

Tenure and spending within UK households at the end of the recent recession

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**TENURE AND SPENDING WITHIN UK HOUSEHOLDS AT THE END OF THE
RECENT RECESSION**

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TENURE AND SPENDING WITHIN UK HOUSEHOLDS AT THE END OF THE RECENT RECESSION

Abstract

Housing costs form a substantial share of aggregate demand in the UK. This study examines the distribution of total expenditure-to-income by homeownership status at the end of the recent recession in 2010. Multivariate quantile regressions uncover *four* important points. *First*, owner-occupiers in England have considerably higher mean spending ratios than their peers in other parts of the UK; an indication of their wealthier status. *Second*, the average spending ratio for residential-occupiers in all UK regions, with the exception of Northern Ireland, is significantly higher than the mean ratio for tenants in both private and public properties. In this last region, the spending rate for private tenants is more prominent. *Third*, the disparity in the expenditure ratio between owner-occupiers and tenants is significantly more pronounced in England. *Fourth*, renters in public housing in Scotland and Wales have much higher spending ratios than their counterparts in private properties, reflecting a greater overall social security provided by the devolved government there. Policy implications allied with heterogeneity in the consumption effect of housing wealth across the different homeownership cohorts is discussed.

Key words: Household consumption, housing tenure, economic recession, quantile regression

JEL classification: O18; O50; C21

INTRODUCTION

There is a general perception that a corollary of the financial crises of 2007-2009, and the subsequent economic recession, was a considerable fall in asset value, in particular houses in the UK. For example, the Nationwide House Price Index (2011) lost around eight percent of its value between the first quarter of 2007 and the last quarter of 2009, leading to a negative equity for many home owners. Basic economic theory suggests such shocks on asset prices are likely to lead to a cut in consumer spending in favour of precautionary savings, especially if households expect the recent turmoil that has been experienced in the global economy to persist for the foreseeable future (Berry and Williams, 2009; Crossley and O’Dea, 2010).

This observation has prompted much discussion in the contemporary literature and provided the justification for the substantial stimulus delivered by the Bank of England’s expansionary monetary policy and quantitative easing (Scholz *et al.* 2006; Khoman and Weale, 2008). In addition, Crossley *et al* (2012) noted that a number of economic recovery initiatives by the UK Government over the years have centred on how to help people buy and occupy new or existing houses. The latest example of such housing purchase options is the “Help to Buy Equity Loans and Mortgage Guarantees” introduced in March 2013 to assist people to acquire residences priced up to £600,000 with as little as a five percent deposit. All these policies are motivated, at least in part, by the concern that if their wealth is considered to be too low by credit-constrained home owners, then they will consume less of all private commodities and/or even save more of their existing capital with a fall in economic activity.

This paper contributes to the debate on housing policy by answering two key questions. They are: (i) how much did those who occupied their properties consume out of their household earnings compared with those who rented either from private landlords or public authorities at the end of the recent economic recession in 2010 and (ii) did aggregate consumption *relative* to income of home owner-occupiers vary significantly across the different UK regions at this crisis end year.

This study attempts to deal with these concerns in two ways. *First*, it examines the distribution of aggregate average household expenditure per week against income (hereafter referred to as the expenditure ratio) for the different types of housing occupancy across the four regions of the UK — Northern Ireland, Wales, Scotland and England. *Second*, it investigates the major determinants of UK household spending on all products and services relative to income in 2010. We focus on the outlay profile of property owner-occupiers in the belief that an examination of how UK consumers responded to recession is best captured by

the impact of unexpected shocks to the market value of houses with related spending adjustment by residential owners compared with tenants in both private and public sectors.

This paper is organised as follows: Section 1 summarizes the theoretical and empirical literature on household consumption. We pay particular attention to those studies which emphasise the role of housing wealth in predicting fluctuations in consumption activity. Section 2 describes the data. Section 3 specifies the empirical models. Section 4 outlines the results of our quantile regressions. The concluding section recommends policy to support spending among home owner-occupiers in the UK.

1. Literature Review

The purpose of this section is discussed under two headings. The *first* summarizes the theory of household consumption and savings. The *second* reviews the findings of previous empirical studies which considered the factors that are likely to influence the aggregate spending decisions of families, in particular, the effect of their housing wealth and home ownership position.

1.1. Household consumption and savings theory

The theoretical reasons why household spending and saving activities may vary is usually based on the following identity equation (Disney *et al*, 2002; Sinai and Souleles, 2005; Berry and Williams 2009 and Campbell and Cocco, 2007)

$$S_t + ND_t = NFA_t + NH_t \dots \dots \dots (Equation 1)$$

Where S_t is household savings representing the difference between current income and consumption. The symbol ND_t is the net acquisition of debt which is measured as new loans minus repayment of principal on existing debt. Therefore, the sum of $S_t + ND_t$ captures the totality of funds raised by households in a given year t . The right hand side of the equation gives the sum of the net assets accumulated by households. For example, the term (NFA_t) is net financial assets measured as the purchase minus sale of financial assets. The symbol (NH_t) is the accumulation of houses defined as the acquisition minus repayment of mortgage principals. Taken together, we may infer from the identity equation that the more households consume out of their current incomes, the more likely they are to incur new debt. Otherwise, households which dissave and which are unable to raise net loans would have to seek funds from other sources, including the sale of existing financial and housing assets, in order to

support current purchasing power. Thaler, (1990) and Disney *et al* (2002) remarked that the magnitude of the propensity to consume out of housing *versus* financial wealth may depend on the economic circumstances and age of a household reference person.

Generally, *four* key broad theories are used to explain how household consumption behaviour varies over time in order to re-establish equilibrium in the identity equation above. They may be summarised as follows:

(i) *The theory of Ricardian equivalence* which dates back to a study by Ricardo in 1820 is among the earliest published hypotheses on the determinants of aggregate consumption and savings. Subsequent theoretical arguments by Modigliani (1961), Diamond (1965), Barro (1974), O'Driscoll (1977), Tanner (1978), Blanchard (1985), Feldstein (1986) and Seater (1993) have clarified the assumptions upon which the conventional Ricardian propositions depend in both the short and long-term. Under the Ricardian hypothesis, deficit-finance tax cuts and government borrowing will exert no expansionary effect on household spending. The reasoning is that rational and farsighted taxpayers will react to such declines in government savings by paying off outstanding loans, acquiring new assets and/or by accumulating bank savings deposits and the equity in their houses. Such is in anticipation that expansionary fiscal policies merely postpone higher tax collection by the authorities in the future. The implication is that consumers would be indifferent of the scale and timing of taxes and government purchases and hence should not alter their spending decisions. However, a number of authors including Modigliani and Sterling (1976), Kotlikoff and Spivak (1981), Carmichael (1982), Abel (1985, 1986), Kotlikoff (1988), Bernheim and Bagwell (1986) and Bernheim (1987) noted that the neutrality proposition of Ricardian equivalence depends upon a set of implausible assumptions, including an efficient capital market and the fact that a deferment of taxes does not lead to a re-distribution of resources within generations.

(ii) *The permanent-income hypothesis* was originally introduced by James Duesenberry (1949) and Milton Friedman (1957). They hypothesized that household income comprised *permanent* and *transitory* components. The permanent income element reflects the effect of fundamental factors such as the training, personality, occupation, status and location of employment which affect the market value of household wealth. The transitory components are likely to be considered by consumers as fortuitous occurrences such as rare illness, loss of job, unexpected inheritances, windfalls or losses arising from changes in asset prices. Hall (1978) reported that the implication of this transitory element is that consumption is likely to follow a random walk. This means that the fraction of permanent income *relative to*

total income is the only factor powerful enough to systematically alter household spending activities. Hence, families with current disposable income which is higher than that anticipated in the future for their tax bracket as whole would save more in order to compensate for the expected decline in their permanent income proportion, regardless of favourable transient effects. Further evidence on the relative importance of permanent and transitory income percentages for the smoothness of consumption was provided by Modigliani (1966), Leland (1968), Mayer (1972), Deaton (1986), Hall (1981), Mankiw (1981), Mankiw and Shapiro (1985), Campbell (1987), Blundell (1988), Attanasio and Weber (1994) and Carroll (2001). These studies concluded that while the evidence on the permanent income hypothesis is generally favourable, the variability in consumption with related precautionary savings appears to be smaller than predicted by the theory. This indicates that households attempt to maintain a constant consumption-income ratio. They attributed this failure to the fact that the traditional permanent income hypothesis model is not robust to variable real interest rates and the presence of borrowing and saving constraints. Under these extensions, expected consumption should fluctuate at a rate proportional to the real rate of return and the degree of restrictions on the utility function. An expected increase in the real rate of return should persuade families, particularly home owners with mortgages to pay off, to postpone present current spending. What is more, prospective rises in future real interest rates would discourage expenditure, in particular among retired people with investment in fixed assets such as bonds and pension funds. Then too, interest charges on loans normally depend on the creditworthiness of the borrower. Thus, individuals with a poor credit history, for example the unemployed, face much higher borrowing costs and are more likely to be denied access to bank loans. Their consumption spending will thus be transitorily curtailed.

(iii) *Financial and housing wealth* is related to movements in personal wealth and consumption therefrom. Skinner (1989) and Millard and Power (2004) theorised that a rise in the price of assets, including houses, could mean that individuals who hold them are likely to raise their transaction and speculative demand for money. They proposed a positive effect of housing wealth on consumption across households. Besides, Benito *et.al* (2006) remarked that, a rise in the price of houses could be evidence that people who own their own properties have more collateral against which to borrow, even when there are housing inheritance motives. If credit becomes cheaper for them, then their spending may be higher (Elliot, 1980, Miles 1992, 1993 and 1997, Bosworth, *et al*, 1991, Attanasio and Weber, 2010). Alternatively, Gale and Sabelhaus (1999), Poterba (2000) and Dynan and Maki (2001) reported that an increase in house prices could force borrowers, especially would-be first-

time buyers, to accumulate higher deposit capital in financial assets such as bank accounts, bonds and shares increases. Thaler, (1990) commented that such active financial savings are normally mentally designated as “non-fungible” accounts as a form of self-control mechanism. This means that home owners could react differently to changes in their realised gains in financial and housing wealth. Nevertheless, Lettau and Ludvigson (2004), Edison and Slok (2001); Case *et.al* (2005) suggested that in line with the permanent income hypothesis, unexpected windfalls in financial and housing wealth must be perceived as long-lasting to affect individual spending plans. Other studies which have investigated the possible independent roles of both financial and housing wealth on consumption include, Belsky and Prakken (2004), Carroll (2004), Chen (2006), Dvornak and Kohler (2003), Campbell and Cocco (2007) and Bostic *et al* (2009).

(iv) **Demographic factors** relating to education, marital status, gender and age are captured by the *life-cycle* theory pioneered especially by Modigliani (1963, 1964 and 1966), Modigliani and Ando (1957) and Brumberg (1956). The basic life-cycle hypothesis deviates from the previous theoretical models by assuming that consumption decisions of households at each point in time do not depend solely on the basis of their tax proposals, current income or financial and housing wealth. Rather households in planning their consumption must take account of expected changes in their future life circumstances and past experience. In particular, it is proposed that because individuals can forestall that their incomes will fall considerably when they retire, they save when younger and dissave after retirement. The outcome is a hump-shaped profile of spending over a person’s life-time. The expenditure-to income ratios are expected to rise when people are young; aged between 20 and 30 years. This population cohort has relatively low income and is more likely to borrow against its anticipated higher future earnings in order to meet current demands for schooling, marriage and child birth. But as it moves into middle age, it tends to cut its spending ratio in favour of savings for retirement. The expenditure ratio for the middle age group is predicted to peak between the ages of 40 and 60 years. As people retire, their savings are run down to support spending on food, heating and lighting, health and care assistance. But Danziger *et al* (1982) and Miles (1997) remarked that the basic life cycle theory is inconsistent with conditions where wealth fails to decline rapidly after retirement due to government and intergenerational transfers to the elderly population. Thus, conventional life-cycle hypothesis may overstate the true magnitude of dissaving for the elderly than for the non-elderly population.

1.2. Empirical literature

Empirical investigation of the patterns of household expenditure dates back to the work by Ernst Engle in the mid-19th century. The conjectures developed by Engle were popularised by many writers, including Houthakker (1952, 1957), Prais (1952), Aitchison and Brown (1954), Stigler (1954), Hirsch (1976) and Scitovsky (1976), in an attempt to explain the nature of income-expenditure relationships in the 20th century. These authors argued that goods and services relating to basic and higher consumer needs display distinctive income elasticities of demand. Such conclusions motivated Blundell *et al* (1993) to propose that empirical studies should be based on microdata on consumer demand for singular products such as alcohol, clothing, energy and education. Alternatively, Capps and Love (1983), Härdle and Jerison, (1991), Manning *et al* (1995), Engel and Kneip (1996), Koenker and Hallock (2001), Ronning and Schulze (2004), and Caglayn and Astar (2012) recommended that empirical researchers employ statistical methods, such as tobit and quantile regression models, which deal explicitly with the heterogeneity associated with the different categories of goods, time, geographic locations and intensity of consumption.

Surprisingly, very little empirical work has been done on the pattern of consumer spending and the factors influencing such expenditure decisions in the UK. Notable exceptions include the study by Atkinson *et al* (1990), Blundell *et al* (1993), Anderson, *et al* (1994), Miller (1998), Pahl (1999; 2000), Nickell (2004), Lise and Seitz (2011), Van de Ven (2011) and Crossley *et al* (2012). For example, Van de Ven (2011) observed that consumer spending in the UK responded strongly to factors which influence individual expectations on current vis-à-vis future developments in credit availability, employment, demography and financial wealth. Lise and Seitz (2011) concluded that around two-thirds of the differences in consumption allocations on goods categories within households can be explained by the disparity in the earnings and hours worked by husbands and wives. Crossley *et al* (2012) found that the impact of an economic downturn on consumer spending has been deeper in the most recent recession which occurred in 2008-2009 than in the previous two which happened in the early 1980s and 1990s. In particular, the young have cut back expenditure more than the old as have mortgage holders compared to private and public renters. By contrast, the effect of the recession has been similar across the high and low education attainment groups, partly due to state benefit and the UK's progressive tax system.

There are few prominent studies which specifically assess the marginal propensity to consume out of housing wealth by the owner-occupiers normally cited in the literature. They include the research by Skinner (1989) and Engelhardt (1996) who found a positive impact of

house price shocks on household consumption in the United States. Similarly, Muellbauer and Murphy (1997), Carruth and Henley (1990), Miles (1993, 1997) reported an affirmative marginal propensity to consume from housing wealth for UK residents. Disney *et al* (2002) extended the methodology employed in these earlier studies by examining the degree of asymmetric response of consumption to gains and falls in house prices in the UK. They found greater responsiveness of consumption to house price gains than falls for owners-occupiers with zero or negative equity values, especially among elderly households who may be unwilling to move in order to release housing wealth. Belsky and Prakken (2004), Carroll (2004) and Campbell and Cocco (2007) concluded that appreciation in housing wealth generally results in increased consumption by younger owner-occupiers who tend to be less cautious in spending those gains.

The review of literature in this section illustrates that the importance given to a robust analysis of household expenditures by researchers and policymakers has risen considerably in the past decade. The current paper adds to this debate by comparing the patterns of consumer spending relative to the gross income of property owner-occupiers with those of renters in the UK in the year 2010, soon after the most recent global crises. In contrast to most prior research, we disaggregate the data on the expenditure ratio into total quantile in order to test for differential house wealth estimates across the low and high spending categories.

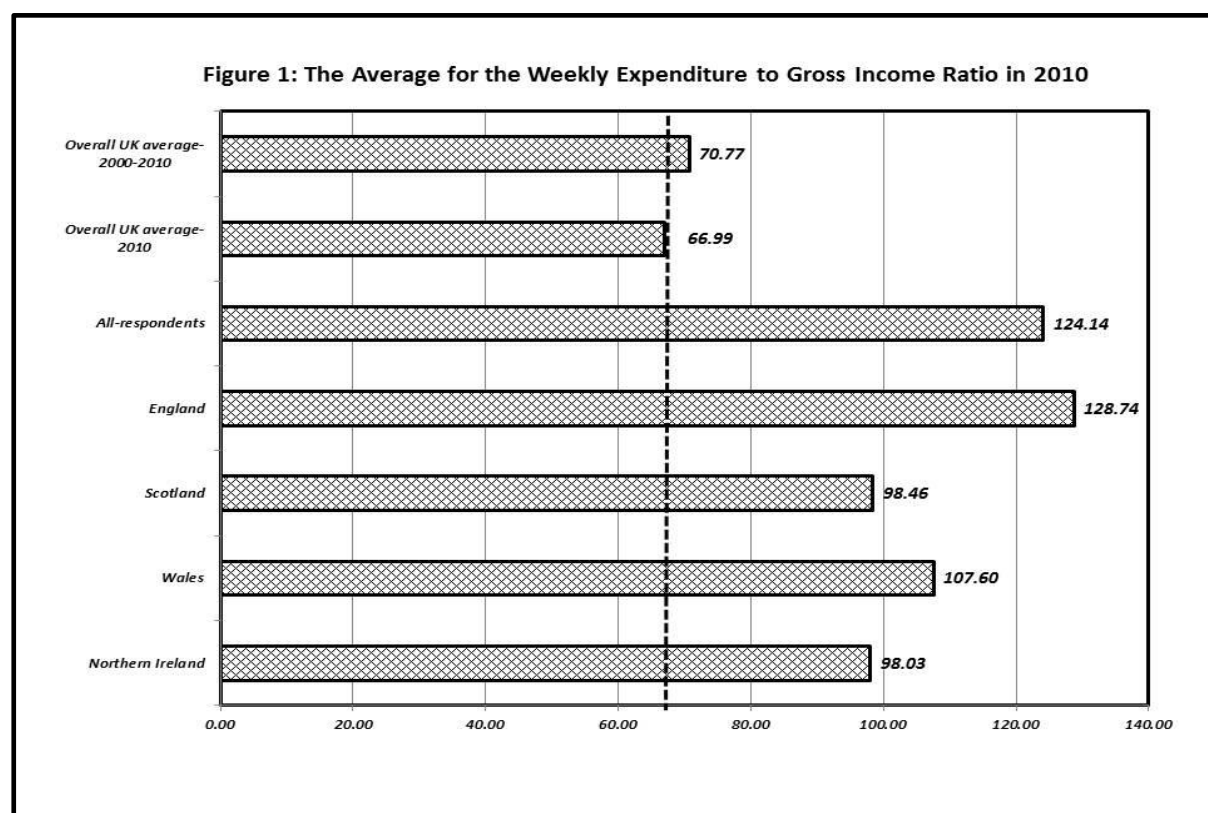
2. Data

This section gives a descriptive account of our data under the following headings: (1) the trend in regional household expenditure ratios in the UK, (2) data distribution and (3) housing tenure and household expenditure ratios across the different UK regions.

2.1. The trend in regional household expenditure ratios in the UK

Appendix Table 1 contains the description of the dummy variables used in our classification of UK households. Also, we provide in Appendix Table 2 some descriptive statistics on the average expenditure ratio for our overall sample and for the following three sub-groups of housing tenure: (i) house owner-occupiers, (ii) private tenants and (iii) public tenants. The overall dataset contains the entire 5,263 households which continuously kept a diary record of the family's daily spending on the thirteen categories of goods and services identified by the designers of the Living Costs and Food (LCF) questionnaire in 2010. Figure 1 charts the pattern of the ratio of aggregate weekly spending to gross income for households in Northern Ireland, Wales, Scotland, England and for all the respondents in our study sample. For

comparative purposes, we have also included the average figures for the UK as a whole in 2010 and for the period 2000-2010 obtained from the Office for National Statistics (ONS, Family Spending, 2011)¹. Two key features stand out.



The first is that families in Wales, Northern Ireland and Scotland spent below our study sample average of 124.14 percent of gross income. What is more, the expenditure ratios for the last two regions are more alike than the ratio for England. Such is presumably an indication of the resemblance in poverty levels and the social welfare benefits provided by the devolved regional assemblies in Northern Ireland and Scotland. By contrast, respondents in England spent almost five percentage points above the study sample average. Information from the Office for National Statistics consistently indicates that English residents, on average, pay more for housing together with fuel and power, household goods and services including home improvement and insurance, health services including private medical treatment and pharmaceutical items as well as recreation and cultural events. Besides, English residents, especially those in London and the South East, are wealthier than elsewhere in the UK. Statistics show that they have the highest spending amongst our households on education

¹ The figures from the ONS are weighted averages created using population data from the 1991-2001 Census. They are therefore not directly comparable to the equally weighted average spending ratios which underlie our analysis in this paper. Nevertheless, we have chosen to include the ONS figures in order to provide the reader with a benchmark on which to relate any discrepancy in the expenditure behaviour of our responding households in 2010.

and on luxury items like restaurants and hotels, communication, transport and miscellaneous items which may include holiday overseas, legal protection and personal services from domestic servants, exercise trainers and nannies or *au pairs*.

Second, residents in Wales and England spent more than their average weekly incomes in 2010. Consequently, the mean spending ratio for our study sample of 124.14 percent is considerably higher than the population-weighted average figure of 66.99 percent and 70.77 percent reported by the ONS for the UK as a whole in 2010 and from 2000 to 2010 respectively. Two propositions may be deduced from the identity equation in section 1.1. They are: (i) the Welsh and English inhabitants are increasing their net debt burden either by acquiring further new loans and/or failing to repay interest or principal on existing loans in full and on time and (ii) the majority of our Welsh and English dwellers could be drawing down their assets, including equity in their houses, in order to maintain the level of consumption for which they have become accustomed. We may therefore insinuate a positive correlation between housing wealth and consumption rates. Further, we may propose that regional heterogeneity in house prices have an important effect on household consumption rates since our figures suggest that the impact of the wealth effect is highest for homeowners in England, followed by Wales. This may be because housing is an asset that can be used as collateral for a loan. Thus, the higher property prices in England in particular may have allowed borrowing constrained homeowners to smooth consumption.

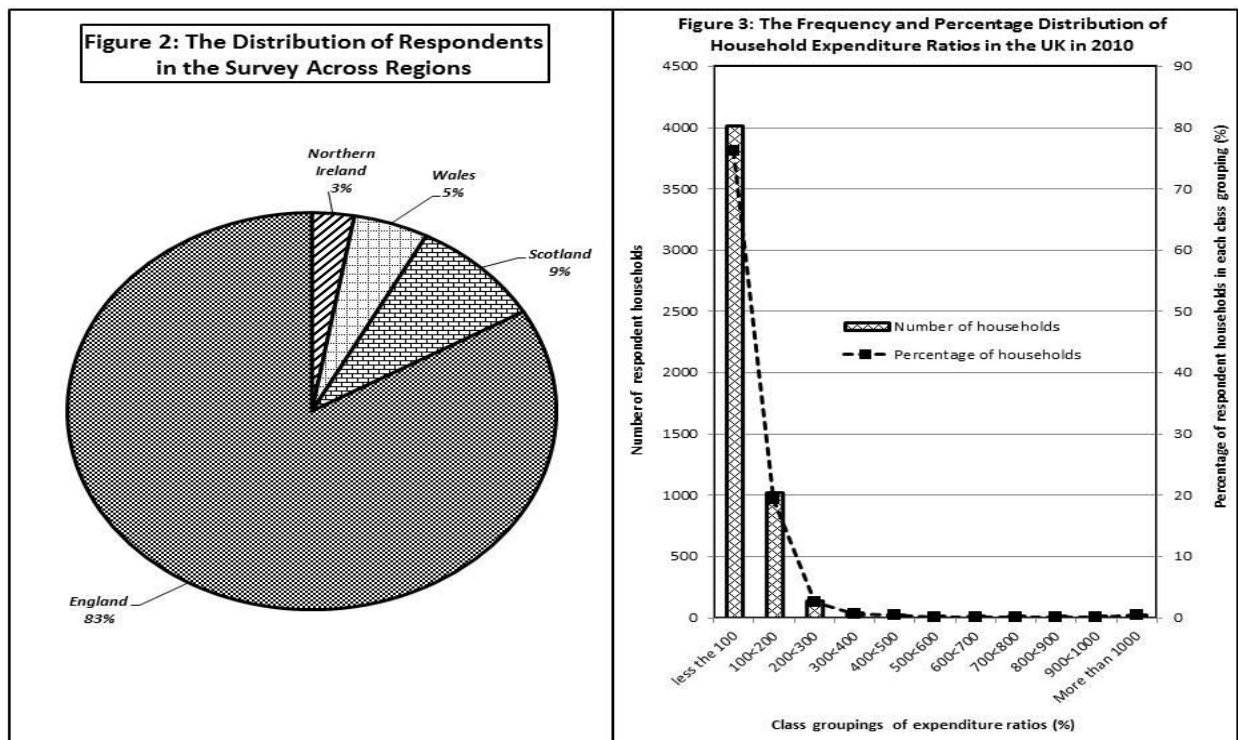
2.2. Data distribution

Discussion here comprises (i) a brief description of the nature of our household-level data provided by the Living Costs and Food Survey (LCF), (ii) a distribution of respondents across regions and (iii) a distribution of respondents across homeownership status.

2.2.1: The Living Costs and Food Survey (LCF) provides the microdata used in our study. The LCF which was formally known as the Expenditure and Food Survey from 2001 to 2008 or the Family Expenditure Survey prior to 2001 was introduced in 2001/2002 by the Office for National Statistics (ONS) and the Department for Environment, Food and Rural Affairs (DEFRA). The aim was to collect information on the purchasing habit of private households and individuals aged 16 and above in the UK. The selection of households for an LCF survey was based on a multi-stage stratified random sample design in order to maintain the proportion of households in each region of the UK population.

Expenditure data for each household was garnered in two ways. *First*, through an interview which was carried out once per household in the relevant financial year, resulting in around 1,750 households been interviewed in each quarter, so that in a typical financial year there are potentially 7000 observations available. *Second*, over a two-week period, the adult members of each household were asked to keep a diary of their consumption expenditures on durable and non-durable goods and services. In addition the survey contained a variety of other information, including the region where the household lived, gross income, major source of income, economic status, demographics such as gender, age and household composition, social class and homeownership status. The key advantages and methodological limitations of the LCF Survey are detailed in many of the studies identified in the empirical literature in section 2.2, more specifically, Campbell and Cocco (2007), Collis *et al*, 2010, Purshouse *et al*, 2010 and Meng *et al* (2014).

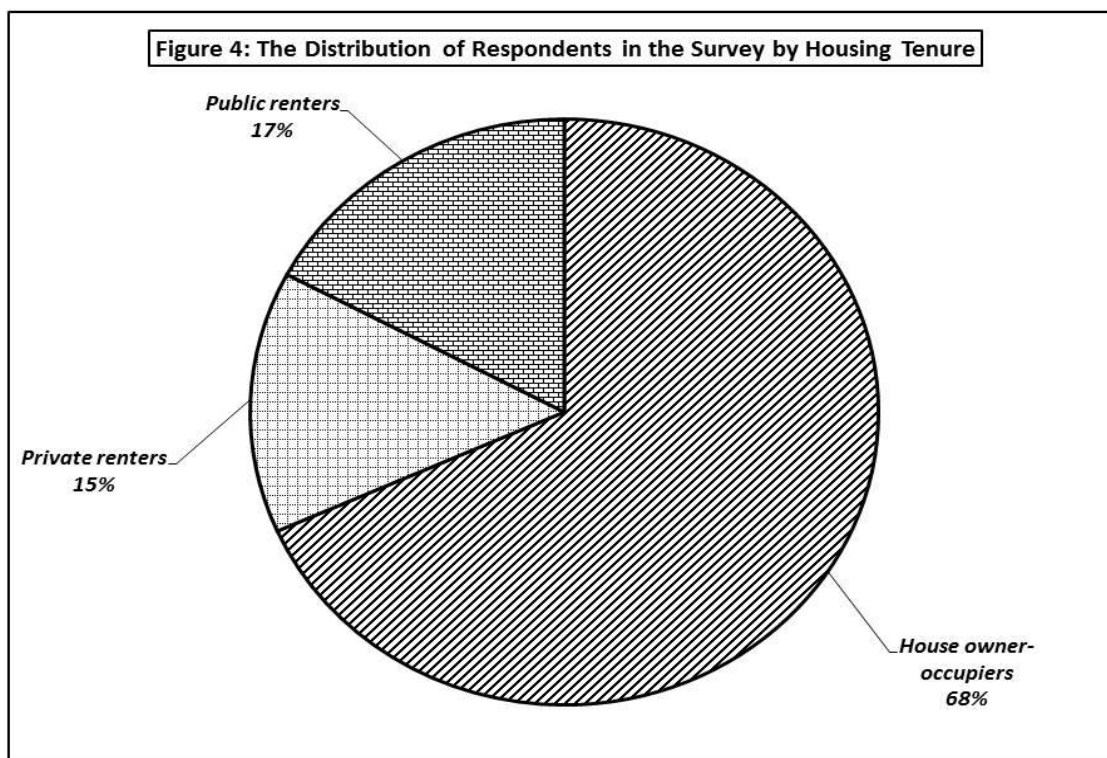
2.2.2: The distribution of the 5,263 respondent households in our study sample is depicted in Figure 2 across the four UK regions — England, Scotland, Wales and Northern Ireland.



It shows that our dataset for analysis is dominated by respondents from England. Collectively families in England make up around 83 percent of our sample and by inference of the UK as a whole. This outcome is to be expected given that respondents are selected from a stratum rather than from a universe of the entire UK households.

Further, Figure 3 shows a frequency distribution of our respondents in a histogram with data on the range of household spending ratios presented on the horizontal axis. About three-quarters of respondents in our sample have average expenditure ratios under 100 percent. Interestingly 0.4 percent of households reported an expenditure ratio in excess of 1000 percent. Such resulted in a distribution that is positively skewed with a long right tail. Indeed, a test for normality using the Jarque-Bera test statistic rejects the null hypothesis that our expenditure ratio series is normally distributed. This indicates that the raw data will have to be transformed using common techniques, such as natural logarithms, in order to obtain the appropriate functional form for an empirical modelling of the determinants of household spending in the UK. The manner in which this data transformation is carried out for our empirical model is discussed in the subsequent section.

Also, in Figure 4, we exploit the information in our dataset by grouping cohorts in terms of their homeownership status, regardless of the UK region where the household lives.

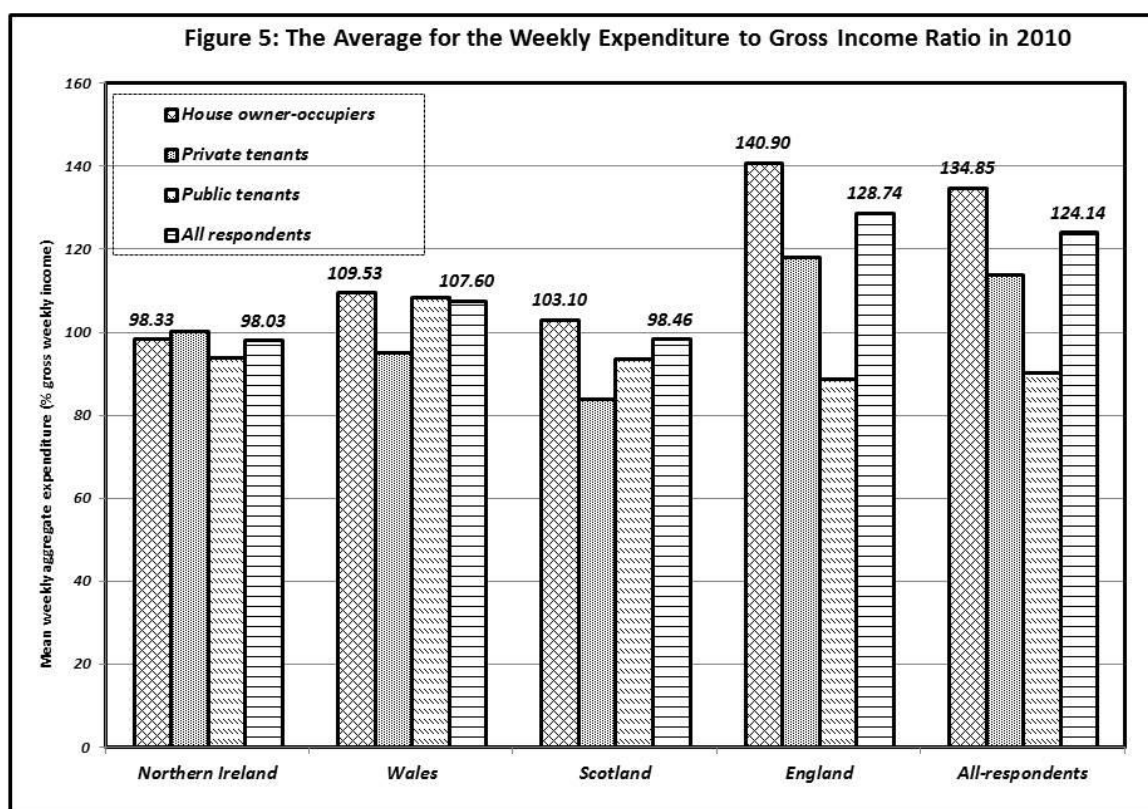


The data for the residential-owner occupiers dominates with more than two-thirds of the respondents in our sample claiming to own the house in which they reside. This outcome is to be expected given the prevalence of homeownership in the UK. Nevertheless, the potential problem of sample selection that might have biased estimation results of previous empirical studies which used the LCF survey data is clearly visible from our split of the sample

between home-owner occupiers and renters. Campbell and Cocco (2007) attempted to deal with this sampling error by assuming that the decision to become a homeowner or renter is endogenous, and hence correlated with individual characteristics such as income, consumption, age and economic status. Indeed they found that over time for a fixed birth year, the group of tenants in their dataset shrank and became more concentrated in the low-income population. Deaton (2000) remarked that quantile regressions which we employ in this study are appropriate for exploring such potential shifts in household survey data.

2.3: Housing tenure and expenditure ratios across the UK Regions

Figure 5 provides an overview of the aggregate weekly spending relative to the income of our responding families subdivided into the aforementioned three types of housing occupation across the four regions of the UK. Four interesting features emerge from this chart.



The *first* is the fact that an average property owner in all regions of the UK, with the exception of Northern Ireland, is consuming more than his/her average weekly wage. This is especially pronounced in England where a typical house owner-occupier spent roughly 40.90 percent in excess of average weekly wage in 2010. We note from Figure 1 that the expenditure ratio for the cohort of English homeowners was more than double the figure

observed for the UK as whole from 2000 to 2010. This abnormality was doubtless influenced by the high level of house prices in the South East and London in particular (Disney *et al*, 2002; Medland, 2011). Campbell and Cocco (2007) uncovered a similar heterogeneity in the consumption effect of house prices with the highest estimated coefficient for old homeowners than for young homeowners and for renters. They remarked that the observed differentiation in the magnitude of expenditure ratios was linked to the fact that the vast majority of older homeowners were paying off fixed rate mortgages which remained relatively high. Additionally, Crossley *et al* (2012) commented on the resilience of household spending on certain durable goods and services, including council tax, utility bills and home improvement which were customarily paid by property owners and landlords. It seemed that the majority of families in England went into debt or drew down on their financial assets in order to settle payment on these household items in 2010.

Second, the difference in the mean expenditure ratio of owner-occupiers and renters in England was considerably greater than the corresponding variation in the other parts of the UK. For example, the dissimilarity in the spending ratio for property owners in England was 23 percentage points and 52 percentage points higher than that reported for private and public tenants in that order. Campbell and Cocco (2007) remarked on the greater severity of borrowing constraints faced by renters who tend to have lower assets than their landlords.

Third, contrary to expectation, respondents who are renting from public authorities in Scotland and Wales consumed a larger proportion of their incomes compared with private tenants in the same regions. This may be a reflection of the greater overall social security provided by councils and the devolved assemblies in these regions. It could be that Welsh and Scottish public tenants judge it less necessary to save for old age and unemployment compared to the, perhaps, more self-reliant and better educated private renters.

Fourth, in Northern Ireland, there was little difference in the expenditure behaviour of our three different categories of house occupancy. This region is the poorest part of the UK following decades of civil unrest. We may therefore propose that social housing predominates here, forcing down private rental and ownership costs in the other two sub-groups. Interestingly, the expenditure ratios for all types of housing tenure in Northern Ireland was at, or below 100 percent, perhaps due to precautionary savings associated with the uncertainty caused by decades of civil disorder in the region.

3. Regression Model and Expected Relationships

The purpose of this section is twofold. *First*, it specifies the regression model underlying the empirical analysis. *Second*, it describes the expected impact on total expenditure ratios of selected household characteristics.

3.1. Model specification

The linear model which we use to capture the influence of the characteristics of households on the expenditure ratio can be broadly expressed as follows.

$$LCY_i = \alpha_0 + \beta'(X_i)_D + \pi'(REGION)_D + \omega'(Z_i)_D + \varepsilon_i \dots \dots \dots (Equation 2)$$

The variable LCY_i is a natural logarithm of our aggregate expenditure ratio for respondent i . The decision to take the natural log of the series follows from the skewness in the distribution of expenditure ratio in Figure 3. Asteriou and Hall (2007), Brooks (2008) and Caglayn and Astar (2012) suggested that the use of such logarithmic-linear functional forms may help resolve misspecification errors, including those arising from non-normality and heteroscedasticity of residuals. Moreover, the use of logarithmic models means that the estimated differential slope coefficients may be interpreted as marginal propensities of consumption.

The term X_i is an $N \times 1$ matrix of dummy variables(D) representing the covariate of primary interest — homeownership status of respondent i . $REGION$ is UK region where the respondent claims to live at the time of the LCF survey. The symbol Z_i is an $N \times 8$ matrix of conditioning variables drawn from a pool of potential household characteristics theoretically or empirically linked to changes in expenditure ratio in the economics literature (e.g., Miles, 1997; Campbell and Cocco, 2007; Jacobson *et al*, 2010; van de Ven, 2011, Meng et al, 2014). The definitions of these explanatory variables are provided in Appendix Table 1. For ease of interpretation, all the categories for our chosen household characteristics are binary dummy variables. The symbols β' π' and ω' are the differential slope coefficients to be estimated. The term α_0 is a constant which captures the expected value of the expenditure ratio of the household category omitted from the regression because it was assigned a value of zero in the construction of the dummy variables. The notation ε_i is an idiosyncratic residual capturing omitted determinants of LCY_i , including measurement error to which data from surveys are particularly prone. It is expected to have a zero mean and constant variance.

3.2. Bivariate analysis and expected relationships

To be able to initially describe the potential linkage between the expenditure ratio and each of our selected binary dummy variables $[(X_i)_D, (REGION)_D \text{ and } (Z_i)_D]$ in isolation, we ran a series of bivariate regressions based on the expression in equation 2. The null hypothesis to be tested is that the average consumption ratio of those respondents in our sample with the characteristics assigned a value of one (say home owner-occupiers) does not deviate significantly from the mean ratio of their peers within the category with an allocated value of zero, (say the renters). As a result, it is proposed that the value of the differential slope coefficients $\beta', \pi' \text{ and } \omega'$ is equal to 0 at the conventional five percent confidence level. Columns 1 to 10 of Appendix Table 3 present the result for each of our ten household attributes. The interpretation of these pairwise correlation coefficients is presented under (i) variables of interest and (ii) control variables.

3.2.1: Variables of interest: The estimated coefficients for our two variables of primary focus — house ownership and regional location — are in Columns 1 and 2 respectively. The *first* variable (TENURE) relates to the marginal consumption propensities of households with different ownership status for their main residences. Following from the identity in equation 1, we may expect that the consumption ratio should rise as the share of respondents that live in their own residences increase, if new borrowing against financial and housing collateral becomes easier (Campbell and Cocco, 2007). The statistically significant negative coefficient (-0.08) indicates otherwise. What is more, the negative correlation contradicts the figures reported in our descriptive statistics in Appendix Table 2 and Figure 5. Such a revision in the sign on the differential slope coefficients highlights the importance of the unobservable determinants of the spending ratio captured by the common intercept term α_0 in equation 2. Taken together, the negative coefficient on (TENURE) infers that individuals who lived in their own properties had lower average expenditure ratios than renters in 2010. This finding is consistent with the wealth effect of the lower house prices at the end of recession. Such would have intensified the borrowing constraints on home owner-occupiers vis-à-vis renters. It is possible that these owner-occupiers might have chosen to use their savings and/or windfalls from the government to reduce outstanding debt stock in order to lower their cost of mortgage debt servicing. In any event, homeowners have got to be such as a consequence of an inherent desire to save for down and annual payments on mortgages (Sheiner, 1995).

The positive coefficient for the *second* series REGIONS in Column 2 is statistically insignificant. The implication is that the total expenditure ratio of a typical family in any part of the UK, say England, is comparable with their counterparts in Scotland, Wales and Northern Ireland. This may be due to some extent to the universal dispensations of the welfare state, particularly child and unemployment benefit, as well as the winter fuel allowance for the elderly. Medland (2011) noted that the relatively high expenditures by London residents were substantially offset by the lower spending in the other regions in England, especially those living in the lowest expenditure counties in Yorkshire, the North East and the Humber region.

3.2.2. Control variables: The pairwise correlations between each of the eight conditioning dummy variables in the matrix Z_i and our total consumption ratios are reported in Columns 3 to 10. Two covariates are predicted to show a significantly positive coefficient, indicating an increase in household total expenditure ratio. These attributes are: (i) households with internet connection (INTERNET) and (ii) the number of children in a family unit (CHILDREN). There is a suggestion that a 10 percentage point increase in the share of families with internet connections would raise the UK average spending ratio by 0.42 percent rising to 0.59 percent for the fraction of households with children *relative* to those without. A possible explanation may be related to the life-cycle theory in the sense that the majority of our internet users, as well as those individuals with dependents under the age of sixteen, are likely to be young people who are expected to have a higher marginal propensity to consume than the elderly. What is more, a positive coefficient could be taken as a sign that internet connection in a household is private rather than a shared or public good. In fact, most individuals in a household have personal mobile internet contracts with different providers. Additionally, the ease of comparing prices and shopping for items on line through mobile communication equipment, such as smartphones and tablet computers, could have increased the amount of goods and services purchased by consumers of all ages, especially the young.

The remaining six household characteristics in our conditioning set have a negative effect on the aggregate expenditure ratio. These are presented here in a decreasing order of the absolute size of the estimated differential slope coefficients.

The *first* is the source of earnings for the household reference person (WAGE) with an estimated coefficient of (-0.25) in Column 3. The inverse relationship between the spending ratio and the proportion of households who derive their income largely from a regular wage or salary is consistent with the rationale that this category of earners has higher

incomes than pensioners and those on benefits. Thus, it is expected that they will have a lower marginal propensity to consume. Then too, it is possible that the uncertainty surrounding pay conditions and hours worked at the end of the financial crisis increased considerably compared with state and index linked pensions, in particular. Risk-averse families fearing prospective unemployment or a cut in their wages might wish to maintain some buffer by raising the amount of their precautionary savings from current income. Indeed, descriptive statistics in Appendix Table 2 indicate that this discrepancy in the spending ratio was largest among the residential homeowner category for which borrowing constraints were exaggerated at the end of the crisis period.

The *second* important conditioning variable is a dummy that captures the effect on total expenditure ratio of an increase in the percentage of families headed by respondents who claim to work in managerial positions (CLASS). As expected, we estimated a negative correlation coefficient of (-0.172) in Column 6 in line with the lower consumption propensities for this higher income class. Alternatively, from the asset pricing model, we may infer that the lower mean expenditure ratio for our managerial class is related to the fact that they are better educated and so are more likely to hold financial assets such as shares and bonds. Therefore, the fall in asset prices at the end crisis period would have reduced their perceived existing wealth. Such could have inhibited their relative expenditures.

The *third* prominent attribute relates to the effect of employment status (EMPLOYMENT) on the spending ratio. The predicted negative coefficient (-0.12) in Column 5 may be associated with a greater scepticism on the part of our working families about their future job security and pay increases. We may suppose that in the aftermath of financial crisis, many British workers expected their overall disposable incomes to fall significantly below their then current pay packets in the foreseeable future due to the higher rate of unemployment. Such would have motivated them to cut consumption expenditures in line with the predictions of the permanent income theory. Another reason may be that those in employment, especially in full time work, are unlikely to be free at the hours when shops are open and the time of year when the prices of recreational activities including holidays abroad are discounted. Such could have led to a decline in their aggregate expenditure ratio.

The *fourth* relevant conditioning series is the size of households in terms of the number of adults (ADULTS) in Column 9. A negative coefficient of (-0.086) posits that the average expenditure ratio of families with more than two adults is lower than that for their equivalents with a single or two persons aged 16 and over. This outcome is presumably because all these adults are likely to be earning or receiving welfare benefits, leading to a

high overall household income. Then too, cost savings arising from discounts are enjoyed by larger adult families that buy items such as food, holidays and insurance in bulk (Deaton and Paxson, 1998). Moreover, gains allied to opportunities to share goods as well as to spread fixed family payments, such as those for mortgage or rent, telephone rentals, utilities, council tax and a car, should be higher for larger adult households (Jacobson *et al*, 2010).

The significantly negative coefficient (-0.082) on the *fifth* important conditioning dummy variable (GENDER) in Column 7 indicates a substantial disparity in the mean expenditure ratio of households headed by males versus females. The underlying reason for the lower spending ratio observed for our male respondents is that men are more likely to be sole earners and in full employment with higher incomes than females. They would have handed over a larger percentage of their income to their wives for general household expenditure. Consequently, we may conjecture that the majority of males who responded to the LCF questionnaire failed to accurately record their contributions to family budgets in their expenditure diaries, while the recipient females did so. Then too, males may be more likely than females to shop on line, set up direct debit payments and have credit and/or debit cards because of their employment and income positions (Pahl 1999; 2000). Payments of utility and shopping bills with such cashless methods often attract considerable discounts, leading to a lower aggregate spending bill for men.

The overall size of a household (HSIZE) is measured in terms of the number of people, including children, living together in a family unit. The insignificantly negative correlation coefficient of (-0.003) in Column 8 suggests that the mean for the total expenditure ratio for a family with more than three persons is comparable to the ratio for smaller sized households. This finding could be taken as a signal that individuals in larger homes are increasingly substituting private with shared goods (Jacobson *et al*, 2010). For example, it is reasonable to suppose that at the end of the recession, families, especially those with more than three people, gradually replaced meals in restaurants, pubs and take-aways with food cooked at home. Also, cars, clothing and children's toys are more likely to be shared among family members in the wake of a crisis, leading to a reduction in household expenditure bills relative to income. Nonetheless, the fact that the estimated coefficient is insignificantly different from zero at the conventional five-percent level implies that we do not have sufficient information in our aggregate expenditure data to determine what goods and services were cut back and to what extent by our large versus small households.

To summarise, results of the pairwise correlation analysis support our decision to differentiate between the spending habits of home owner-occupiers versus renters. However,

we find little heterogeneity in the response of household consumption ratio to regional fixed effects. The analysis in the subsequent section attempts to further explore the sensitivity of these findings to estimation method and a simultaneous addition of the other household characteristics in our conditioning set.

4. Multivariate Regression Method and Main Results

The bivariate regressions in the previous section provide a simplified account of the extent to which expenditure-to-income ratio for an average UK family in 2010 is predicted by each of our chosen eleven characteristics in isolation. However, there are instances where interactions might exist between our set of household attributes. For example, representations in Figure 5 suggest that individuals who claimed to live in their own properties in England have considerably higher expenditure ratios compared with other home owners and renters in the other UK regions. A multivariate regression is therefore required to establish the correlation between the average expenditure ratio and such interrelatedness between housing tenure and regional location of respondents over and above the effects of all our other household characteristics enumerated in the vectors X_i and Z_i . Specifically, the extended regression model which we analyse in this paper may be represented as follows:

$$\begin{aligned}
LCY_i = & \alpha_0 + \beta_1(TENURE_i)_D + \pi_1(REGION)_D + \gamma_1(TENURE_i * REGION)_D \\
& + \omega_1(WAGE_i)_D + \omega_2(INTERNET_i)_D + \omega_3(EMPLOYMENT_i)_D \\
& + \omega_4(CLASS_i)_D + \omega_5(GENDER_i)_D + \omega_6(HSIZE_i)_D \\
& + \omega_7(ADULTS_i)_D + \omega_8(CHILDREN_i)_D + \varepsilon_i \dots \dots (Equation 3)
\end{aligned}$$

To estimate equation 3, we utilise a quantile regression approach which minimises the sum of absolute error. Such median estimators are increasingly used in the econometric literature in place of conditional mean models, such as OLS, as a convenient way for providing a more complete description of the underlying distribution of a response variable.

Quantile regression was introduced by Koenker and Bassett (1978) in an attempt to extend the classical least squares ideas to the estimation of conditional quantiles of a dependent variable given a set of control regressors. The model expresses the conditional distribution of a response variable into quantile or percentile of the observed covariates. For the present study, we split our sample of 5263 households into 20 percentiles of equal size according to their observable characteristics which are captured by each of the regressors in

equation 3. Koenker and Hallock (2001) remarked that the use of such a relatively large number of distinct cells is more efficient than non-parametric approaches which are traditionally employed in tests for the distributional robustness of conditional mean models.

Detailed representations of the conditional quantile function, which are usually minimized by researchers in order to obtain the vector of parameters β_τ , are provided in the articles by Koenker and Bassett (1978), Buchinsky (1998), Deaton, 2000; Koenker and Hallock (2001) and Ronning and Schulze (2004). However, for ease of computation and interpretation, a simplified form of a conditional quantile regression of a random variable Y given K independent regressors is employed. This may be written as follows:

$$\text{Quantile}_\theta(Y_i|K_i) = \gamma_\theta K_i + \varepsilon_{\theta i} \dots \dots \dots (Equation 4)$$

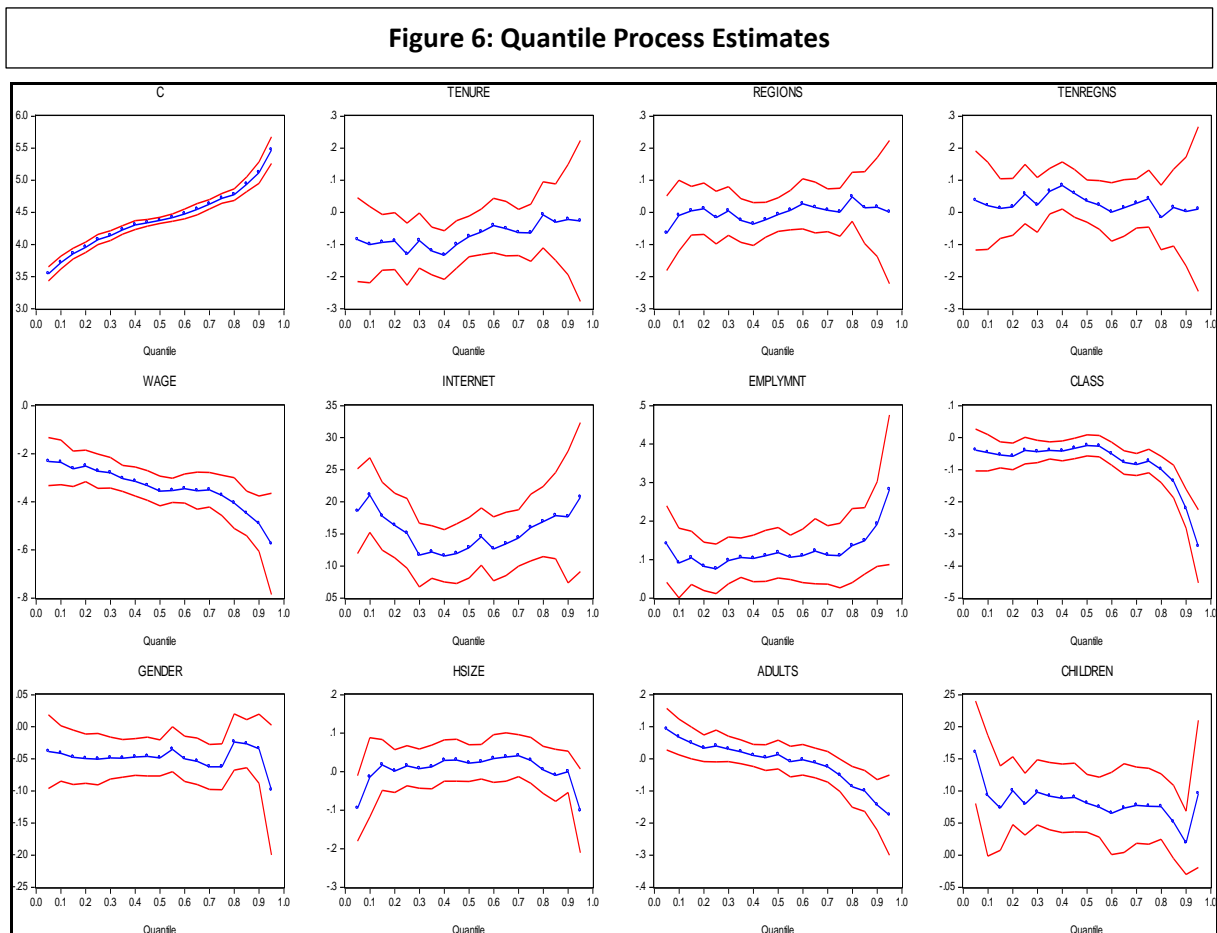
Where Y_i is the natural logarithm of the total expenditure to income ratio for *respondent i*, K is a vector of the covariates listed in equation 3. The term γ_θ is a vector of parameter coefficients and θ is the quantile being analysed. We estimated the conditional expenditure ratio for nineteen separate quantiles $\{0.05 \dots \dots \dots 0.95\}$ using the least absolute deviation (LAD) estimator in EVIEWS Version 8. The LAD estimator maintains the classical linear regression assumption that the error terms are independent and identically distributed (i.i.d). Standard errors were obtained using the bootstrapping option recommended by Buchinsky (1998). The results are presented in Appendix Table 4.

To clarify our discussion here, Figure 6 presents a summary of quantile regression results for all of our chosen covariates bounded within a 95 percent confidence interval. For each of the regressors, we plot the nineteen distinct quantile regression estimates for *tau* (τ) ranging from 0.05 to 0.95. The point estimate may be interpreted as the impact on the total expenditure ratio of a one percentage point change of the covariate, holding the other regressors fixed. So each plot indicates the quantile or *tau* scale on the horizontal axis and the marginal effect of the covariate on the vertical axis.

The signs on the coefficients on the house tenure dummy (TENURE) are insensitive to the concurrent inclusion of our chosen conditioning set in the sense that they retain their negative values for all quantiles. This finding provides support for the effectiveness of the incentives provided by the Bank of England and the UK government in an attempt to promote demand for both new and existing houses across all sections of society.

The parameter coefficient for the regional dummy (REGION) is persistently insignificant at all quantiles, even though the English households at the upper quantile appear to have a slightly higher spending ratio than their counterparts in the other UK regions.

The coefficient on our interaction variable (TENREGNS) which was included to capture any potential disparity in the consumption habits of homeowners in England and their peers in the rest of the UK has the expected positive sign, although the estimated slope differential of (+0.084) at the 40th percentile is the only statistically significant figure. This perhaps captures the fact that English middle classes aspire to higher priced housing, cars, private education and more expensive foreign holidays. Also, Disney *et al* (2002) suggested that the size of the estimated coefficients on these regional dummy variables correlates closely and positively with average regional house prices.



With respect to our selected conditioning variables, we found that the sign on the coefficients is consistent with those originally reported using the pairwise correlation analysis in section 3.2.2. The only important exceptions where we obtained a revision in the sign for

the estimated coefficient were for the following two categories: (i) employment status of household head and (ii) the number of adults in a household.

The coefficient on the EMPLOYMENT variable reverted to a significantly positive sign across all quantiles. The effect is at its strongest at the upper quantile, rising from 0.1 for the lower percentile to 0.3 for the 95th quantile. The inference is that these later households have lower incomes and so have higher marginal consumption rates. They are therefore expected to spend increasing proportions of their additional earnings from employment on private goods and services rather than substitute them for shared or public goods.

The results also show that the expenditure ratio of households consisting of at least three adults at the upper 80th percentile is considerably lower than those at the bottom and middle quantiles. As we said earlier, the underlying reason for this is the economies of scale arising from gains to be derived from shared goods among adults in a family unit, particularly those on lower incomes.

The intercept of the model is significantly positive for all quantiles. Such an outcome may be taken as evidence of a higher total expenditure ratio for those categories which were assigned a value of zero and so were excluded from the regression in order to avoid the problem of a dummy variable trap.

To evaluate the quality of a quantile regression model, EViews produces a series of goodness of fit measures. They include: (i) an adjusted R-squared which is analogous to that reported from conventional OLS regression analysis. We obtained an adjusted R-square which indicates that almost 42 percent of the variation in the ratio of aggregate expenditure to income was explained by our choice of independent variables. (ii) the statistics for an equality test which compares the slope coefficient for the median against the estimated upper and lower quantiles. We observed that a Chi-square statistic of 83.25 is statistically significant. The implication is that the estimated slope coefficients differ considerably across conditional quantile values and (iii) the statistic for a test for the degree of symmetry for the parameter coefficients around the median quantile. An estimated Chi-square statistic of 16.16 with associated p-value of (0.1839) is taken as evidence that the null of conditional symmetrical quantiles around the median cannot be rejected.

Conclusions and Policy Recommendations

This paper is primarily concerned with the spending behaviour of those individuals who live in their own properties in the UK at the end of the recent recession in 2010. The study uses

data from the LCF 2010 survey of 5,263 respondents who consistently kept a daily record of their household income and spending on specified categories of goods and services at regular two week intervals in that year. The key findings with related policy actions which were uncovered from our bivariate and multivariate quantile regression models are as follows:

First, the aggregate spending-to-income ratio of home owner-occupiers across the UK is significantly lower than for renters, particularly for households in the middle quantile. This finding gives support to the Bank of England's decision to keep the basic interest rate at 0.5 percent in order to improve credit conditions. Also, the latest government "Help to Buy Equity Loans and Mortgage Guarantees" scheme introduced in March 2013 should alleviate the credit constraint on would-be home owners and so encourage them to increase their effective demand for housing, furniture and home appliances with a consequent increase in aggregate output and employment.

Second, we find insignificant variation in the aggregate spending of families which live in the different UK regions but which are similar in other respects. This lack of regional discrepancy may be a sign that targeted welfare benefits to support low income families with children and disabilities, together with the elderly and unemployed has succeeded in narrowing the gap in income and expenditure on essential items such as food, clothing, housing and heating across the country. For example, the elderly especially those aged 70 and above, throughout the UK are entitled to a free bus pass, television licences and pharmaceutical prescriptions. They also receive state pensions, winter fuel allowances linked to inflation, as well as payments for care homes where they have insufficient personal assets.

Third, access to internet connections and employment status are the two characteristics in our conditioning set which were found to be most important in raising household expenditure ratios, judging by the absolute size, statistical significance and persistence of their estimated parameter coefficients across all quantiles. .

With respect to *internet connection*, we may infer that government policies to deregulate the broadband market for the provision of superfast internet services to homes should encourage more competition and cut the cost of shopping online. Then too, efforts to combat cybercrime and to strengthen the legal protection afforded to online shoppers should enhance general confidence, especially among the retired population. Moreover, the government should support schemes to provide free access to Wi-Fi in towns and in libraries coupled with computer training for the unemployed in particular. Another initiative to promote sustainable online shopping includes publicly-funded advertising campaigns on television, bill boards and newspapers to publicize the availability of free price comparison

websites, as well as the organisations which help people to switch providers of items such as utilities and mortgages which absorb a significant proportion of family budget.

In terms of general *employment*, it is recommended that the authorities pay particular attention to actions which enhance expectations for long-term well-paid jobs by lower-income families which rely mainly on a regular wage or salary. An example of such policies is the stance adopted by the government to maintain fiscal discipline. This now appears to be raising the overall economic growth with employment, as well as pay and consumer spending. Besides the recent increase in the minimum wage for adults aged 25 and above from £6.31 at present towards the so-called living wage of £8.80 for London and £7.65 for the rest of the country is encouraging. Supporters of the living wage campaign have argued that the government should name and shame firms which do not pay wages that enable their employees to live above the poverty line.

An important weakness of this study is that the data on expenditure is for all goods and services and for all types of homeowners. An examination of the individual components of these aggregates for mortgage, negative equity and non-mortgage owner-occupiers would provide a better explanation of what goods and services were cut back to the greatest extent by each type of property owner and the reasons lying behind their spending decisions. Another limitation of this study is the fact that the empirical results are obtained from a quantile regression function. However, there is a growing debate in the literature that non-parametric methods, such as Neural Network which do not require researchers to impose *a priori* a functional form on the estimates, are more apposite for dealing with both outliers of the dependent variables and the lack of information about the correct functional form. A key area for further research therefore would be to re-estimate our extended regression models using such non-parametric techniques. The results could then be compared with our benchmark least absolute deviation estimator.

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Appendix Table 1: The Definition of Independent Variables used in the Analysis

Variable symbol	Variable name	Description
LCY	Logarithm of expenditure ratio	The natural logarithm of the ratio of total weekly expenditure by adults and children divided by gross nominal income.
TENURE	Tenure type	House owned = 1 House is privately or publically rented = 0
REGIONS	Government office region	England = 1 Other regions = 0
TENREGNS	The product of tenure and regions	Homeowners in England = 1 Others home occupancy types = 0. This comprises homeowners in other parts of the UK and renters in England and the other UK regions.
WAGE	Main source of household income	Earned income = 1 Other sources of income = 0
INTERNET	Internet connection in household	Household has internet connection = 1 Household has no internet connection = 0
EMPLOYMENT	Economic position of household reference	Economically active = 1 Economically inactive = 0
CLASS	Class of household reference person	Higher managerial classes = 1 Other working classes = 0
GENDER	Sex of household reference person	Male = 1 Female = 0
HSIZE	Number of persons in household	Three persons or more = 1 Less the three persons = 0
ADULTS	Number of adults in household	Two adults or more = 1 One adult = 0
CHILDREN	Number of children in household	Children in the household = 1 No child in the household = 0

Appendix Table 2: Weekly Aggregate Expenditure to Income Ratios of UK Households (Mean in the year 2010)

		<i>House owner- occupiers</i>	<i>Private tenants</i>	<i>Public tenants</i>	<i>All respondents</i>
	<i>GOVERNMENT OFFICE REGIONS</i>				
	Northern Ireland (0)	98.33	100.32	93.86	98.03
	Wales (1)	109.53	95.19	108.44	107.60
	Scotland (2)	103.10	83.98	93.44	98.46
	England (3)	140.90	118.13	88.63	128.74
	Overall UK sample	134.85	113.88	90.21	124.14
1	<u>GOVERNMENT OFFICE REGIONS (REGIONS)</u>				
a	<i>Other regions [Category, 0]</i>	104.29	90.31	97.29	101.11
	Number of observations	594.00	116.00	166.00	876.00
	Observations (% total sample)	16.52	15.26	18.32	16.65
b	<i>England [Category, 1]</i>	140.90	118.13	88.63	128.74
	Number of observations	3002.00	644.00	740.00	4386.00
	Observations (% total sample)	83.48	84.74	81.68	83.35
c	<i>All respondents</i>	134.85	113.88	90.21	124.14
	Number of observations	3596.00	760.00	906.00	5262.00
d	<i>Difference in the mean spending ratio</i>				
	Item (b) minus item (a)	36.61	27.81	-8.66	27.62
2	<u>MAIN SOURCE OF HOUSEHOLD INCOME (WAGE)</u>				
a	<i>Other sources of income [Category, 0]</i>	226.17	170.22	93.77	183.47
	Number of observations	1413.00	274.00	632.00	2319.00
	Observations (% total sample)	39.29	36.05	69.76	44.07
b	<i>Earned income [Category, 1]</i>	75.75	82.12	82.01	77.38
	Number of observations	2183.00	486.00	274.00	2943.00
	Observations (% total sample)	60.71	63.95	30.24	55.93
c	<i>All respondents</i>	134.85	113.88	90.21	124.14
	Number of observations	3596.00	760.00	906.00	5262.00

d	<i>Difference in the mean spending ratio</i>				
	Item (b) minus item (a)	-150.42	-88.10	-11.77	-106.09
3	<u>INTERNET CONNECTION IN HOUSEHOLD (INTERNET)</u>				
a	<i>No internet [category, 0]</i>	132.62	101.42	84.31	112.88
	Number of observations	750.00	180.00	446.00	1376.00
	Observations (% total sample)	20.86	23.68	49.23	26.15
b	<i>Has Internet connection [Category, 1]</i>	135.44	117.75	95.93	128.12
	Number of observations	2846.00	580.00	460.00	3886.00
	Observations (% total sample)	79.14	76.32	50.77	73.85
c	<i>All respondents</i>	134.85	113.88	90.21	124.14
	Number of observations	3596.00	760.00	906.00	5262.00
d	<i>Difference in the mean spending ratio</i>				
	Item (b) minus item (a)	2.82	16.33	11.62	15.24
4	<u>EMPLOYMENT POSITION OF HOUSEHOLD REFERENCE PERSON (EMPLOYMENT)</u>				
a	<i>Unemployed or retired [Category, 0]</i>	130.17	182.15	91.26	123.93
	Number of observations	1279.00	177.00	560.00	2016.00
	Observations (% total sample)	35.57	23.29	61.81	38.31
b	<i>Full or part time employed [Category, 1]</i>	137.44	93.15	88.52	124.27
	Number of observations	2317.00	583.00	346.00	3246.00
	Observations (% total sample)	64.43	76.71	38.19	61.69
c	<i>All respondents</i>	134.85	113.88	90.21	124.14
	Number of observations	3596.00	760.00	906.00	5262.00
d	<i>Difference in the mean spending ratio</i>				
	Item (b) minus item (a)	7.26	-89.00	-2.73	0.34
5	<u>CLASS OF HOUSEHOLD REFERENCE PERSON (CLASS)</u>				
a	<i>Other working classes [Category ,0]</i>	164.98	130.70	91.25	143.23
	Number of observations	2355.00	523.00	859.00	3737.00
	Observations (% total sample)	65.49	68.82	94.81	71.02
b	<i>Higher managerial classes [category, 1]</i>	77.69	76.77	71.26	77.35

	Number of observations	1241.00	237.00	47.00	1525.00
	Observations (% total sample)	34.51	31.18	5.19	28.98
c	<i>All respondents</i>	134.85	113.88	90.21	124.14
	Number of observations	3596.00	760.00	906.00	5262.00
d	<i>Difference in the mean spending ratio</i>				
	Item (b) minus item (a)	-87.29	-53.93	-19.99	-65.88
6	<u>SEX OF HOUSEHOLD REFERENCE PERSON (GENDER)</u>				
a	<i>Female [Category, 0]</i>	107.88	109.32	92.06	104.10
	Number of observations	1210.00	337.00	526.00	2073.00
	Observations (% total sample)	33.65	44.34	58.06	39.40
b	<i>Male (Category, 1]</i>	148.53	117.51	87.66	137.16
	Number of observations	2386.00	423.00	380.00	3189.00
	Observations (% total sample)	66.35	55.66	41.94	60.60
c	<i>All respondents</i>	134.85	113.88	90.21	124.14
	Number of observations	3596.00	760.00	906.00	5262.00
d	<i>Difference in the mean spending ratio</i>				
	Item (b) minus item (a)	40.65	8.19	-4.40	33.06
7	<u>HOUSEHOLD SIZE, NO OF PERSONS IN HOUSEHOLD (HSIZE)</u>				
a	<i>Less the three persons [category, 0]</i>	160.19	101.61	90.90	139.22
	Number of observations	2343.00	506.00	623.00	3472.00
	Observations (% total sample)	65.16	66.58	68.76	65.98
b	<i>Three person or more [Category, 1]</i>	87.48	138.32	88.69	94.88
	Number of observations	1253.00	254.00	283.00	1790.00
	Observations (% total sample)	34.84	33.42	31.24	34.02
c	<i>All respondents</i>	134.85	113.88	90.21	124.14
	Number of observations	3596.00	760.00	906.00	5262.00
d	<i>Difference in the mean spending ratio</i>				
	Item (b) minus item (a)	-72.71	36.70	-2.21	-44.34
8	<u>NUMBER OF ADULTS IN HOUSEHOLD (ADULTS)</u>				

a	<i>One adult [category, 0]</i>	154.13	116.82	91.87	129.45
	Number of observations	978.00	326.00	533.00	1837.00
	Observations (% total sample)	27.20	42.89	58.83	34.91
b	<i>Two adults or more [Category, 1]</i>	127.65	111.67	87.84	121.29
	Number of observations	2618.00	434.00	373.00	3425.00
	Observations (% total sample)	72.80	57.11	41.17	65.09
c	<i>All respondents</i>	134.85	113.88	90.21	124.14
	Number of observations	3596.00	760.00	906.00	5262.00
d	<i>Difference in the mean spending ratio</i>				
	Item (b) minus item (a)	-26.48	-5.15	-4.04	-8.16
9	<u>NUMBER OF CHILDREN IN HOUSEHOLD (CHILDREN)</u>				
a	<i>No Children in the household[Category , 0]</i>	151.38	106.82	88.25	135.29
	Number of observations	2597.00	496.00	588.00	3681.00
	Observations (% total sample)	72.22	65.26	64.90	69.95
b	<i>Children in the household [Category, 1]</i>	91.89	127.14	93.84	98.17
	Number of observations	999.00	264.00	318.00	1581.00
	Observations (% total sample)	27.78	34.74	35.10	30.05
c	<i>All respondents</i>	134.85	113.88	90.21	124.14
	Number of observations	3596.00	760.00	906.00	5262.00
d	<i>Difference in the mean spending ratio</i>				
	Item (b) minus item (a)	-59.49	20.31	5.59	-37.13

Appendix Table 3: OLS Bivariate Regression of the Determinants of UK Expenditure Ratio

	<i>Column 1</i>	<i>Column 2</i>	<i>Column 3</i>	<i>Column 4</i>	<i>Column 5</i>	<i>Column 6</i>	<i>Column 7</i>	<i>Column 8</i>	<i>Column 9</i>	<i>Column 10</i>
Intercept	4.40*** [324.88]	4.33*** [223.83]	4.49*** [321.07]	4.32*** [267.61]	4.42*** [324.56]	4.40*** [440.04]	4.40*** [355.98]	4.35*** [422.69]	4.40 *** [284.26]	4.33*** [441.11]
TENURE	-0.084*** [-5.044]		...	...	...	...	...	...	...	...
REGION	...	0.026 [1.258]		...	...	...	...	...	...	...
WAGES	...		-0.250*** [-15.426]		...	...	...	...	...	...
INTERNET	...		...	0.042*** [2.275]		...	...	...	...	...
EMPLOYMENT	...				-0.123*** [-7.396]		...	...	...	...
CLASS					...	-0.172*** [-11.413]	...	...	...	...
GENDER	...						-0.082*** [-5.098]	...	...	...
HSIZE	...							-0.003 [-0.221]	...	...
ADULTS	...								-0.086*** [-4.820]	...
CHILDREN	...								...	0.059*** [3.675]
No of observations	5262	5262	5262	5262	5262	5262	5262	5262	5262	5262

Note: (i) Dependent variable is the natural logarithm of the ratio of aggregate expenditure to income for the UK. (ii) Numbers in [...] bracket are t-statistics. (ii) The symbol *** indicates significance at the one percent confidence level. The definition of all variables are provided in Appendix Table 1

Appendix Table 4: Quantile Regression Estimates

Variables	Intercept	TENURE	REGIONS	TENREGNS	WAGE	INTERNET	EMPLYMNT	CLASS	GENDER	HSIZE	ADULTS	CHILDREN
0.05	3.542*** [62.44]	-0.085 [-1.271]	-0.065 [-1.094]	0.038 [0.476]	-0.233*** [-4.571]	0.185*** [5.492]	0.140*** [2.759]	-0.038 [-1.143]	-0.039 [-1.322]	-0.095** [-2.194]	0.093*** [2.803]	0.160*** [3.928]
0.1	3.718*** [71.42]	-0.101* [-1.661]	-0.010 [-0.176]	0.021 [0.298]	-0.236*** [-4.972]	0.210*** [7.086]	0.091** [1.971]	-0.047 [-1.625]	-0.042* [-1.879]	-0.015 [-0.277]	0.068** [2.395]	0.093** [1.926]
0.15	3.858*** [90.07]	-0.094** [-2.117]	0.005 [0.128]	0.012 [0.257]	-0.263*** [-7.002]	0.178*** [6.568]	0.104*** [2.956]	-0.054** [-2.592]	-0.048** [-2.194]	0.017 [0.521]	0.050** [1.971]	0.073** [2.188]
0.2	3.956*** [95.31]	-0.090** [-1.977]	0.012 [0.288]	0.017 [0.385]	-0.251*** [-7.516]	0.163*** [6.353]	0.082** [2.557]	-0.058*** [-2.729]	-0.050** [-2.524]	0.002 [0.059]	0.033 [1.572]	0.101*** [3.730]
0.25	4.078*** [100.35]	-0.130*** [-2.647]	-0.016 [-0.392]	0.057 [1.211]	-0.273*** [-7.458]	0.151*** [5.453]	0.076** [2.302]	-0.040*** [-1.888]	-0.050** [-2.456]	0.015 [0.575]	0.040 [1.582]	0.080*** [3.238]
0.3	4.138*** [104.32]	-0.088** [-1.994]	0.004 [0.112]	0.023 [0.536]	-0.279*** [-8.629]	0.117*** [4.637]	0.097*** [3.140]	-0.043** [-2.437]	-0.049*** [-2.909]	0.008 [0.319]	0.031 [1.527]	0.098*** [3.785]
0.35	4.228*** [121.19]	-0.120*** [-3.182]	-0.025 [-0.727]	0.066* [1.817]	-0.303*** [-10.972]	0.122*** [5.835]	0.105*** [3.997]	-0.040*** [-2.898]	-0.049*** [-3.271]	0.012 [0.431]	0.022 [1.167]	0.092*** [3.429]
0.4	4.302*** [124.03]	-0.133*** [-3.443]	-0.036 [-1.067]	0.084** [2.249]	-0.315*** [-10.168]	0.116*** [5.590]	0.103*** [3.336]	-0.041** [-2.595]	-0.047*** [-3.217]	0.029 [1.068]	0.011 [0.614]	0.088*** [3.244]
0.45	4.337*** [160.83]	-0.100*** [-2.638]	-0.023 [-0.827]	0.059 [1.553]	-0.333*** [-10.570]	0.119*** [5.011]	0.110*** [3.243]	-0.033** [-2.038]	-0.046*** [-2.997]	0.030 [1.082]	0.004 [0.186]	0.090*** [3.289]
0.5	4.376*** [173.79]	-0.075*** [-2.312]	-0.007 [-0.249]	0.035 [1.049]	-0.355*** [-11.301]	0.128*** [5.345]	0.118*** [3.522]	-0.024 [-1.449]	-0.048*** [-3.382]	0.022 [0.918]	0.013 [0.579]	0.081*** [3.500]
0.55	4.419*** [154.66]	-0.061* [-1.667]	0.007 [0.226]	0.023 [0.599]	-0.352*** [-13.775]	0.146*** [6.427]	0.106*** [3.592]	-0.027 [-1.560]	-0.035** [-1.949]	0.026 [1.125]	-0.008 [-0.340]	0.075*** [3.142]

0.6	4.476*** [116.04]	-0.041 [-0.944]	0.027 [0.676]	0.001 [0.026]	-0.345*** [-11.170]	0.127*** [4.993]	0.110*** [3.106]	-0.050*** [-2.693]	-0.050** [-2.761]	0.035 [1.095]	-0.003 [-0.114]	0.065** [1.981]
0.65	4.550*** [102.95]	-0.050 [-1.168]	0.015 [0.380]	0.014 [0.309]	-0.354*** [-9.040]	0.134*** [5.350]	0.122*** [2.827]	-0.077*** [-4.113]	-0.054** [-2.900]	0.038 [1.196]	-0.013 [-0.534]	0.073** [2.083]
0.7	4.628*** [122.79]	-0.063* [-1.711]	0.007 [0.197]	0.028 [0.727]	-0.350*** [-9.542]	0.144*** [6.424]	0.112*** [2.894]	-0.083*** [-4.764]	-0.062*** [-3.494]	0.042 [1.494]	-0.025 [-1.015]	0.078** [2.560]
0.75	4.719*** [118.48]	-0.063 [-1.396]	0.000 [0.013]	0.043 [0.953]	-0.373*** [-8.669]	0.160*** [6.019]	0.110** [2.587]	-0.073*** [-3.891]	-0.062*** [-3.422]	0.029 [0.970]	-0.051** [-1.973]	0.076** [2.516]
0.8	4.777*** [103.68]	-0.008 [-0.145]	0.049 [1.249]	-0.016 [-0.314]	-0.405*** [-7.546]	0.169*** [6.072]	0.137*** [2.786]	-0.099*** [-4.757]	-0.024 [-1.059]	0.005 [0.156]	-0.087*** [-2.674]	0.076** [2.896]
0.85	4.940*** [84.62]	-0.030 [-0.499]	0.015 [0.257]	0.015 [0.245]	-0.448*** [-9.469]	0.178*** [5.196]	0.149*** [3.371]	-0.136*** [-5.206]	-0.026 [-1.374]	-0.010 [-0.282]	-0.100*** [-3.056]	0.052* [1.777]
0.9	5.121*** [60.10]	-0.022 [-0.254]	0.017 [0.210]	0.002 [0.029]	-0.491*** [-8.362]	0.176*** [3.360]	0.192*** [3.419]	-0.221*** [-7.179]	-0.034 [-1.242]	0.000 [0.000]	-0.144*** [-3.566]	0.019 [0.755]
0.95	5.472*** [51.61]	-0.027 [-0.209]	0.001 [0.007]	0.010 [0.080]	-0.575*** [-5.352]	0.207*** [3.498]	0.281*** [2.837]	-0.339*** [-5.836]	-0.099* [-1.914]	-0.102* [-1.829]	-0.175*** [-2.754]	0.095 [1.632]

Note: (i) The estimated regression model is specified in equation 3 using the least absolute deviation (LAD) estimator in EVIEWS Version 8; (ii) Dependent variable LCY_t is the natural logarithm of the ratio of aggregate expenditure to income for the UK; (iii) The independent variables comprise all the bivariate dummies defined in appendix Table 1; (iv) Numbers in [...] bracket are t-statistics. (ii) The symbols ***, ** and * indicate significance at the one percent, five percent and ten percent confidence level respectively. The estimated coefficients are differences in the marginal rate of consumption between households in the category assigned the value of one and those with the attribute allocated a value of zero.

