherlands.

Across EU countries, evidence suggests that if imputed rents were included in measures of household income, income inequality would be reduced (Frick et al., 2010, 2007; Frick and Grabka, 2003; Smeeding et al., 1993). The empirical analysis in this paper provides a detailed examination of this in the UK context. Figari et al. (2012) find in a simulation of six European countries that if imputed rents were included in calculations of household income and the tax revenue raised through taxation of imputed rent is redistributed to taxpayers through a lump sum credit, this would have an inequality-reducing effect on the distribution of incomes, with gainers mostly situated in the middle of the income distribution. However, in contrast they find that if the revenue is redistributed through a proportional tax liability rebate, then the effect appears to be regressive. For the UK, Mullan et al. (2009) find that accounting for the net value of housing income does not significantly reduce child poverty risk compared to the standard BHC income measure, although the composition of children counted as poor is different. In contrast, they find that three-quarters of pensioner poverty would be removed by this change in the calculation of income.

Social housing residents who do not pay full market rents can also be described as receiving an imputed rent from the difference between their rent levels and market levels (Hills, 2007). In 2001, those in the bottom BHC income quintile received 8.1 times the benefit from social housing compared to those in the top quintile (measured here as the difference between rent levels and landlord costs). Sefton (2002) finds that this was the most redistributive aspect of in-kind welfare state benefits, with the ratio of top to bottom-quintile spending being 1.6 for the Right to Buy subsidy, 1.0 for education, 1.5 for health care, 1.3 for non-residential care, and 2.4 for residential care. Most social landlords also provide some services intended to prevent poverty and increase employment, such as money advice and debt prevention assistance to tenants (Chartered Institute of Housing, 2009), and many individual schemes appear effective (Tunstall et al., 2013). Taking these in-kind advantages of social housing

into account would have a mitigating effect on the numbers and type of people living in poverty, although gauging the total impact is difficult.

2.3 Recent changes to Housing Benefit and Local Housing Allowance

A number of recent changes to Housing Benefit allocation have impacted the housing costs faced by private tenants and rents received by private landlords. In order to reduce expenditure on Housing Benefit, in April 2011 the government introduced new Housing Benefit payment caps by property size. The caps were:

- £250 a week for a one bedroom property
- £290 a week for two bedrooms
- £340 a week for three bedrooms
- £400 a week for four or more bedrooms

Comparing these rental caps with average market rents across the UK, analysis suggests that only London exceeded these cap levels before the caps were introduced (Savills Research, 2011b). Northern Ireland did not introduce these caps due to difficulty in passing the legislation through the Northern Ireland Assembly (Kennedy et al., 2016).

In contrast to the cap on benefit, the actual level of Housing Benefit paid in different locations is determined by the Local Housing Allowance (LHA). The LHA payable to the tenant is calculated according to market rents in a defined Broad Rental Market Area (BRMA), of which there are 193 in Great Britain. Before April 2011, the rate for different sizes of accommodation was set based on the median rent in the BRMA. Proposals put forward by the coalition government involved reducing the level at which LHA is set. From April 2011, alongside the Housing Benefit caps, changes in calculation of the LHA reduced the LHA from a median level (50th percentile) to the 30th percentile. The maximum Housing Benefit available to tenants is determined by the lower of the LHA and the Housing Benefit cap.

Private landlords are an important intermediate housing provider for those who do not qualify for social housing and cannot afford to buy. In the private sector 19% of tenants were in receipt of Housing Benefit in 2011, compared with 59% of households in the social rented sector. Since the LHA is not applicable to people receiving Housing Benefit in the social rented sector, the affected households were mostly tenants in the private rented sector who had made a new claim or changed address since April

2008, while social tenants in local authority or housing association accommodation remained unaffected (Savills Research, 2011b).

A study of the impacts of the 2011 LHA reforms on existing claimants found that a year after being rolled onto the reformed system, existing claimants' maximum entitlements in given property types were reduced by on average £6.84 per week. This was found to comprise of £0.79 in actual rent reductions and £6.06 in reduced LHA, implying that on average, tenants bore 89 per cent of the incidence of LHA reduction (Brewer et al., 2014). In contrast to most of the country, in London and the East Midlands the majority of the incidence fell on landlords rather than tenants in the short run. Findings also included evidence that groups impacted most heavily by the reforms (for a given type of property) have been those who had higher entitlements to start with – claimants in London and lone parents.

3 Data and methodology

3.1 Data

The key datasets for this analysis are the Family Resources Survey (FRS) and the Households Below Average Income (HBAI) dataset. The FRS captures detailed information on income sources, as well as contextual information on household and individual living circumstances. The HBAI dataset is derived from the FRS data, and includes adjustment for top incomes using the Survey of Personal Incomes. Together, these allow for detailed analysis of housing cost components across the income distribution. However, while the records in the HBAI are at the 'benefit unit' level, the FRS contains data at the individual, benefit unit, and household level. We therefore link the two datasets by matching benefit units from the HBAI to their respective constituent individuals and containing households in the FRS in order to use variables from both datasets.

We are interested in three concepts of income in our analysis – income before housing costs (BHC), after housing costs (AHC), and with housing income (WHI). Each of these is discussed in more detail below. For each measure, we use equivalised household disposable income, which takes into account the size and composition of households to make the income figures comparable. Incomes are assumed to be shared equally between everyone in the household.

3.2 Before Housing Costs

BHC income aggregates income from all household members, including dependants, and includes the following main components:

- net earnings from employment and self-employment
- all Social Security benefits and tax credits, including Housing Benefit
- income from occupational and private pensions
- investment income
- maintenance payments, if a person receives them directly
- income from educational grants and scholarships (including, for students, top-up loans and parental contributions)
- the cash value of certain forms of income in kind (free school meals, Healthy Start vouchers and free school milk and free TV licence for those aged 75 and over).

Income is net of the following items:

- Income Tax payments
- National Insurance contributions
- Council Tax (or domestic rates for Northern Ireland)

- contributions to occupational pension schemes
- all maintenance and child support payments, which are deducted from the income of the person making the payment
- parental contributions to students living away from home
- student loan repayments.

3.3 After Housing Costs

AHC income deducts a measure of housing costs from the BHC income measure.

Housing costs include the following main components:

- rent (gross of housing benefit)
- water rates, community water charges and council water charges
- mortgage interest payments
- structural insurance premiums (for owner occupiers)
- ground rent and service charges

A BHC measure acknowledges that some households may choose to spend more on housing in order to enjoy a better quality of accommodation. On the other hand, variations in housing costs may not always reflect differences in the quality of accommodation (for example, geographical differences mean two households could face very different costs for a comparable standard of housing). In this case, an AHC measure is arguably more informative. Poverty levels are generally higher when household incomes are measured AHC, as households at the lower end of the income distribution tend to spend a larger share of their income on housing than higher-income households.

AHC measures also partially remove the influence of housing benefits from the figures – when housing benefits rise to offset increases in rents, the before housing cost (BHC) measure counts this as an income rise (rather than no change), which can create misleading and perverse policy implications. The difference between AHC and BHC income is therefore an important distinction.

An advantage of the AHC measure is that it removes distortions between tenants with the same net housing costs, but subsidised through different routes (housing allowances as opposed to below-market rents). In the UK this has been important in making income distribution comparisons over time periods when there have been shifts from ‘bricks and mortar’ subsidies to income-related housing allowances, as there were over the 1980s. However, a disadvantage of AHC measures is that they only give a fair

comparison of relative living standards between households if they occupy accommodation of the same quality or value. The fact that a household has little in the way of net resources left over for other forms of consumption because it has chosen to spend most of its income on living in a luxury apartment in the centre of a capital city does not mean that it is appropriate to place it 'in poverty' by comparison with another household with slightly higher AHC income, but occupying low cost accommodation.

Individuals living in Local Authority (LA) and Housing Association (HA) accommodation benefit from paying rents that are below the market rate. This effective economic subsidy is in addition to any Housing Benefit received, which is already included in household disposable income. The subsidy, however, is not captured by BHC income, since it is reflected in the lower costs of rent that are not captured in this measure. While AHC income does capture the impact of the subsidy through the smaller rent component of housing for LA and HA tenants in comparison to private tenants, it does not tell us about the size of this subsidy. To measure this subsidy, we therefore estimate the market rental value of LA and HA housing using a hedonic regression model (see below), and deduct the rents actually charged by LAs and HAs. This is the approach taken in the With Housing Income measure, described below.

3.4 With Housing Income

As mentioned earlier, the WHI measure accounts for the value of in-kind advantages not otherwise reflected in the BHC disposable income measure. For owner-occupiers, the "housing income" advantages they receive is calculated as the net imputed rent on their property, which would incorporate real capital gains on the property, less real net interest payments on borrowing. Net imputed rent is an estimate of the market rent the property could command, deducting expenses like repair, maintenance and depreciation. Net interest payments would reflect the effects of any tax reliefs or subsidies benefiting owners with mortgages. Income would also include any income-related housing allowances received by owners.

For a tenant paying a full market rent without any assistance from housing allowances or tax reliefs there would be no housing income. If the tenant received a housing allowance, this would contribute to income (and might or might not be included in BHC income measures). In addition, if tenants pay below-market rents, the difference between actual and market rent would also be part of housing income. Note that it is the difference between

actual rent and gross market rent which has to be estimated, since tenants typically do not normally have to bear the cost of repairs and maintenance.

Note that while the HBAI data contains BHC and AHC-specific equivalence scales to compute equivalised BHC and AHC income, there is no WHI equivalence scale. As such, the BHC equivalence scale is used for WHI equivalisation, since economies of scale of a comprehensive income measure will be much more similar to BHC economies of scale than AHC economies of scale within households.

The advantage of using imputed rents to calculate such a With Housing Income (WHI) measure is that it allows a fair comparison between households in different circumstances and between countries where institutional arrangements vary. Data limitations may, however, mean that its calculation can only be estimated with error. This is discussed in the following sections.

3.5 Gross rent hedonic imputation model

Information is not available on the value of rents that *would* be charged for LA and HA housing if they were made available on the private rental market. These therefore need to be estimated, based on the values of comparable properties in the private rental sector.

We use the market rental value of property as a measure of the consumption value of living in that property. This value is observed in the data for those households who rent their property from a private landlord. But we do not observe a rental value for owner-occupiers, and, for tenants of "social landlords", we observe a rent which will typically be less than the market rent. We therefore need to estimate the rent that owner-occupiers and social tenants would pay for their property if they rented it on the private market.

We do this estimating a hedonic regression model, which imputes a rent for each property based on the geographical region, the number of rooms, property type, furnished status and the council tax bill. Following an approach similar to Brewer and O'Dea (2012), we take households who rent a property in the private market in each year, and split them into four groups defined by the education of the head of household and whether or not the property is located in London. For each group, we estimate a regression of the log of rent on council tax band interacted with a dummy for the regional council tax regime, indicators for government office region,

and indicators for the number of rooms in the property, property type and furnished status. Again following Brewer and O’Dea (2012), for all households we then calculate a measure of imputed (log) rent as the prediction from this regression plus a draw from the empirical distribution of the regression residuals (the draw for a particular household is a random draw from the sample comprising the residuals for all households surveyed in the same year and with the same education level). Regression results are provided in the Appendix.

3.6 Calculating net imputed rent

To calculate net imputed rents, we need to deduct the expenses that owner-occupiers would face if they were letting and renting on the private market. The hedonic regression described gives us gross imputed rents, that is, the rents paid by tenants without factoring in the costs of running the property. In order to calculate the WHI measure, which requires net imputed rent, we therefore use estimates of landlord expenses to calculate the expenses that owner-occupiers would face if they were letting and renting on the private market.

Table 1 provides up-to-date and comprehensive information from Kent Reliance for Intermediaries (2017), a specialist buy-to-let mortgage lender, about the costs necessary to calculate deductions from imputed rent for owner-occupiers. Shaded spending categories are usually either passed on to tenants (service charges and ground rent), or are not applicable to the circumstances of owner-occupiers (voids), and so are not included in the deductions to obtain net rents from gross imputed rents. Deducting the inapplicable categories of spending, the other categories comprise 72 per cent of total landlord costs (given by the calculation: $1 - ((652 + 312 + 62) / 3632) = 0.72$).

Concluding the derivation of the WHI measure, the final step is to adjust the gross rents imputed from the hedonic model by deducting the percentage of region-specific owner-occupier running costs given in the last column of Table 2.

Table 1. Annual cost of running the average rental property in Great Britain.

Category of spending	Cost of running a property
Property upkeep, maintenance, servicing	£1,025
Letting agent fees	£870
Voids	£652
Service charges	£312
Other	£198
Insurance	£181
Utilities	£170
Legal/accountancy	£121
Ground rent	£62
Licensing fees	£41
Total	£3,632

Source: Kent Reliance for Intermediaries (2017)

We then take the region-specific total cost of running a property normally paid by landlords as a percentage of rental income, and adjust this to reflect the costs owner-occupiers would face by taking 72 per cent of this figure, as explained above. Table 2 presents the region-specific average total landlord running costs and these costs as a percentage of rental income, and in the final column adjusted as a percentage of only the 72 per cent of included spending categories applicable to owner-occupiers.

Table 2. Landlord and owner-occupier expenses as a ratio of rental income by region.

Region	Annual landlord running cost before mortgage	As % of rental income	Owner-occupier running costs (72%)
London	£6,535	32%	23%
East of England	£3,212	35%	25%
South West	£2,963	35%	25%
Yorkshire and The Humber	£2,508	34%	24%
North West	£2,483	33%	24%
Wales	£2,211	41%	30%
South East	£3,691	37%	27%
North East	£1,895	34%	24%
West Midlands	£2,785	33%	24%
East Midlands	£2,657	34%	24%
Scotland	£2,966	33%	24%
Great Britain	£3,632	34%	24%

Source: Kent Reliance for Intermediaries (2017) and author's own calculations

4 Analysis and discussion

4.1 Housing and the income distribution

In moving from the conventional BHC measure of income to measures that account for the effects of housing (the AHC measure and WHI measure including imputed rents and economic subsidies), the amount of adjustment will be affected by the tenure pattern across the population. In particular, if tenure varies with income, the shape of the AHC and WHI distributions may differ from that of the conventional BHC income distribution.

Table 3 to Table 5 present the Gini, P90/P50 and P50/P10 measures of inequality in the years 2006-7, 2011-12 and 2015-16, to show the differences between the conventional BHC income distribution and each of the two housing-adjusted income distributions.¹ The effect of using the AHC measure is to produce a substantially more unequal distribution, with the P50/P10 displaying particularly large increases relative to the BHC measure. Note that this is partly because the housing cost deductions in the AHC income measure are larger *relative to BHC income* for those with lower BHC incomes. This then affects the P50/P10, which captures dispersion in the bottom part of the distribution. In contrast to AHC inequality, the distribution of the WHI measures is very similar to BHC inequality, with the exception that P50/P10 inequality between the median and bottom decile widens in 2011-12 and 2015-16 relative to the BHC baseline.

Income inequality measured by the Gini coefficient has remained constant over the three years examined in the 2006-2016 period, 2006-7, 2011-12 and 2015-16. The P90/P50 inequality figures indicate that dispersion between the top decile and the median narrowed between 2006 and 2016, as the top decile fell more relative to the median between 2006-7 and 2011-12 after the financial crisis, and then rose less relative to the median in the economic recovery between 2011-12 and 2015-16. The P50/P10 figures, on the other hand, show a narrowing in the dispersion between the bottom decile and the median between 2006-7 and 2011-12, as median but not bottom decile incomes fell in the aftermath of the financial crisis, and then a widening again in 2015-16. These patterns are fairly consistent across income measures, whether housing is accounted for or not. The contrast between the relatively constant level of inequality measured by

¹ To remain consistent with official DWP FRS-HBAI calculations, we measure inequality on an individual basis. Although each observation is a benefit unit, by using the appropriate grossing factor, totals for the number of individuals can be calculated.

the Gini and the changing decile ratios indicate that the changes in dispersion towards the tails of the income distribution were offset by changes nearer the centre of the distribution. These changes may be linked to changes in the relative fortunes of different tenure types in the distribution, and we turn to this in Table 6 to Table 8.

Table 3. Income inequality for each of the three income concepts in 2006-7.

Measure	Gini	P90/P50	P50/P10
BHC	0.35	2.07	1.99
AHC	0.38	2.15	2.28
WHI	0.35	2.08	2.00

Source: Own calculations from FRS

Table 4. Income inequality for each of the three income concepts in 2011-12.

Measure	Gini	P90/P50	P50/P10
BHC	0.34	2.05	1.88
AHC	0.38	2.16	2.24
WHI	0.34	2.04	1.92

Source: Own calculations from FRS

Table 5. Income inequality for each of the three income concepts in 2015-16.

Measure	Gini	P90/P50	P50/P10
BHC	0.35	2.00	1.92
AHC	0.39	2.13	2.30
WHI	0.34	2.00	1.95

Source: Own calculations from FRS

4.2 Re-rankings and relative poverty

Table 6 to Table 8 present breakdowns by tenure type of the incidence of those who fall below 60 per cent of median income. Inspecting the incidence of low income across tenure types, we see that tenants comprise the majority of those in relative poverty, with the AHC measure producing particularly high figures, especially in relation to the baseline BHC incidences for private tenants. The WHI measures show reductions in the incidence of low income for social tenants, relative to the BHC baseline, as a result of factoring in the economic subsidy to social tenants for 2006-7 and 2011-12. In 2015-16, however, this economic subsidy appears

insufficient relative to the imputed rents of higher-income households to reduce the incidence of WHI relative poverty for social tenants.

Overall, the pattern of change in incidence of low income for tenants over the three years in the 2006-2016 period matches that of the changes in P50/P10 inequality, pointing to changes in inequality occurring in this part of the distribution being driven by the relative positions of tenants in the distribution. For homeowners, on the other hand, the incidence of low income has either remained fairly constant or fallen over the period. Overall, homeowners, particularly outright owners, have seen their relative positions improve from 2006-2016 as seen by the decrease in their incidence of low income. This is particularly noticeable using the WHI measure factoring in the in-kind benefits of housing, since homeowners benefited over this period from a combination of buoyant house prices and rent levels increasing their imputed rents, and near-zero interest rates on mortgage repayments for mortgagors.

Table 6. Relative poverty rates by tenure type (%) from 2006-7.

Relative poverty	Social tenants (%)	Private tenants (%)	Mortgagors (%)	Outright owners (%)	All tenures (%)
BHC	35	21	9	22	18
AHC	48	42	12	16	23
WHI	28	23	12	17	18

Table 7. Relative poverty rates by tenure type (%) from 2011-12.

Relative poverty	Social tenants (%)	Private tenants (%)	Mortgagors (%)	Outright owners (%)	All tenures (%)
BHC	27	17	10	17	16
AHC	43	36	12	12	21
WHI	26	21	11	14	16

Table 8. Relative poverty rates by tenure type (%) 2015-16.

Relative poverty	Social tenants (%)	Private tenants (%)	Mortgagors (%)	Outright owners (%)	All tenures (%)
BHC	29	18	9	18	17
AHC	45	37	10	13	22
WHI	30	25	9	13	17

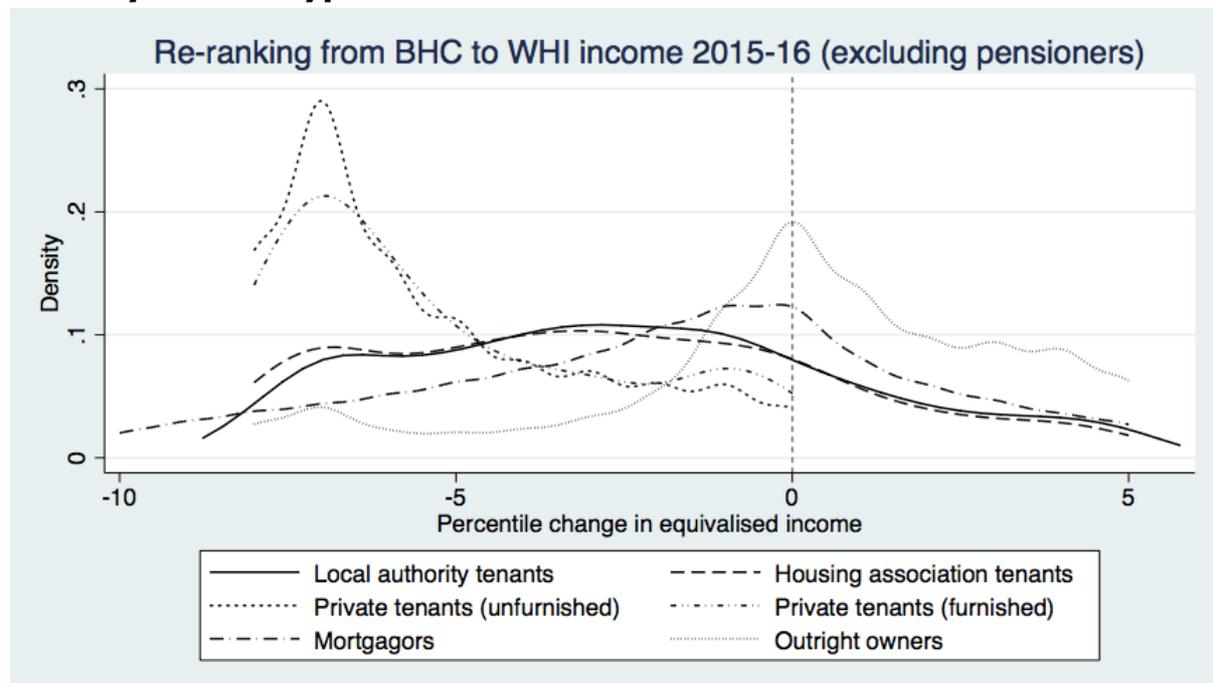
Table 9 presents a cross-tabulation of quintiles of BHC income and WHI income, telling us the degree of agreement and disagreement between the relative rankings of BHC and WHI income. The households whose relative positions improve and deteriorate after accounting for housing income (WHI) compared to BHC income fall into categories above and below the diagonal respectively. We can see that while the majority of households remain in the same quintile, a substantial percentage do experience improvements and deteriorations in relative position by one quintile.

Table 9. Percentages of households belonging to corresponding quintiles equivalised BHC and WHI 2015-16.

Quintiles of BHC income	Quintiles of WHI income					Total
	1	2	3	4	5	
1	80.29	13.78	4.59	1.05	0.29	100
2	15.71	62.98	17.43	3.34	0.55	100
3	0.16	19.98	60.4	17.89	1.58	100
4	0.03	0.14	16.35	69.16	14.33	100
5	0.00	0.00	0.06	11.15	88.79	100
Total	20.92	20.55	20.22	19.63	18.69	100

Source: Own calculations from FRS

Figure 3. Change in relative positions of households from BHC to WHI by tenure type 2015-16.



Source: Own calculations from FRS

To directly quantify how much the relative positions of individual households improve or deteriorate, Figure 3 plots the changes in their relative positions in the income distribution from BHC percentile to WHI percentile, by tenure type. Pensioners are excluded from the figure because low pensioner incomes mean that non home-owning pensioners remain near the bottom of the WHI distribution, resulting in bunching at the bottom of the tenant distributions of percentile changes. To the left of the zero-change line, it is clear that all private tenants experience deteriorations in their relative positions, since these households receive no housing advantages from homeownership nor rent subsidies. Among those whose positions improve, the highest proportion are outright homeowners, followed by mortgagors (the portion who benefit more from the stream housing services provided by their property than is paid out as mortgage interest), and slightly lower proportions of social tenants. The figure visually illustrates that even though WHI inequality does not greatly differ from BHC inequality (as we saw from Table 3 to Table 5), there is substantial re-ranking of households within the distribution, such that private tenants are at greater risk of relative poverty.

Table 10 presents another a cross-tabulation of quintiles of BHC income, this time displaying percentages of households in each BHC quintile that find themselves in relative poverty, that is, below 60 per cent of the median, with the median recalculated for the BHC, AHC and WHI measures of income respectively. A first observation is that the incidence of relative poverty is higher when measured using the AHC measure compared to using the standard BHC measure, such that households higher up in the BHC distribution are at risk of falling into relative poverty after factoring in housing costs (though of course, this risk is smaller for higher quintiles). For the WHI measure, we see that while some households higher up in the BHC distribution do also find themselves in relative poverty once housing income is accounted for, there is also a reduction in those in the bottom quintile falling into poverty. This is a result of some low-income households benefiting from the in-kind advantages of owner-occupation, as well as households who benefit from subsidised social rents.

Table 10. Percentage of households in each BHC quintile falling into BHC and AHC poverty 2015-16.

Quintiles of BHC income	In relative poverty		
	BHC	AHC	WHI
1	81.56	84.12	78.22
2	0.00	21.2	5.36
3	0.00	2.49	0.21
4	0.00	0.28	0.02
5	0.00	0.02	0.00
Total	16.63	22.04	16.79

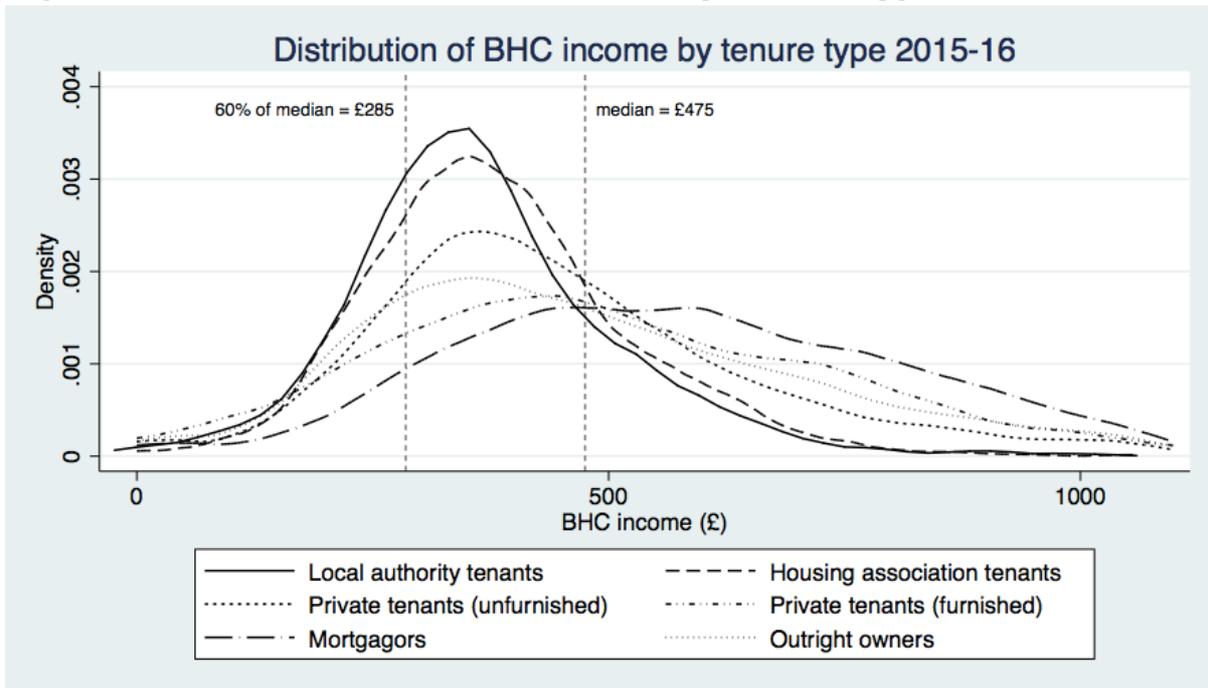
Source: Own calculations from FRS

Figure 4 to Figure 6 allow us to visually compare these differences in the distribution of households between the BHC measure and the AHC and WHI measures by tenure type. Mortgagors tend to have the highest BHC incomes on average (the distribution of mortgagors is to the right-hand side of all other tenure type distributions). Figure 4 shows that private tenants (unfurnished)² are better off BHC, on average, than outright owners, but less well-off than mortgagors. While we might expect outright homeowners to be better off than tenants, inspection of the two groups shows that over 55 per cent of outright owners are pensioners, and therefore receive relatively low pension incomes. The two groups of social tenants are least well-off, as would be expected.

Figure 5 shows the substantial worsening of the relative AHC positions of private tenants in comparison to their BHC positions, shown by the leftward shift of the private tenants (unfurnished) distribution relative to the other tenure distributions. This is accompanied by an improvement in the relative position of outright homeowners, shown by the rightward shift of their respective distribution relative to the other tenure distributions. Figure 6 shows the relative improvements, and therefore rightward shifts, of households in the distribution for outright owners and the two social tenant groups, resulting from the addition of imputed rents and economic subsidies to BHC incomes respectively. In both figures, we observe the worsening of the situation of private tenants in relation to the other tenancy types.

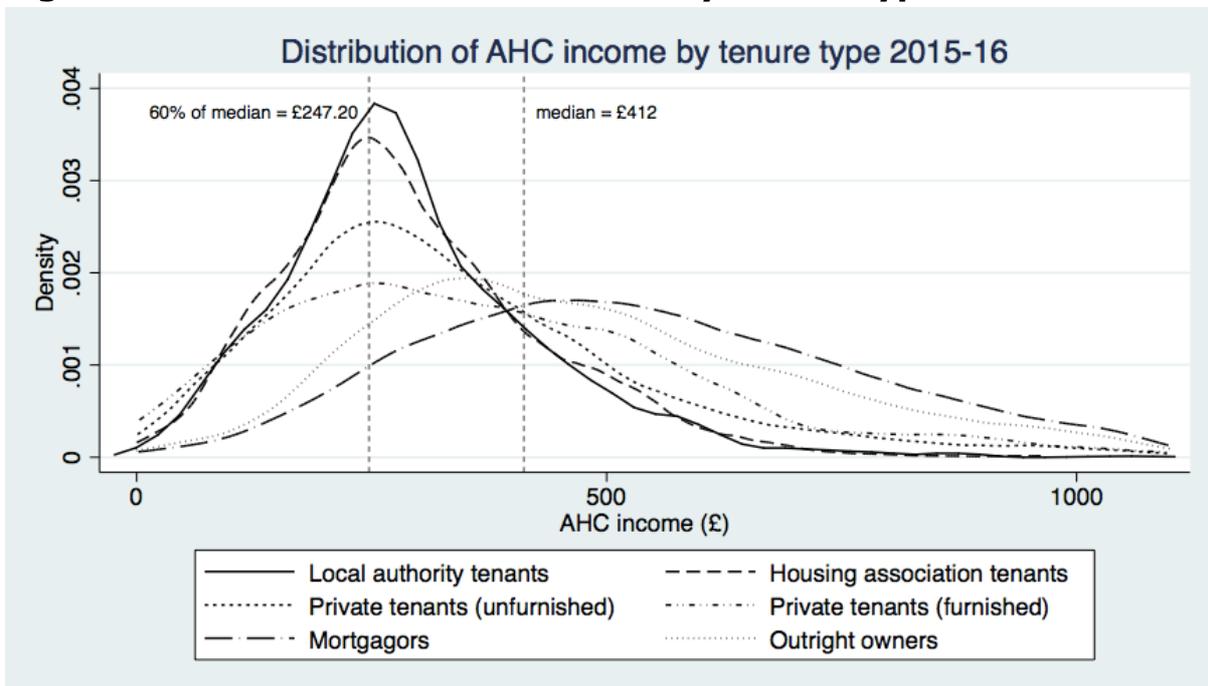
² The proportion of private tenants who rent their accommodation already furnished is very small, and so we focus our discussion on the distribution of private tenants in unfurnished accommodation.

Figure 4. Distribution of BHC income by tenure type 2015-16.



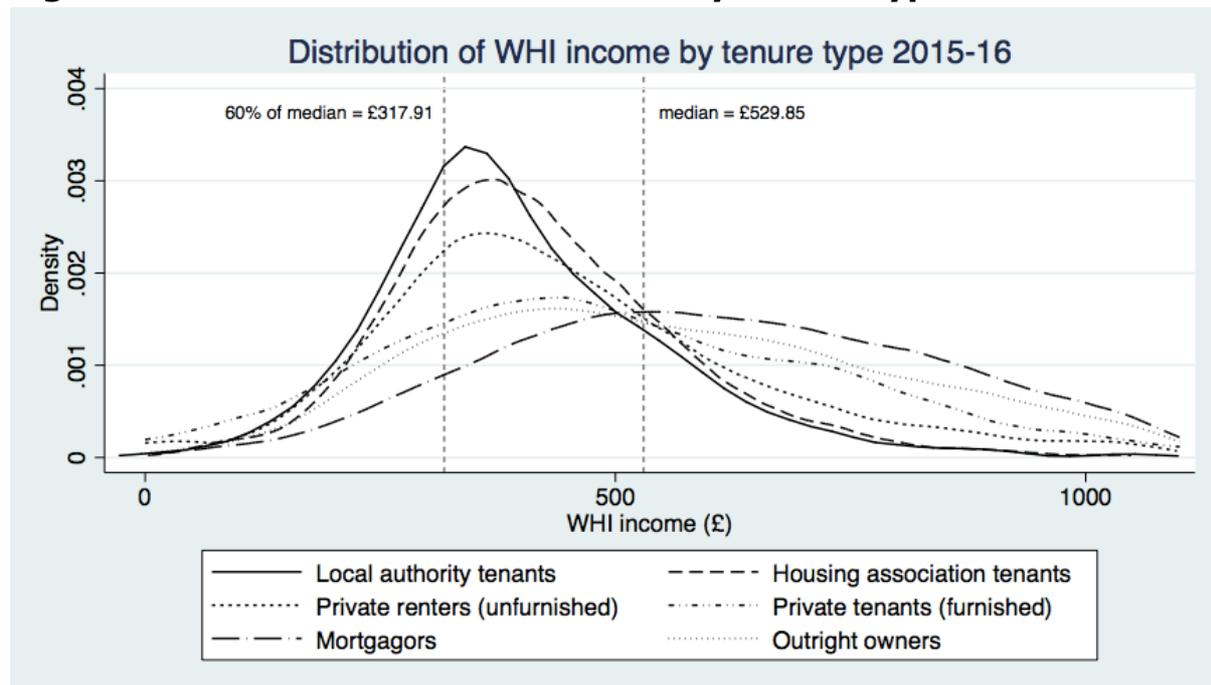
Source: Own calculations from FRS

Figure 5. Distribution of AHC income by tenure type 2015-16.



Source: Own calculations from FRS

Figure 6. Distribution of WHI income by tenure type 2015-16.



Source: Own calculations from FRS

Table 11 shows the net effect on the income distribution in 2015-16 of adjusting for housing in the two different ways, by BHC income quintile. While the AHC measure shifts the entire distribution of income to the left, WHI shifts it to the right. This “translation” effect can therefore affect inequality according to inequality measures that are not translation invariant, that is, measures that do not produce the same evaluation of inequality when the same amount is *added or subtracted* to all incomes. (The Gini and decile ratios are scale invariant, producing the same evaluation of inequality when all incomes are *multiplied* by the same amount, but are not translation invariant.) Distributions at lower income levels will produce higher degrees of inequality compared to distributions with the same shape but shifted to higher income levels.

Table 11. Effects of adjusting for housing.

Quintile	BHC	AHC		WHI	
1	£223.66	£150.46	- £72.20	£267.02	+£43.36
2	£363.35	£294.82	- £68.53	£404.64	+£41.29
3	£482.38	£414.52	- £67.86	£531.12	+£48.74
4	£643.23	£572.33	- £70.90	£703.46	+£60.13
5	£1284.43	£1188.36	- £96.07	£1360.19	+£75.76

Source: Own calculations from FRS

4.3 Inequality between second homeowner landlords and private tenants

As Table 12 shows, tenure patterns have evolved over the 10 year period from 2006-2016. Though the relative position of homeowners has improved, however, there has been a well-documented decline in the proportion of new homeowners with mortgages, coinciding with a marked increase in the size of the private rented sector. This is due to would-be first-time buyers entering, or remaining in, the private rented sector instead of purchasing property.

Table 12. Housing tenure (%) from 2006-2016.

Year	Social rented (%)	Private rented (%)	Mortgagors (%)	Outright owners (%)
2006-7	17	11	45	26
2011-12	16	16	40	27
2015-16	17	19	36	28

Source: Own calculations from FRS

At the same time, second homeownership has increased (Gardiner, 2017), though the FRS-HBAI data show that only 3-4 per cent of households let out second properties as a means of generating rental income (note that these figures include only reported rental income from second homes, and therefore cannot capture business income for households who set up property rental businesses). Table 13 shows that most of these second home landlords are existing homeowners, with the majority of these having mortgages. These households have therefore been able to use the

additional rental income from second homeownership to offset the cost of mortgage repayments and boost their relative positions in the income distribution, as well as to acquire an additional asset.

Table 13. Second home landlords by tenure type (%) from 2006-2016.

Year	Social rented (%)	Private rented (%)	Mortgagors (%)	Outright owners (%)	Percentage of population
2006-7	0.5	9	49	39	3
2011-12	0.4	15	45	37	3
2015-16	0.3	12	48	38	4

Source: Own calculations from FRS

Focusing on the private tenant group, whose relative positions in the income distribution decline most upon accounting for housing, what is the composition of the least well-off among this group? Table 14 presents a breakdown by family type of private tenants falling below 60 per cent of median income according to our alternative income measures in 2015-16. It shows that families with children (couples and lone parents) comprise over 65 per cent of this group. Accounting for housing costs using the AHC or WHI measure, lone parents are disproportionately worse-off compared to the other family types.

Note that Table 14 presents only private tenants, and therefore the incidence for pensioners is very low since most pensioners are outright homeowners. The high proportion of pensioners in the outright owners group is the reason for the higher incidence of low income for outright owners compared to mortgagors in Table 6 to Table 8, for example.

Table 14. Private tenants in relative poverty according to each income measure, broken down by family type 2015-16.

Family type	Private tenants		
	In BHC poverty (%)	In AHC poverty (%)	In WHI poverty (%)
Pensioner couple	1.77	2.53	1.57
Male pensioner	0.21	0.59	0.23
Female pensioner	1.21	1.40	1.03
Couple with children	47.71	46.26	49.63
Couple no children	12.19	11.20	11.74
Lone parent	17.62	21.43	19.08
Single male	11.83	10.02	10.21
Single female	7.45	6.57	6.50

Source: Own calculations from FRS

To compare the value of housing services obtained by private tenants with those of other tenant groups, Table 15 presents the observed gross rents of private tenants along with the imputed rents of social tenants, mortgagors and outright owners by BHC income quintile. These are calculated from the hedonic model previously discussed. The predicted private tenant rents are also included in the table, showing that our imputed estimates are indeed comparable with the observed data.

We see that as would be expected, average predicted market gross rents of social tenants are lower than private market rents at each quintile. The imputed rents of mortgagors and outright owners tend to be higher than observed private rents, except for outright owners in the top quintiles. Gross of mortgage interest payments, home-owners therefore appear to obtain more value from in-kind housing services than private tenants at each BHC income quintile. This is because the value of the benefit that homeowners obtain from in-kind housing services is higher, on average, than the value of the housing-services that private tenants obtain through rent payments.

Table 15. Predicted gross rents by BHC income quintile 2015-16.

BHC quintile	Private tenant observed gross rents	Social tenant predicted market gross rents	Private tenant predicted gross rents	Mortgagor imputed gross rents	Outright owner imputed gross rents
1	£150.32	£138.77	£154.97	£161.71	£177.29
2	£150.92	£145.26	£160.32	£183.47	£160.00
3	£160.05	£153.17	£164.67	£204.26	£172.16
4	£188.49	£147.63	£182.98	£269.80	£183.45
5	£250.84	£159.69	£241.38	£304.60	£240.34

Source: Own calculations from FRS

The benefits from in-kind housing services are not only distributed unequally across tenure types and income quintiles, but also geographically. Table 16 presents the imputed net rents of owner-occupiers by region, and as a proportion of BHC income. The “London effect” can be clearly seen, showing that homeowners in London benefit disproportionately from the value of in-kind housing services, and well as from actual rental income for second homeowner landlords. By the same token, this means that private tenants in London are disproportionately worse-off relative to homeowners in comparison to in other regions of the UK.

Table 16. BHC and WHI income by region 2015-16.

Region	BHC income	Imputed rent	Proportion
North East	£487.55	£118.30	0.24
North West	£509.93	£122.94	0.24
Yorks and The Humber	£500.09	£119.93	0.24
East Midlands	£519.52	£113.74	0.22
West Midlands	£509.36	£131.01	0.26
East of England	£631.34	£166.98	0.26
London	£658.86	£315.23	0.48
South East	£647.31	£167.01	0.26
South West	£556.27	£144.28	0.26
Wales	£479.75	£108.47	0.23
Scotland	£540.97	£123.99	0.23
Northern Ireland	£466.85	£87.39	0.19

Source: Own calculations from FRS

In addition to this inequality in the value of housing services, the outgoing rents paid by a portion of private tenants for these housing services are directly transferred as rental income to second homeowners who let out their second homes. As Table 13 shows, the vast majority of these second homeowners also own their primary accommodation (as opposed to second homeowners who rent their primary accommodation), thereby contributing to the inequality between private tenants and homeowners. These transfers of rent are captured in BHC (as well as AHC and WHI) income figures, and are therefore already incorporated into the inequality figures in Table 3 to Table 5. Counterfactual inequality in absence of these rent transfers is examined in the next section of the paper.

To investigate which parts of the income distribution these private rent transfers originate from and are transferred to, Table 17 presents the mean gross rental income of second homeowners who let out their property, broken down by BHC income quintile. Comparing these figures to the observed gross private rents in the first column of Table 15, we see that the mean private rent for even the lowest BHC quintile, £150.32, is higher than the mean rental income received by second homeowners in the highest BHC quintile, £126.50. Although we must acknowledge that the data captures rental income only very imperfectly, the indication of this is that the rents directly transferred from private tenants to second homeowners (and not recorded as other business income from households who set up property rental companies) primarily go to second homeowners at the very top of the income distribution.

Further breaking down rental incomes within the top income quintile, Table 17 also presents mean rental income of second homeowners in the 9th and 10th decile, and in the top 5% and 2% of BHC income. It appears that only in the top decile does mean second homeowner rental income, £151.14, match the mean rents paid by private tenants in the bottom quintile. Taking instead median rental income instead of the mean, the corresponding income group of second homeowners is the top 2% of households. This reinforces the observed pattern of rents that are paid out from private tenant households, who are made relatively worse off, and that are transferred upwards in the income distribution to second home-owning households concentrated at the very top of the income distribution.

Table 17. Mean and median gross rental income for second homeowners, by income group.

	Second homeowners		
BHC Quintile	Mean rental income	Median income	rental
1	£84.68	£34.43	
2	£62.35	£57.38	
3	£76.91	£32.97	
4	£86.52	£47.81	
5	£126.50	£68.85	
BHC Decile	Mean rental income	Median income	rental
9	£79.48	£47.81	
10	£151.14	£86.85	
BHC Percentile	Mean rental income	Median income	rental
Top 5%	£183.32	£114.75	
Top 2%	£263.35	£206.56	

Source: Own calculations from FRS

Table 18 profiles the characteristics of second homeowners and the value of their properties, including both those who let out these properties and those who do not. Unlike the rest of the analysis, which uses FRS data, this data is taken from the Wealth and Assets Survey (WAS). We see that while second homeowners in the lowest income quintile are comprised mainly of households headed by older, non-employed females, who are likely to be single-householder retirees, in the higher income quintiles these characteristics gradually shift in profile to households headed by younger employed males.

Table 18. Household head characteristics of second homeowners.

BHC Quintile	Aged 55 and over (%)	Female (%)	Employed (%)	Value of property (£)
1	71.31	53.00	31.67	£196,890
2	58.90	48.00	59.68	£218,764
3	59.57	40.61	60.51	£201,131
4	48.87	34.25	71.30	£200,407
5	41.33	24.98	83.17	£379,254

Source: Own calculations from WAS Wave 5 (2014-16)

4.4 Counterfactual distributions without second homeowner rental income transfers

To quantify how much the flows of rent from private tenants to second homeowners contribute to overall income inequality, we recalculate levels of inequality in counterfactual scenarios where the rental income received by second homeowners is reallocated back to private renting households. In generating each counterfactual, a subset of private tenant households must be selected to whom the rents are reallocated. This is because we cannot observe which households the transfers of rent are actually made between – indeed many of these households may not appear in the dataset – and the total rental income to be reallocated comprises just a small fraction of total private tenant rents. By carefully selecting subsets, however, upper and lower bounds can be estimated for the effect on inequality and poverty of removing these rent transfers.

The assumptions underlying the selection of private tenant subsets for each counterfactual scenario are as follows:

Scenario 1: Assume that second homeowner rental income is reallocated to private tenants with the lowest rents, ordered by level of rent. This generates an upper bound for the number of private tenant households to whom rents are reallocated.

Scenario 2: Assume that second homeowner rental income is reallocated to private tenants with the highest rents, ordered by level of rent. This generates a lower bound for the number of private tenant households to whom rents are reallocated.

Scenario 3: Assume that second homeowner rental income is reallocated to private tenants with the lowest BHC incomes. This generates an upper bound estimate of the degree to which overall income inequality is reduced as a result of the rent reallocations.

Scenario 4: Assume that second homeowner rental income is reallocated to private tenants with the highest BHC incomes. This generates a lower bound estimate of the degree to which overall income inequality is reduced as a result of the rent reallocations.

We could arrive at scenarios 1 and 3 if, for example, the ownership of second homes was transferred from current second homeowners to the lowest rent-paying or poorest private tenant households respectively. Similarly, we could arrive at scenarios 2 and 4 if the ownership of second homes was transferred from current second homeowners to the highest rent-paying or most well-off private tenant households.

Counterfactual AHC income inequality under each of the four scenarios is presented in Table 19, along with actual AHC inequality as a point of comparison. Since the BHC and WHI measures do not capture changes in the outgoing rents of private tenants, these are therefore not included in the counterfactual inequality recalculations.

Under all counterfactual scenarios, the degree of inequality is reduced in comparison to actual AHC inequality, as would be expected. The Gini coefficient falls from 0.39 for AHC income inequality to 0.36 in each of the counterfactual scenarios. While the P90/P50 and P50/P10 ratios also fall in comparison to their AHC values, there are variations between scenarios that result from their greater sensitivity to the choice of assumptions made under each scenario (see scenario assumptions above). Under scenario 2, the inequality-reducing effect on the P90/P50 and P50/P10 ratios of reallocating to the highest rent payers is smaller than under scenario 1, since relatively few private tenants are affected by this arrangement due to the fixed value of second homeowner rental income to be reallocated. Under scenario 1, reallocating to the lowest rent payers means that the total value of reallocated second homeowner rental income is shared among many more private tenant households. Since private tenant households with the lowest rents will also tend to be the poorer households, this counterfactual reallocation has a greater inequality-reducing effect in comparison to the actual AHC distribution.

The greatest inequality-reducing effect on the P90/P50 ratio occurs under scenario 1, from 2.13 to 2.08, while the greatest inequality-reducing effect on the P50/P10 ratio occurs under scenario 3, from 2.30 to 2.15, in which second homeowner rental income is reallocated to the lowest-income private tenant households. To interpret this, note that under scenario 3, the counterfactual is constructed such that the reduction in inequality is generated by transfers to the poorest households, so that this effect is concentrated in the bottom half of the income distribution. The P50/P10 ratio captures this effect. On the other hand, under scenario 1, the private tenant households with the lowest rents do not necessarily coincide with those with the lowest incomes, and so transfers may be received by private tenant households dispersed more widely up and down the income distribution. Therefore, the inequality-reducing effect generated by transfers *to* private tenant households combined with the effect generated by transfers *from* higher-income second homeowners appears to have a greater effect on the upper half of the income distribution in comparison to scenario 3.

As noted in the scenario assumptions, scenarios 2 and 4 provide lower bounds on the estimated inequality-reducing effect. Table 19 confirms that the P90/P50 and P50/P10 ratios do indeed fall by smaller degrees in comparison to the other two scenarios, though inequality does still decrease.

Table 19. Counterfactual AHC scenarios with second homeowner rental income reallocated to private tenants with the lowest rents in 2015-16.

Measure	Gini	P90/P50	P50/P10
AHC	0.39	2.13	2.30
Scenario 1	0.36	2.08	2.23
Scenario 2	0.36	2.11	2.26
Scenario 3	0.36	2.10	2.15
Scenario 4	0.36	2.11	2.26

Source: Own calculations from FRS

The explicit effect of the counterfactual rent reallocations on relative poverty is presented in Table 20. In line with the results from the counterfactual inequality figures, the poverty figures show that scenario 3 evidently provides the sharpest reduction in poverty compared to the AHC relative poverty rate.

Table 20. Relative poverty rates under the counterfactual scenarios 2015-16.

	AHC	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Relative poverty rate	22.04%	21.04%	20.99%	19.83%	20.99%

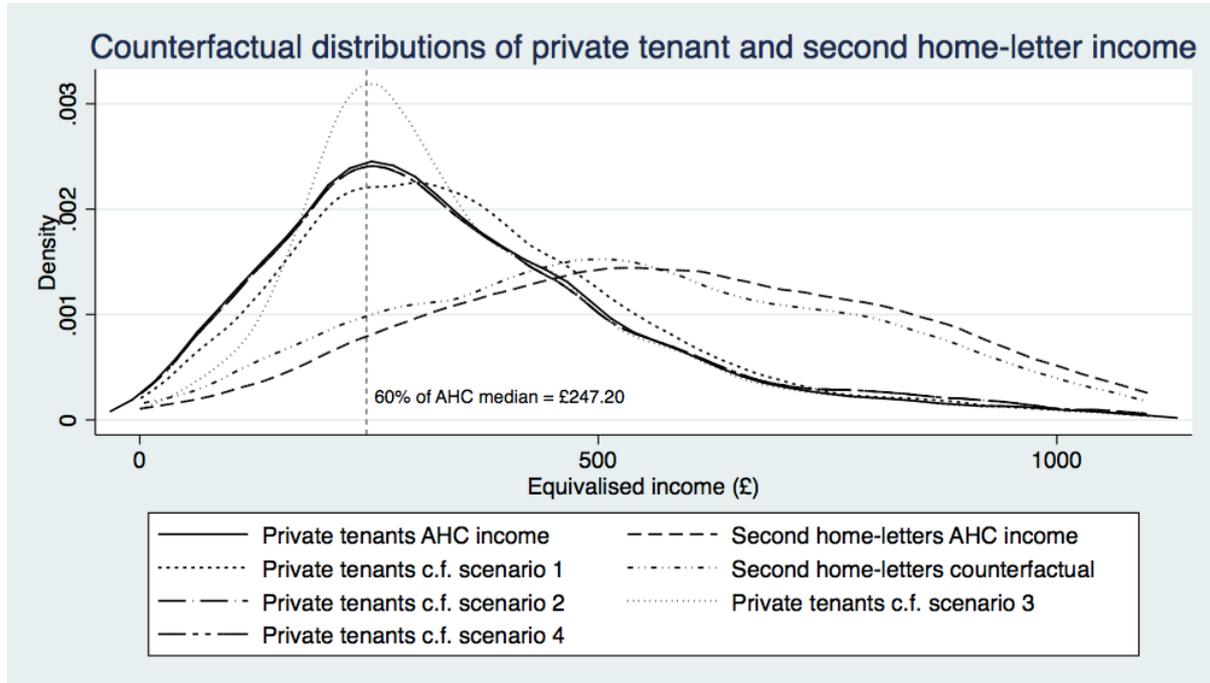
Source: Own calculations from FRS

Finally, Figure 7 illustrates graphically the changes to the AHC income distribution of private tenants and second homeowners who let out their homes, as a result of the rent reallocations under the four counterfactual scenario assumptions. We can clearly see the contraction of the bottom tail of the private tenant income distribution up towards the relative poverty line³ under scenario 3, which generates the reductions in inequality and poverty observed in the previous set of results. The inequality-reducing downward shift of second home landlords can also clearly be seen, although

³ The position of the relative poverty line does not change much under each of the counterfactual scenarios, since it is calculated across all tenancy types, most of which do not change under the counterfactuals. Therefore, only the AHC poverty line is shown in the figure.

the incomes of these households remain distributed around much higher incomes than those of the private tenant group.

Figure 7. Private tenant and second home landlord income distributions under counterfactual scenarios in 2015-16.



Source: Own calculations from FRS

5 Summary

In this paper we have examined how inequality from the interaction of income and housing circumstances changes the relative position of households in the income distribution, and influences the incidence and socio-demographic profile of those in housing-induced poverty. We used three measures of income – the standard Before Housing Costs (BHC) measure, and the After Housing Costs (AHC) and With Housing Income (WHI) measures which adjust for housing in two different ways – to analyse the net effect of housing costs and advantages on poverty and inequality, and the underlying distributional changes linking the two.

We find that inequality as measured by the Gini coefficient has not changed substantially in the period from 2006 to 2016, although this masks some changes in dispersion between the median and the top and bottom deciles of the income distribution. Inequality according to the AHC measure is consistently higher compared to the BHC measure, in part due to the fact that the housing cost deductions in the AHC income measure are larger *relative to BHC income* for those with lower BHC incomes, and in part due to the translation effect of all incomes shifting to lower absolute levels compared to the BHC baseline. The higher AHC inequality relative to BHC inequality is driven by the worsening positions of tenants near the bottom of the income distribution. Inequality according to the WHI measure is much more similar to BHC inequality; however, this hides substantial re-ranking of households within the distribution, such that private tenants are at greater risk of relative poverty. The smaller difference in WHI inequality relative to BHC inequality is due to the improved positions of social tenants lower down the income distribution accompanied by improved positions homeowners higher up the distribution, so that the overall income distribution does not become more or less dispersed.

The incidence of relative poverty fell between 2006-7 and 2011-12 as income dispersion contracted in the aftermath of the financial crisis, and then rose again from 2011-12 to 2015-16 during the recovery. Relative poverty is higher when measured using the AHC measure compared to using the standard BHC measure, such that households higher up in the BHC distribution are at risk of falling into relative poverty after factoring in housing costs. For the WHI measure, we see that while some households higher up in the BHC distribution do also find themselves in relative WHI poverty once housing income is accounted for, there is also a reduction in those in the bottom BHC quintile falling into WHI poverty.

Focusing on private tenants, whose positions in the income distribution deteriorate most relative to other tenure types according to both housing-adjusted measures, BHC and WHI, we find that families with children (couples and lone parents) comprise over 65 per cent of this group. Accounting for housing costs and advantages using the AHC or WHI measure, lone parents are disproportionately worse-off relative to the BHC baseline compared to the other family types.

Decomposing housing inequalities by region, the “London effect” is evident, with homeowners in London benefiting disproportionately from the value of in-kind housing advantages, and private tenants in London disproportionately worse-off relative to homeowners in comparison to private tenants in other regions of the UK. This not only widens the income disparity between homeowners and private tenants, but in particular between private tenants and second home-owning landlords, who receive additional rental income from private tenants and also acquire an additional asset.

The analysis of counterfactual scenarios, removing this second homeowner rental income and reallocating it back to subsets of private tenants, shows that this has varying but universally inequality-reducing effects on AHC income inequality. The greatest poverty-reducing effect comes from reallocating second homeowner rental income to private tenant households with the lowest BHC incomes, which could hypothetically be arrived at by transferring the ownership of second homes of current second homeowners to the poorest private tenant households.

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Appendix: Hedonic regression results

5.1.1 London, A level or lower educated 2015-16

N = 138

		Robust		
Log of rent	Coef.	Std. Err.	t	P>t
REGION				
London	0	(omitted)		
REGION#COUNCIL TAX				
London#GB: Band B	-0.441	0.311	-1.420	0.160
London#GB: Band C	-0.227	0.295	-0.770	0.445
London#GB: Band D	-0.196	0.310	-0.630	0.528
London#GB: Band E	-0.328	0.365	-0.900	0.371
London#GB: Band F	0.034	0.360	0.090	0.926
London#GB: Band G	0.595	0.358	1.660	0.099
London#GB: Band H	-0.227	0.348	-0.650	0.515
ACCOMMODATION TYPE				
Whole house/bungalow, semi-detached	0.113	0.307	0.370	0.715
Whole house/bungalow, terraced	0.176	0.304	0.580	0.564
Purpose-built flat or maisonette	0.273	0.324	0.840	0.401
Converted house/building	0.291	0.333	0.880	0.383
Other	-0.157	0.496	-0.320	0.752
ROOMS	0.179	0.052	3.460	0.001
FURNISHED STATUS				
Partially Furnished	-0.118	0.082	-1.450	0.151
Unfurnished	-0.201	0.090	-2.240	0.027
Constant	4.856	0.498	9.740	0.000

5.1.2 London, degree level or higher educated 2015-16

N=185

		Robust		

Log of rent	Coef.	Std. Err.	t	P>t
REGION				
London	0	(omitted)		
REGION#COUNCIL TAX				
London#GB: Band B	0.201	0.184	1.090	0.278
London#GB: Band C	0.328	0.184	1.780	0.077
London#GB: Band D	0.321	0.187	1.720	0.088
London#GB: Band E	0.480	0.212	2.260	0.025
London#GB: Band F	0.552	0.304	1.810	0.071
London#GB: Band G	0.984	0.355	2.770	0.006
London#GB: Band H	0.743	0.483	1.540	0.126
ACCOMMODATION TYPE				
Whole house/bungalow, semi-detached	0.684	0.456	1.500	0.136
Whole house/bungalow, terraced	0.361	0.467	0.770	0.441
Purpose-built flat or maisonette	0.261	0.480	0.540	0.587
Converted house/building	0.380	0.484	0.780	0.434
Other	-0.410	0.539	-0.760	0.448
ROOMS	0.060	0.042	1.420	0.159
FURNISHED STATUS				
Partially Furnished	-0.029	0.063	-0.460	0.649
Unfurnished	-0.102	0.093	-1.100	0.274
Constant	4.786	0.531	9.020	0.000

5.1.3 Non-London, A level or lower

N = 1480

Log of rent	Coef.	Robust Std. Err.	t	P>t
REGION				
North West	0.070	0.052	1.360	0.174
Yorks and the Humber	0.019	0.064	0.300	0.763

East Midlands	0.063	0.051	1.240	0.214
West Midlands	0.132	0.056	2.350	0.019
East of England	0.316	0.058	5.440	0.000
South East	0.460	0.072	6.370	0.000
South West	0.058	0.100	0.580	0.561
Wales	-0.063	0.062	-1.010	0.313
Scotland	-0.087	0.070	-1.240	0.214
Northern Ireland	0.670	0.061	10.890	0.000
REGION#COUNCIL TAX				
North East#GB: Band B	0.610	0.191	3.200	0.001
North East#GB: Band C	0.675	0.246	2.740	0.006
North East#GB: Band D	0.130	0.043	3.030	0.002
North East#GB: Band E	0.983	0.262	3.760	0.000
North East#GB: Band F	0.000	(empty)		
North East#GB: Band G	0.000	(empty)		
North East#GB: Band H	0.000	(empty)		
North West#GB: Band B	0.190	0.072	2.650	0.008
North West#GB: Band C	0.319	0.096	3.320	0.001
North West#GB: Band D	0.252	0.153	1.650	0.100
North West#GB: Band E	0.236	0.483	0.490	0.625
North West#GB: Band F	1.343	0.129	10.430	0.000
North West#GB: Band G	0.000	(empty)		
North West#GB: Band H	0.367	0.060	6.110	0.000
Yorks and the Humber#GB: Band B	0.066	0.088	0.750	0.451
Yorks and the Humber#GB: Band C	0.220	0.112	1.970	0.050
Yorks and the Humber#GB: Band D	0.277	0.110	2.510	0.012
Yorks and the Humber#GB: Band E	0.738	0.107	6.900	0.000
Yorks and the Humber#GB: Band F	0.718	0.061	11.830	0.000
Yorks and the Humber#GB: Band G	0.354	0.098	3.620	0.000
Yorks and the Humber#GB: Band H	0.494	0.544	0.910	0.364
East Midlands#GB: Band B	0.181	0.059	3.090	0.002
East Midlands#GB: Band C	0.390	0.067	5.830	0.000

East Midlands#GB: Band D	0.159	0.077	2.060	0.040
East Midlands#GB: Band E	0.442	0.158	2.800	0.005
East Midlands#GB: Band F	0.000	(empty)		
East Midlands#GB: Band G	0.000	(empty)		
East Midlands#GB: Band H	-0.913	0.034	-26.640	0.000
West Midlands#GB: Band B	0.096	0.058	1.660	0.098
West Midlands#GB: Band C	0.261	0.074	3.530	0.000
West Midlands#GB: Band D	0.312	0.102	3.060	0.002
West Midlands#GB: Band E	0.741	0.170	4.370	0.000
West Midlands#GB: Band F	0.909	0.061	15.010	0.000
West Midlands#GB: Band G	0.399	0.091	4.380	0.000
West Midlands#GB: Band H	0.107	0.169	0.640	0.525
East of England#GB: Band B	0.095	0.056	1.700	0.090
East of England#GB: Band C	0.129	0.113	1.140	0.256
East of England#GB: Band D	0.331	0.113	2.920	0.004
East of England#GB: Band E	0.745	0.109	6.850	0.000
East of England#GB: Band F	0.794	0.132	6.020	0.000
East of England#GB: Band G	0.000	(empty)		
East of England#GB: Band H	-0.865	0.323	-2.680	0.007
South East#GB: Band B	0.075	0.071	1.060	0.290
South East#GB: Band C	0.106	0.068	1.560	0.118
South East#GB: Band D	0.027	0.153	0.170	0.862
South East#GB: Band E	-0.027	0.196	-0.140	0.891
South East#GB: Band F	0.911	0.087	10.460	0.000
South East#GB: Band G	-0.759	0.092	-8.260	0.000
South East#GB: Band H	-0.451	0.293	-1.540	0.124
South West#GB: Band B	0.254	0.105	2.410	0.016
South West#GB: Band C	0.445	0.116	3.830	0.000
South West#GB: Band D	0.210	0.188	1.120	0.264
South West#GB: Band E	0.172	0.390	0.440	0.659
South West#GB: Band F	1.477	0.119	12.360	0.000
South West#GB: Band G	0.000	(empty)		
South West#GB: Band H	-0.041	0.256	-0.160	0.872
Wales#GB: Band B	-0.029	0.126	-0.230	0.816
Wales#GB: Band C	0.202	0.063	3.210	0.001
Wales#GB: Band D	0.280	0.101	2.780	0.005
Wales#GB: Band E	0.257	0.106	2.430	0.015
Wales#GB: Band F	0.766	0.083	9.210	0.000
Wales#GB: Band G	0.816	0.165	4.940	0.000
Wales#GB: Band H	0.084	0.051	1.630	0.104

Scotland#GB: Band B	0.083	0.082	1.010	0.313
Scotland#GB: Band C	0.146	0.112	1.300	0.195
Scotland#GB: Band D	0.367	0.138	2.660	0.008
Scotland#GB: Band E	0.496	0.133	3.740	0.000
Scotland#GB: Band F	1.206	0.185	6.520	0.000
Scotland#GB: Band G	0.000	(empty)		
Scotland#GB: Band H	-0.010	0.197	-0.050	0.960
Northern Ireland#NI: Band 1	-0.768	0.055	-13.950	0.000
Northern Ireland#NI: Band 2	-0.726	0.050	-14.410	0.000
Northern Ireland#NI: Band 3	-0.683	0.065	-10.580	0.000
Northern Ireland#NI: Band 4	-0.713	0.080	-8.960	0.000
Northern Ireland#NI: Band 5	-0.448	0.072	-6.240	0.000
Northern Ireland#NI: Band 6	-0.306	0.236	-1.300	0.195
Northern Ireland#NI: Band 7	0.000	(omitted)		
ACCOMMODATION TYPE				
Whole house/bungalow, semi-detached	0.149	0.068	2.190	0.029
Whole house/bungalow, terraced	0.175	0.071	2.450	0.014
Purpose-built flat or maisonette	0.256	0.079	3.240	0.001
Converted house/building	0.163	0.085	1.910	0.057
Caravan/Mobile home or Houseboat	-0.136	0.153	-0.890	0.376
Other	0.474	0.163	2.910	0.004
ROOMS	0.060	0.012	5.160	0.000
FURNISHED STATUS				
Partially Furnished	-0.137	0.047	-2.930	0.003
Unfurnished	-0.133	0.043	-3.110	0.002
Constant	4.245	0.111	38.180	0.000

5.1.4 Non-London, degree level or higher educated

N=845

		Robust		
Log of rent	Coef.	Std. Err.	t	P>t

REGION				
North West	0.045	0.105	0.430	0.667
Yorks and the Humber	0.092	0.096	0.950	0.340
East Midlands	0.018	0.104	0.180	0.860
West Midlands	0.257	0.104	2.460	0.014
East of England	0.315	0.108	2.910	0.004
South East	0.366	0.107	3.420	0.001
South West	0.287	0.101	2.850	0.005
Wales	-0.056	0.112	-0.500	0.616
Scotland	-0.065	0.121	-0.540	0.592
Northern Ireland	0.431	0.086	5.010	0.000
REGION#COUNCIL TAX				
North East#GB: Band B	0.092	0.160	0.580	0.565
North East#GB: Band C	0.078	0.180	0.440	0.663
North East#GB: Band D	0.076	0.097	0.790	0.432
North East#GB: Band E	0.523	0.108	4.860	0.000
North East#GB: Band F	0.000	(empty)		
North East#GB: Band G	0.000	(empty)		
North East#GB: Band H	0.000	(empty)		
North West#GB: Band B	0.196	0.076	2.580	0.010
North West#GB: Band C	0.384	0.098	3.900	0.000
North West#GB: Band D	-0.011	0.077	-0.140	0.885
North West#GB: Band E	1.140	0.112	10.180	0.000
North West#GB: Band F	0.000	(empty)		
North West#GB: Band G	0.000	(empty)		
North West#GB: Band H	-0.911	0.083	-10.950	0.000
Yorks and the Humber#GB: Band B	0.122	0.050	2.440	0.015
Yorks and the Humber#GB: Band C	0.314	0.091	3.430	0.001
Yorks and the Humber#GB: Band D	0.257	0.068	3.780	0.000
Yorks and the Humber#GB: Band E	0.660	0.244	2.710	0.007
Yorks and the Humber#GB: Band F	0.477	0.319	1.500	0.135
Yorks and the Humber#GB: Band G	0.000	(empty)		

Yorks and the Humber#GB: Band H	-0.126	0.529	-0.240	0.812
East Midlands#GB: Band B	0.108	0.085	1.280	0.202
East Midlands#GB: Band C	0.081	0.153	0.530	0.595
East Midlands#GB: Band D	-0.173	0.714	-0.240	0.808
East Midlands#GB: Band E	0.000	(empty)		
East Midlands#GB: Band F	0.937	0.244	3.850	0.000
East Midlands#GB: Band G	0.000	(empty)		
East Midlands#GB: Band H	0.246	0.101	2.420	0.016
West Midlands#GB: Band B	-0.024	0.069	-0.350	0.729
West Midlands#GB: Band C	0.155	0.070	2.200	0.028
West Midlands#GB: Band D	0.318	0.092	3.450	0.001
West Midlands#GB: Band E	0.524	0.161	3.250	0.001
West Midlands#GB: Band F	-0.401	0.534	-0.750	0.453
West Midlands#GB: Band G	0.000	(empty)		
West Midlands#GB: Band H	0.008	0.155	0.050	0.961
East of England#GB: Band B	0.138	0.072	1.930	0.054
East of England#GB: Band C	0.229	0.093	2.470	0.014
East of England#GB: Band D	0.520	0.123	4.210	0.000
East of England#GB: Band E	-0.006	0.333	-0.020	0.986
East of England#GB: Band F	0.763	0.219	3.480	0.001
East of England#GB: Band G	0.864	0.083	10.440	0.000
East of England#GB: Band H	0.000	(empty)		
South East#GB: Band B	0.144	0.082	1.750	0.080
South East#GB: Band C	0.248	0.077	3.230	0.001
South East#GB: Band D	0.491	0.094	5.220	0.000
South East#GB: Band E	0.386	0.128	3.010	0.003
South East#GB: Band F	0.889	0.128	6.970	0.000
South East#GB: Band G	-0.270	0.714	-0.380	0.706
South East#GB: Band H	0.983	0.557	1.760	0.078
South West#GB: Band B	0.001	0.084	0.010	0.991
South West#GB: Band C	0.183	0.082	2.230	0.026
South West#GB: Band D	0.093	0.176	0.530	0.595
South West#GB: Band E	0.211	0.165	1.280	0.202
South West#GB: Band F	-0.033	0.310	-0.110	0.915
South West#GB: Band G	0.719	0.273	2.630	0.009
South West#GB: Band H	0.294	0.464	0.630	0.527
Wales#GB: Band B	0.036	0.103	0.350	0.728
Wales#GB: Band C	0.177	0.076	2.340	0.020
Wales#GB: Band D	0.071	0.126	0.560	0.573

Wales#GB: Band E	0.363	0.101	3.580	0.000
Wales#GB: Band F	0.646	0.100	6.440	0.000
Wales#GB: Band G	0.000	(empty)		
Wales#GB: Band H	0.000	(empty)		
Scotland#GB: Band B	0.175	0.105	1.680	0.094
Scotland#GB: Band C	0.222	0.102	2.180	0.030
Scotland#GB: Band D	0.206	0.180	1.140	0.253
Scotland#GB: Band E	0.399	0.175	2.280	0.023
Scotland#GB: Band F	0.012	0.577	0.020	0.983
Scotland#GB: Band G	1.178	0.184	6.390	0.000
Scotland#GB: Band H	0.023	0.224	0.100	0.918
Northern Ireland#NI: Band 1	-0.626	0.067	-9.280	0.000
Northern Ireland#NI: Band 2	-0.651	0.105	-6.190	0.000
Northern Ireland#NI: Band 3	-0.447	0.061	-7.350	0.000
Northern Ireland#NI: Band 4	-0.284	0.070	-4.040	0.000
Northern Ireland#NI: Band 5	-0.174	0.114	-1.530	0.125
Northern Ireland#NI: Band 6	0.000	(omitted)		
ACCOMMODATION TYPE				
Whole house/bungalow, semi-detached	-0.057	0.057	-1.000	0.320
Whole house/bungalow, terraced	0.021	0.053	0.390	0.697
Purpose-built flat or maisonette	0.108	0.055	1.960	0.051
Converted house/building	0.071	0.066	1.070	0.284
Caravan/Mobile home or Houseboat	-0.568	0.075	-7.560	0.000
Other	-0.320	0.528	-0.610	0.545
ROOMS	0.065	0.015	4.290	0.000
FURNISHED STATUS				
Partially Furnished	0.000	0.042	-0.010	0.994
Unfurnished	0.000	0.040	0.010	0.994
Constant	4.269	0.135	31.550	0.000