Three Papers on UK Households' Consumption

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Chapter 1

Introduction

This thesis consists of three papers on UK households' consumption with the aim to improve the understanding of household income and consumption changes. The First paper contributes to the literature which examines the link between consumer confidence indicators and households consumption changes. The second paper contributes to the literature which tests the consumption response to permanent and anticipated income shocks. The third paper contributes to the literature which tests the consumption response to transitory and unanticipated income shocks.

We use the permanent income hypothesis formulated by Milton Friedman (1957) as our main framework. The central idea of the permanent income hypothesis is that people base consumption on what they consider their "normal" income. Thereby, they attempt to maintain a fairly constant standard of living even though their incomes may vary considerably from time to time. In other words, if households do not perceive permanent income as changing, they will maintain their established spending patterns. As a result, changes in income that people see as temporary have little effect on their consumption spending.

The permanent income hypothesis, therefore, indicates that, firstly, informed individuals' consumption and savings decisions are more greatly impacted by permanent changes to income rather than changes to income that are perceived as ephemeral. Secondly, individuals are able to respond to income changes by saving and borrowing to smooth consumption.

In a major paper, to assess the validity of the permanent income hypothesis Pistaferri

(2006) identifies separately the transitory and the permanent income shock by decomposing income into two components of transitory and permanent. It investigates the consumption changes as a result of anticipated and permanent changes in income or transitory and unanticipated changes in income. The main implication of the permanent income hypothesis is that households save the transitory component of income innovations for the periods when income falls and consume all of the permanent anticipated income changes. Further, Jappelli et al (2010) suggests that the households' response to income changes depend on the nature and duration of the changes. Anticipated permanent income changes have a different consumption impact than unanticipated transitory shocks.

Typically, income shock components are not separately observable. Therefore, using household survey data, the main challenge is to identify episodes of income changes that are truly anticipated and permanent or unanticipated and transitory. With this framework, we explored the UK's Family Expenditure Survey(FES) data for the episodes of income changes that we believe fits the definition of anticipated and permanent or unanticipated and transitory income changes.

The Family Expenditure Survey (FES) combined with the National Food Survey (NFS) which ran from 1961-2001, was a continuous survey with an annual sample of around 10,000 households providing information on households' incomes and regular payments. From 2001, both the Family Expenditure Survey (FES) and the National Food Survey (NFS) were

replaced by a new survey, the Expenditure and Food Survey (EFS), which subsequently became the Living Costs and Food Survey (LCF) from 2008.

We have carefully compiled the three surveys to construct a measure of household non-durable and durable expenditure that is comparable across years. This enabled us to secure a rich dataset spanning from Q1 1986 to Q1 2016. Our dataset includes information about the household; the sex and age of each member, and also details about the type and size of the household expenditure such as housing costs, gas, electricity, and telephone charges, licences and television rental. It also contains information about less occurring expenses such as motor vehicles, season tickets for transport, life and accident insurances, a refund of expenses by an employer, welfare foods, education grants and fees. Data also concerns with income, national insurance contributions and income tax. Information collected includes: employment status and recent absences from work, earnings of an employee, self-employed earnings, National Insurance contributions, pensions and other regular allowances, social security benefits, investment income, tax paid directly to Inland Revenue or refunded, and income of a child.

Households are interviewed only once; therefore, this is not a panel. Thus, using some common households characteristics, we construct pseudo-panels for this study. These criteria are explained in more details in each chapter.

A fundamental assumption of the permanent income hypothesis is the agents' access to

the credit market. In reality, however, many have limited access to the credit market. Liquidity constrained agents are not able to borrow when expecting a fall in income. Liquidity constraint is, therefore, the most cited reason for the failure of the permanent income hypothesis. We also investigate the effect of liquidity constraints on households with respect to the permanent income hypothesis.

Our data includes the periods before and after the 2007 financial crisis. We believe that the financial crisis had an effect on households consumption since the credit access requirements for households have been restructured and households' ability to borrow was greatly affected by these changes in lending criteria. Ten years after the 2007- financial Crisis happened, this is a great opportunity to investigate this issue.

Three Papers on the UK Household Consumption

Using the UK Family Expenditure Survey, from 1986 Q1 to 2016 Q1, we have investigated the marginal propensity to consume out of changes in income. Here we present a brief introduction to the three papers.

Chapter two: Paper One - Does Consumer Confidence Index improve prediction of Household Consumption Behaviour?

In this chapter, we examine the link between consumption expenditures and consumer confidence indicator. The purpose of this paper is to asses the extend at which the confidence indicators bring additional information beyond variables usually found to have some

explanatory power for household real consumption expenditures (e.g. income, interest rates). With the permanent income hypothesis as our main framework, we assess the predictability of the consumer confidence index after controlling for information in economic fundamentals. One major implication of the permanent income hypothesis is that changes in spending are unpredictable from any past information known to consumers. We assume that the index contains some private information not captured by other economic factors.

While most literature examining the link between consumer confidence indicators and households consumption changes are focused on US national account data, this chapter will add to the literature by examining the link using UK households survey data.

We regress changes in consumption against changes in income, using the Euler equation augmented to include consumer confidence index while controlling for household characteristics. Empirical tests based on cross-section data indicate that the marginal propensity to consume from predictable changes in income are higher than would be predicted by the Permanent Income Hypothesis, for both total consumption and the consumption of non-durable goods and services. The paper also finds that including the lagged consumer confidence index can improve the ability to predict changes in total consumption. The predictive power for consumer confidence index though small in magnitude is statistically significant. The effect is not significant in the case of non-durable goods and services. The predictive power of lagged consumer confidence index primarily refutes the simple random-walk hypothesis.

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Chapter Three: Paper Two - The Marginal Propensity to Consume for Different Socio-economic Groups

In this chapter, we investigate the marginal propensity to consume out of anticipated and permanent changes in income for the UK households. We construct pseudo-panels based on the socio-economic status of the household head. Socio-economic status is a good proxy for the households' level of access to the credit market. We find that households with higher socio-economic status have lower marginal propensity to consume. We also find that the marginal propensity to consume increased after the 2007-2009 financial crisis for some households. Results for the full sample expenditure on non-durable goods and services reject the permanent income hypothesis indicating the marginal propensity to consume of more than zero and significant for four socio-economic groups. The financial crisis also has a significant effect on households' expenditure behaviour. Overall our results support the hypothesis that credit constraints are more serious for lower-income groups.

Chapter Four: Paper Three - Consumption response to unanticipated changes in income: Gambling Gains

This paper investigates the marginal propensity to consume out of unanticipated and transitory changes in income for UK households. Using a pseudo-panel, we conduct a cohort study based on the head of households' age and socio-economic status. We consider gambling gains as the households' unanticipated and transitory changes in income. The results show

some households do alter their consumption when income changes unexpectedly. Further, we investigate the marginal propensity to consume out of gambling gains before and after the 2007 financial crisis. Households that are likely to be credit constrained after the financial crisis due to structural changes in credit available to households by lending entities alter their consumption on the recipient of gambling gains. We find the marginal propensity to consume for these group of households to be small in magnitude.

The evidence presented by this paper shows that the group of households who are credit constrained according to various criteria explained in details in the respective chapter, increase their expenditure primarily in non-durable consumption as well as the total consumption.

These set of papers try to investigate the variability of consumption with respect to the changes in income using the UK households micro-data. To date, no systematic investigation has considered UK households' expenditure survey data that spans over 30 years. The research uses a conventional research method calculating the marginal propensity to consume for households in different cohorts. Cohorts are separately explained in future chapters. This study reveals while some households' consumption patterns comply with the permanent income hypothesis, those who are likely to be credit constrained, do not follow the permanent income hypothesis. This study offers insights into households' expected response to macro-policy changes. It prompts a re-thinking of expectations when implementing

policies concerning inflation, for example, to manipulate consumption and eventually gross domestic product (GDP). Our study shows though some household consumption changes do not comply with the permanent income hypothesis, the group of households who have access to the credit market, manage to smooth consumption when their income changes.

Chapter 2

Does Consumer Confidence Index improve prediction of Household Consumption Behaviour?

Abstract

This paper assesses whether consumer confidence measured by the GfK consumer confidence index, can help explain consumer behaviour using British households data. We assume that the index contains some private information not captured by other economic factors. Using the continuous Household Expenditure Survey for years 1986- 2015, the Euler equation is constructed to estimate the marginal propensity to consume. The model is augmented to include the consumer confidence indicator measured by GfK index, a variable which measures consumer sentiment. We construct a pseudo-panel using age cohorts for each quarter for total consumption and non-durable consumption. We regress changes in consumption against changes in income while controlling for household characteristics. As well as finding that the marginal propensity to consume from predictable changes in income is higher than would be predicted by the Permanent Income Hypothesis, the paper also finds that including the consumer confidence index can improve the ability to predict changes in consumption.

Keywords: Consumer sentiment; Household consumption; Cohort analysis

JEL classification: D14, G21.

2.1 Introduction

The purpose of this paper is to empirically assess the role of consumer confidence in explaining household spending in the United Kingdom using carefully aggregated household expenditure micro-data. The consumer confidence index as one of the most-watched economic indicators can be used to capture psychological motives as a representation of the household's 'willingness to buy' (See: Katona, 1975).

The term consumer confidence is frequently cited by the Bank of England's governor as a key indicator of near-term economic decisions. The sentiment is frequently considered as an indicator that contains information about future changes in household spending beyond that already contained in past values of other available indicators. It is frequently used to reflect consumers' attitude to estimate the depth and endurance of the variation in willingness of households to consume. However, despite the careful development of the survey measurement techniques to quantify consumer sentiments, so far there has been no academic evidence suggesting that it can actually predict consumption behaviour and the role of consumer sentiment has largely been overlooked in the study of household consumption.

We use UK households' Expenditure and Food Survey(EFS) and GfK's consumer confidence index. We use the indicator reported by the GfK in the United Kingdom. GfK consumer confidence index is calculated based on a survey and it measures the level of opti-

mism that consumers have about the performance of the economy in the next 12 months.[1]
Therefore, it is believed to contain information about future changes in household spending
beyond that already contained in past values of other available indicators.

The permanent income hypothesis (PIH) introduced by Friedman (1957) suggests that
consumption at any point in time is linked to the individuals' total income earned over their
lifetime; i.e. consumers only change their consumption in response to the unexpected changes
in income. In an economy where all consumers are forward-looking and behave according
to the standard permanent income model, changes in spending are unpredictable from any
past information known to consumers, including the lagged sentiment measures. Later, the
random walk proposition for consumption is explored by Hall(1978) as one implication of
the permanent income hypothesis (PIH). In this paper, following Carroll et al. (1994), we
take the permanent income hypothesis (PIH) as the framework for this study and test for
the Random Walk Model of consumption (See: Hall, 1978). Hence, following his method
we evaluate consumer sentiments predictive content for household spending we are looking
to augment the Euler model of UK consumption expenditure with a measure of consumer
confidence indicator. Significant results indicate that consumer confidence indicator contains

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[1]Established in 1934 as Gesellschaft für Konsumforschung, "Society for Consumer Research" is Germany's
largest market research institute. GfK has been conducting the Consumer Confidence survey in the same
format across Europe, including the UK, since the early 1970s.

some information about future income not reflected in current income.

Several US studies are using aggregate data and the Michigan Consumer Sentiment Index. In this paper, we use data from the Family Expenditure Survey of the British households and the Martin Hamblin GfK organization's consumer confidence index from the first quarter of 1986 to the first quarter of 2016. GfK's consumer confidence index is constructed in a very similar way as the Michigan Consumer Sentiment Index, using the same survey questions. Therefore, we are able to make a good comparison with the existing literature.

To our knowledge, no similar study is conducted using Household Expenditure survey data. We thus consider using it as one of our main contributions.

The paper is organized as follows. Section 2.2 discusses the existing literature on the use of confidence indices in Euler equations. The data is described in section 2.3. The regression analysis is motivated in section 2.4, and the results are reported in section 2.5. We conclude in section 2.6.

2.2 Literature Review

An important interpretation arising from the permanent income hypothesis (PIH) is that past, information already known to the consumer should not have predictive power for future consumption changes. Therefore, any deviation from the permanent income hypothe-

sis (PIH), implies the existence of unobserved component. What may look like an irrational behaviour could be justified by the role of private information in the decision-making process. Individuals have an enormous amount of personal information about their future that can affect current or near-future behaviour. Any seemingly irrational behaviour could be justified with reference to private information. Furthermore, sometimes what looks like positive innovation may be bad news if the agent was expecting more. This is not captured by most traditionally used variables to study consumption.

Private information is specifically mentioned as a key influencer in the expenditure decision-making process (See: Deaton, 1992). Therefore, an index to represent private information may be useful. Quantifying private information, however, has proven elusive and provides a strong obstacle since it is not obtainable through hard data. Hence, a good proxy for private information that is conducted long enough is required to study decisions shaped by private information. We believe that the consumer confidence index (CCI) could be a coincident proxy of private information and a valuable indicator to capture the agent's belief about the future. Consumer confidence is a measure of uncertainty about the future. It captures something unique of substantial importance; consumers' private information about the future that is not reflected on hard data such as national account data or even household expenditure survey data. People may become pessimistic or optimistic for reasons not related to a change in economic fundamentals.

The link between consumer confidence indicators and consumption changes have been investigated mainly in the US, using national account data and the Michigan Confidence Index as a measure of consumer confidence indicator. In a leading paper, Carroll et al (1994) using quarterly averages of the Michigan Confidence Index, together with the quarterly growth in real personal consumption expenditures of US household 1978-1993 as measured in the national income account suggest that lagged consumer confidence has some explanatory power for current changes in household spending; resulting in ruling out of permanent income hypothesis.

Eppright et al (1994) using The University of Michigan Survey Research Center's indexes of consumer sentiment and expectations and the Conference Board's index of consumer confidence and expectations are analyzed using time-series methods. The empirical findings suggest that the indexes are useful in predicting future values of aggregate consumer spending and business and economic activity. Juster and Watchel (1972) using Michigan consumer index finds it useful in the prediction of future automobile purchases. Lilien et al. (1984) suggest that buyer attitudinal surveys are valuable means for anticipating future buyer activity.

In more recent papers, the effect of consumer sentiment on consumption has been analyzed by Özerkek and Çelik (2010), Bruno (2013), Lahiri et al. (2015), and Lachowska (2016). Their results can be construed as supporting the hypothesis that consumer confidence

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contains information relevant to predicting spending, independent from other indicators, and improves the accuracy of consumption forecasts.

Although there are rich data available for the UK households' consumption and the consumer confidence index, the literature investigating the link between the two is scarce. Some recent works using UK national account data and GFK as a measure of Consumer Confidence Index shows that there is a weak relationship between consumer confidence index and households' consumption. Easaw et al. (2005) investigated whether the consumer confidence indices help predict household consumption and durable goods consumption growth for the United Kingdom and the United States and find that similar to the US, consumers' willingness is important in determining discretionary consumption for the UK. Further, Al-Eyd, Barrell, and Davis (2009) using data derived from national account data tried to establish whether there is a short-term predictive relationship between measures of consumer confidence and aggregate consumption across five major OECD (USA, France, Germany, UK and Italy). Using data derived from national account data they concluded that confidence effects on consumption are weak when other key determinants of consumption are taken into account.

As mentioned earlier, despite the extensive attention given to household spending behaviour, the influence of the consumer sentiment on actual households' consumption level is often overlooked in the UK. Most existing literature is focused on The University of Michigan

Consumer Sentiment Index and US household consumption. Few papers are studying the link using the UK national account data. Therefore, the use of the UK household survey data is considered the main contribution of this paper.

2.3 Data

2.3.1 UK Household Consumption Data

For this study, 30 years (from quarter 1 of 1986 to quarter 1 2016) of UK household Expenditure and Food Survey (EFS) are used to construct a quarterly series of expenditure. The consumption data used is drawn from the Family Expenditure Survey and the UK Living Costs and Food Survey (FES/LCF). Data is collected by the Office for National Statistics and consists of detailed information on spending patterns of around 6,000 randomly selected households a year interviewed twice over a two week period to reflect household budgets across the country. Household expenditure is seasonally adjusted to make a meaningful comparison possible. A good advantage of FES/LCF is that it is a relatively complete account of consumption. Each individual aged 16 or over in the household is requested to keep a detailed diary of all expenditures that recurred regularly over a 14-day period in addition to any credit purchase of durable goods over the year. It is then weighted to adjust for non-response and to gross to population estimates. There is no panel element in this survey

since the households so not remain in the sample for more than 15 months. Cohort data is constructed to include year-of-birth cohorts. However, as a repeated cross-sectional survey, the FES/LCF has been employed extensively by Micro- researcher to monitor patterns of aggregate change.

Data are classified according to an internationally agreed commodity grouping system since 2001; Classification of Individual Consumption by Purpose (COICOP). Previous data is then regrouped manually to place each commodity in each category of consumption to match COICOP classification. Classes comprise goods or services that are either durable or non-durable. The distinction between non-durable and durable goods is based on whether the goods can be used only once, or repeatedly or continuously over a period of considerably more than one year. The process, hence, made the longest possible series of recent data available in the identical format to conduct a reliable study on UK household expenditure. Since the format of this survey has changed over time, special attention is given to combining this data in a way that income and expenditure variables are comparable over time.

The choice of survey household data over national account data is prompted by Attanasio and Weber(1989). The use of household data allows us to separate durable and non-durable goods and services for each category of expenditure. The disaggregation of total expenditure into the three categories of consumption is to better reflect decision taking time to estimate consumer spending. FES/LCF has been extensively studied and used by economists and

econometricians in the past. However, in the process of averaging data, simple arithmetic means are produced for consistency with National Account (NA) data. Considering that National Account data has failed to measure, both in extent and timeliness, expenditure with a specific gap in the service section, there is little intuition why micro-data should be aggregated to look like the National Account Data. Therefore, in this paper, following Jensen's inequality average logarithm of household expenditure are recruited as average consumption. That is for average values, the arithmetic average of the logarithm of reported values are calculated rather than the customary logarithm of the arithmetic average.

There are two breaks, one on 1994Q1 and the other on 2001Q4. These breaks occur due to the irreversible changes made in the process of data collection. In all cases, age of household reference point is between 24 to 66 years old. It is designed so that a large number of participants are still economically active. Some are not covered: (i.e: military people in military bases, students in dormitories, elderly and disabled in nursing homes and hospitals, migrant workers in residences, people in jails, and homeless people). This data set contains 77,148 households when pooled.

The key question on income which is the same across all three surveys is the question 'what is the normal weekly disposable income of the household?'. Although it is not asking about the households' exact income in any particular week, it is a measure of households' expected income, hence, it is a good proxy for the households' permanent income. The

permanent income hypothesis (PIH) states that changes in permanent income drive the changes in a consumer's consumption patterns.

Table 2.1 reports summary statistics by age cohort of the consumption variables. The total expenditure for families living in the UK averages £411.33 a week. Average expenditure on durable goods and services is £110.00 and average expenditure on non-durable goods and services are £301.33. The average family size in the UK is 2.7 and the average age of the household reference person is 43.47 years old for a sample of households with the age of reference person between 25 to 66 years old.

2.3.2 GfK Consumer Confidence Index

In the UK, the consumer confidence index (CCI) captures the overall outlook for the economy with a concentration on consumers' views about their own and the economy's recent, current and expected economic conditions. Commonly used as an indicator of the state of the economy, it is an index that quantifies the consumer sentiment. Consumer confidence is the consumers' outlook towards the economy and their financial situation. Each month the survey tracks changes in consumers' attitude towards current economic conditions, economic conditions for the next six month, current employment conditions, employment conditions for the next six month, and total family income for the next six month.

The indicator is, hence, designed to capture individuals' attitudes regarding the current

and perceived near future economic status. It measures how optimistic or pessimistic consumers are with respect to the economy in the near future and reflects changed expectations and uncertainties about households' future conditions that have not yet occurred. It is, therefore, affected by agents' personal information as well as economic news, uncertainty, and economic growth amongst many other economic factors.

Consumer confidence indicator does not measure consumer confidence explicitly but calculates an index based on a household survey of consumers' opinions on current conditions and future expectations of the economy. In the UK, GFK, commonly used index of consumer confidence is one of the most closely watched indicators that measures the level of consumer confidence throughout the United Kingdom. It is derived from a subset of forward-looking questions surveying about 2,000 consumers who are asked to rate the relative level of past and future economic conditions including personal financial situation, overall economic situation, and savings level. The GfK survey includes two questions related to households' finances, three to the general economic situation and one to the perceptions of respondents as to the current desirability of making major purchases. A reading above zero indicates optimism; below zero indicates pessimism.

This survey includes the same questions as the Michigan confidence index which is commonly used in the US, as well as Carroll et al. (1994). This enables us to compare the results with those of Carroll et al. (1994) whose methods we are using in this paper. The questions

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are as follow: 1. How does the financial situation of your households now compare with what it was 12 months ago? 2. How do you think the financial position of your households will change over the next 12 months? 3. How do you think the general economic situation has changed over the last 12 months? 4. How do you think the general economic situation will develop over the next 12 months? 5. Do you think there are benefits in people making major purchases such as furniture, washing machines, TV sets at the present time?

Further, given that the first four questions indicate households' evaluation of their future finances and general economic situation and questions 2, 4 and 5 (three out of five questions) are forward-looking questions based on past information, the consumer confidence indicators are considered forward-looking variable in economic analysis.

Measures of consumer confidence are shown to be correlated with real consumption changes (See: Al-Eyd et al, 2009).[2] Figure 2.1 shows some comovement between the changes in the consumer confidence index measured by GfK and the log changes in households' consumption.

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[2]Results from data analysis are detailed later in this chapter.

2.4 Motivation for the Regressions

We first examine the forecasting capacity of disposable income using UK households expenditure data. This is a test of Hall (1986) random walk model of consumption, as used more recently by Carroll et al. (2012) and Blundell et al. (2016). According to the permanent income hypothesis, the aggregate consumption function can be represented by the individual's decision.

The rational individual maximizes:

$$MaxE_t \sum_{i=0}^{T-t}(1+\delta)^{-i}U(C_{t-i}) \tag{2.1}$$

Subject to:

$$\sum_{i=0}^{T-t}(1+r)^{-i}(C_{t+i} - Y_{t+i}) = W_t \tag{2.2}$$

Where C_t is private consumption at period t, E_t is expectations subject to information at period t, T is the lifetime of the individual, W_t is wealth excluding human capital at period t, Y_t is disposable income at period t, δ is the rate of time preference, and r is the real rate of interest. To do so, we run a basic Euler equation as follow: Hence the Euler equation can be obtained from the maximization of the above equation:

$$E_tU'(C_{t+1}) = (1+\delta)/(1+r)U'(C_t) \tag{2.3}$$

The equation 2.3 implies that the marginal utility at time t, is the best predictor of the

marginal utility at time $t + 1$. If we assume that the rate of time preference is equal to the real rate of interest, we find:

$$E_t(C_{t+1}) = C_t \tag{2.4}$$

Therefore, at time t, the conditional expectation of consumption in the sequence, given the information accumulated up to time t, consisting of all events about which the consumer know whether they have happened or not, is equal to the present value. This, in turn, implies that current consumption is the best predictor of consumption in the next period or:

$$\Delta C_t = \varepsilon_t \tag{2.5}$$

where ε_t is the innovation in permanent income.

Therefore, using our data, we test:

$$\Delta \ln C_{it} = \beta_0 + \beta_1 \Delta \ln Y_{it} + \beta_2 r_t + \varepsilon_{it} \tag{2.6}$$

where $\Delta \ln Y_{it}$ is the changes in the logarithm of households' normal weekly income. and r_t is the real interest rate. The coefficient of interest in this equation is β_1.

As mentioned in section 2.3 information regarding households' health, willingness (See: Katona, 1974), social network (See: Frank, 1989, and Flingstein et al. 2017) is not available in the big data set to be used and in fact, some are even impossible to measure in the first place. It is then useful to introduce a variable that captures the private information agents

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hold.

Figure 2.1 shows the quarterly average of the consumer confidence index, 1986Q1-2016Q1, together with the quarterly average household consumption expenditure as measured by the Household Expenditure Survey for the United Kingdom.

The co-movement between average weekly GFK consumer confidence index with average weekly consumption is noticeable. We further conducted a basic correlation test. The results from the test of correlation between changes in consumption and changes in consumer sentiment confirms our hypothesis. Although still moderate, the highest correlation was exhibited between the changes in consumption and changes in consumer confidence index, lagged once. the correlation is reported at (0.127) albeit economically small, it is significant at a 5% significance level. In this paper, we use the changes in consumer confidence index, lagged once as a proxy for the information agents hold, affecting their consumption decisions, that is not captured by hard data.

The use of lag changes in consumer sentiment is prompted by the intuition in the first place. That there is a contemporaneous correlation between sentiment and spending does not seem surprising. When the economy is gloomy it is likely that low-spirited households give gloomy responses to Consumer Confidence survey questions and restrain household expenditure. Carroll et al. (1994) present evidence that the lagged values of consumer confidence indicator taken on their own does explain about 14% of total household spending

growth variation. Furthermore, It considers the consumer confidence index as an independent driving factor in the economy. Most works mentioned in the literature confirm it not only forecast changes but also cause them (See: Barrell,2006). lastly, It is likely that confidence rises in advance of consumption, owing to the delay in obtaining credit for consumption to take place. So the value of the index at time $t-1$ contains news received at time $t-1$ about lifetime resources that prompt changes in consumption.

In this paper, we follow the random walk model of consumption, Hall (1978) as the framework. The random walk proposition is simply that the expectation of consumption changes is zero. This means that no information known to the consumer when the consumption choice at time t is made can have any predictive power for how consumption will change between period t and $t+1$ (or for any date beyond $t+1$). Similar to Carroll et al. (1994), we examine the predictive ability of the consumer confidence index using OLS. We first examine the the $\bar{R}^2$ from regressions of the growth of various measures of household spending on lagged values of the consumer confidence index:

$$\Delta \ln C_{it} = \beta_0 + \sum_{j=1}^{4} \theta \Delta CCI_{t-j} + \varepsilon_{it} \tag{2.7}$$

where $\Delta \ln C_{it}$ is the change in the logarithm of the quarterly growth rate of weekly consumption at time t for cohort i, the variable ΔCCI_{t-j} represents the change in consumer confidence index with j from 1 to 4 representing four lags of change in consumer confidence

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index, and ε_{it} is the error term. The coefficient of interest is θ, a non-zero coefficient rejects the random walk hypothesis and suggests that consumer confidence has some predictive power.[3]

We then extend this simple model to include a set of variables, X_{it}, to control for the information contained in other variables available to economic forecasters. This results in the Euler equation augmented by four lags of changes in consumer confidence.

$$\Delta \ln C_{it} = \beta_0 + \sum_{j=1}^{4} \theta \Delta CCI_{t-j} + \beta_1 \Delta \ln Y_{it} + \beta_2 r_t + \beta_3 X_{it} + \varepsilon_{it} \qquad (2.8)$$

where $\Delta \ln Y_{it}$ is the logarithm of the change in the quarterly growth rate of weekly income, and r_t is the base rate interest rate.

We run these regressions for three categories of consumptions: total consumption (C_{it}^t), Consumption of durable goods and services (C_{it}^d), and consumption of non-durable goods and services, (C_{it}^{nd}). The results from the regressions are summarized in table 2.2.

Results confirm that the values of consumer confidence indicator applied directly in the regression is statistically significant for one-quarter-ahead variation in household expenditure on durable goods and services. Moreover, the changes in lagged values of consumer confidence indicator are statistically significant for total household spending growth variation and

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[3]We ran reduced form regression including only one lag of consumer confidence index and lag 2-4 of confidence index separately. This did not change the results.

household spending growth of non-durable goods and services variation.

2.5 Results

The marginal propensity to consume out of predictable changes in income for the initial Euler equation is presented in the first section of table 2.2 for three different categories of consumptions. the coefficient of income changes for the three categories of consumption are different from zero at 1% significance level. The coefficients are 0.645, 0.857, and 0.571 for total expenditure, expenditure on durable goods and services, and the non-durable goods and services respectively, shown in column 5. Our results are in line with those of Flavin (1981) as well as Blinder and Deaton (1985). In both papers, changes in income are shown to affect consumption. The marginal propensity to consume out of normal changes income in the Blinder and Deaton's paper, however, is about 0.15. This is much lower than our findings. The difference can be attributed to the aggregation process (See: Attanasio and Weber, 1995)

Results for reduced form regression including four lags of consumer confidence index is reported in the second section of table 2.2 for three different categories of consumptions. For the households' total consumption, only the one-period lagged consumer confidence index θ_1 is statistically significant. The coefficient is 0.240 and significant at 1% significance level. A

similar result is reported for the consumption of non-durable goods and services in row 6: the coefficient, θ_1, for the consumption of non-durable goods and services is 0.129, however, this is significant at 5% significance level. Results for the consumption of durable goods and services are slightly different. Similar to the other two categories of consumption, one period lagged changes in CCI are statistically significant with a coefficient of 0.678 and significant at 1% significance level. Also, CCI lagged two with a coefficient of 0.331 is statistically significant at 10%. CCI lagged three is not significant in the consumption changes of durable goods and services, however, surprising results are reported for the CCI lagged four. The coefficient for lag four CCI, θ_4 for in the reduced form regression is, interestingly, significant at a 10% significance level with a negative sign.

Results for incremental regression including four lags of consumer confidence index as well as changes in income and level interest rate, are reported in section 3 of table 2.2. Changes in consumption are still sensitive to expected changes in permanent income in all three categories of consumption; Households' total consumption, consumption of durable goods and services, and consumption of non-durable goods and services. The consumer confidence index changes remain significant in predicting changes in the households' total consumption and the consumption of durable goods and services. Changes in consumer confidence index follow the same trend for the changes in household' total consumption and the consumption of durable goods and services. The coefficients' signage remains unchanged compared to

the reduced form regression, however, the magnitude of the coefficients are slightly smaller. The consumer confidence is no longer statistically significant in predicting the changes in consumption of non-durable goods and services when included in incremental regression.

In each category, for all regressions, all coefficients are jointly significant at the 5 percent level or better, except for the coefficients on the lags of consumer confidence index in the reduced form regression, for the households' consumption of non-durable goods and services that are significant at 10 percent level.

The adjusted R-squared is reported in column 6 of table 2.2. Following Carroll at al. (1994), we compare the adjusted R-squared to determine the predictive power of the consumer confidence index. Results from the Euler regression show that changes in income explains 26% of changes in total consumption. This is only 0.6% in the case of durable goods and services and 35% for the changes in consumption of non-durable goods and services.

These results are significant since expectations of future consumption is allowed to depend on past values of consumption indicators that might be relevant for expectation information set. It is to capture the "general forward-looking" attitude of the consumers. If PIH holds, this set of information should be already contained in the decision-making process, hence the coefficient should not be significant in case the variable is directly included in the regression.

Further, results for adjusted R-squared for reduced form regression is reported in section 2

of the table 2.2, in column 6. Our results are significantly different from those of Carroll et al. (1994). Our results show that lagged values of the consumer confidence index taken on their own explain a modest 2% of the one quarter-ahead variation in changes in total consumption and the consumption of durable goods and services. Our results contradict those of Carroll et al. (1994) or Bram and Ludvigson (1998) analysis. Carroll et al. (1994) finds that consumer confidence indicator, independent of income growth, explains an additional 3% and 5% growth in total and durable consumption respectively. This is 14% and 17% of total and durable consumption growth in the case of Bram and Ludvigson (1998). Carroll et al. (1994) or Bram and Ludvigson (1998) do not report predictive power of consumer confidence index for the consumption of non-durable goods and services, however, Carroll et al. (1994) tested for the motor vehicles and the adjusted R-squared is reported to be 4%, that is similar to our results for changes in consumption of durable goods and services that include the purchase of a motor vehicle.

Changes in consumer Confidence index has the least explanatory power for the changes in consumption of non-durable goods and services. The Adjusted R-squared this category of consumption is 1%. These results are also very different from those of the Carroll et al. (1994) who report adjusted R-squared of around 10% for changes in the consumption of non-durable goods and services.

Finally, we investigated whether the consumer confidence index has any additional pre-

dictive ability once information contained in other variables are available. We tested the incremental regression; Euler regression augmented by four lags of changes in confidence index. Adjusted R-squared for this regression is reported in section 3 of table 2.2. We find that lagged values of the consumer confidence index explain 9% of the variation in the growth of households' total consumption, 3% of the variation in households' consumption of durable goods and services, and none of the variation in households' consumption of non-durable goods and services. Our results are similar to those reported by Carroll et al. (1994) except that in the case of total consumption, they find only 3% increase in adjusted R-squared of the regression once lags of consumer confidence index are included.

Considering the UK literature, similar to Easaw et al. (2005) we find that including consumer confidence index improves the prediction of income changes, however, with respect to the power of prediction for the consumer confidence, our results are in line with those of Al-Eyd et al. (2008). Similarly, Al-Eyd et al. (2008) show that confidence effects on consumption are weak when other key determinants of consumption are taken into account across five major OECD countries including the UK.

Overall, our results indicate that the consumer confidence index as a forward-looking measure can explain consumption growth in addition to changes in labour income and this is found to be especially true for the households' total consumption and the consumption of durable goods and services, however, it has no significant impact on expenditures on

non-durables and services.

2.6   Conclusions and Further Research

This paper re-examined the link between consumption expenditures and consumer confidence indicator following Carroll et al. (1994) method of testing the permanent income hypothesis (PIH). The existing literature relies mostly on aggregate national account data that are limited in terms of frequency. So in the first step, we extended the model using quarterly data from the household expenditure survey in the UK. We constructed a pseudo-panel of repeated cross-sections of households in the UK over 30 years, from 1986 to 2015, we investigate to determine the predictive power of the consumer confidence index. Then, we consider the ability of the consumer confidence index to forecast consumption in an even more realistic setting, where Euler equation is augmented by lags of the consumer confidence index.

Firstly, our results show that the lagged response of consumption to changes in Consumer Confidence Indicator is not consistent with the consumption random walk model, suggesting consumer confidence index provides some additional information above readily available economic and financial data. Secondly, the results suggest that the consumer confidence indicator are helpful in forecasting the UK households' consumption. The link is found to be stronger when used as an explanatory variable in a standard forecasting model of

spending, the Euler Equation, on total consumption and the consumption of durable goods and services. The consumer confidence index has no additional predictive power for variation of non-durable goods and services.

Comparing to the US literature, the explanatory ability of the GfK consumer confidence index is lower, however, the results we have derived is consistent with much of the existing literature for the UK. Easaw at al. (2005) suggest that the impact of confidence level on consumption expenditure level although statistically significant, economically it is minor. Similarly, Al-Eyd et al. (2009) suggest the consumer confidence cause the variation in consumption, however, similar to our result, their findings indicate the weak impact of confidence on consumption decision makings.

Although our finding suggests that the consumer confidence index contains modest economic information that influences consumption expenditure, there is still a role for consumer confidence index in the study of households consumption. The survey to calculate and report the GfK consumer confidence index is conducted regularly and the index is reported on a monthly basis making the GfK consumer confidence index as one of the most reliable measurement of current economic conditions available in a timely manner compared to other economic data. Hence, the GfK index as a forward-looking subjective indicator is useful in analyzing and forecasting household expenditure behaviour. A better understanding of the household financial expectations and decisions should be a valuable input into several

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policy areas, in particular into monetary policy and financial stability analysis. This index will give a timely measure of consumer attitudes, and this chapter has shown that it really can predict changes in consumption behaviour. Previously policymakers have used the GfK when considering policy changes, but here we provide evidence (for the first time in the UK), that there are sound reasons for doing so. Consumer confidence may serve to reinforce or counteract policy changes; therefore, it is essential for policymakers to consider it to improve prediction of policy effects.

While a large literature is using basic Euler equation to study the relationship between household expenditure and consumer confidence indicators, some are using Granger causality to determine the predictive power of consumer confidence indicators. Further studies might look for a cross-check with Granger causality. Also, further research on the influence of financial optimism or pessimism on household expenditure behaviour at the household level is recommended. This might, for example, look for combining consumer index and business index together with households' propensity to save and borrow to investigate household financial behaviour and economic cycle. This can be specifically appealing to the monetary and financial policymakers.

A most important topic for future research, however, is developing a theoretical model containing consumer confidence index and household expenditure correlation. In our study, we have controls for economic fundamentals regarded as important determinants of house-

holds consumption growth. Although we do not prove consumer confidence index causes changes in households' expenditure level, our results, however, suggest that consumer confidence indicator can help predict consumption, hence, economic fluctuations. It is, therefore, important to develop such a model.

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Figure 2.1: "United Kingdom:consumption growth(lhs) and consumer confidence index (rhs).
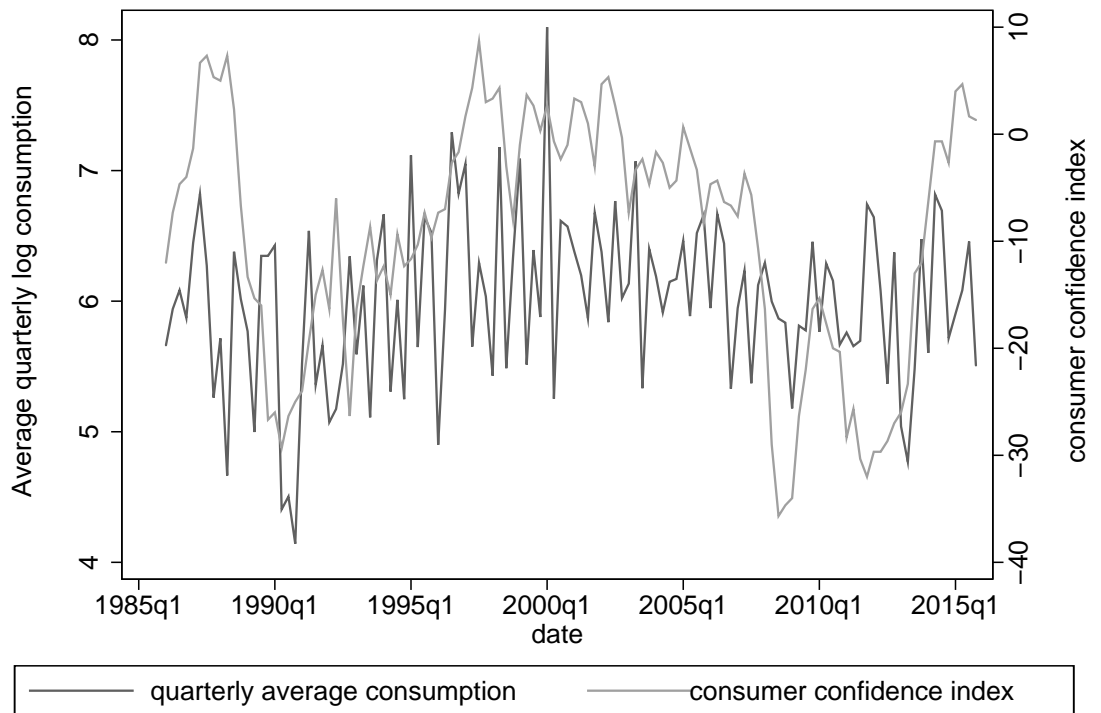
Table 2.1: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Total Consumption	77,148	411.33	392.39	0	1410.892
Durable Goods	77,148	110.00	227.60	0	293.78
Non-Durable Goods	77,148	301.33	260.34	0	1158.192
Age	77,148	43.47	11.03	25	66
Family size	77,148	2.68	1.35	1	15

Notes: Own calculations

Table 2.2: Regression Results.

	θ_1	θ_2	θ_3	θ_4	β_1	β_2	$\bar{R}^2$	Obs.	F-test
Basic Euler Equation									
$\Delta \ln C_{it}^{t}$					0.645***	-0.02	0.261	689	92.13
					(0.0475)	(0.101)			
$\Delta \ln C_{it}^{d}$					0.857***	0.13	0.063	689	19.14
$\Delta \ln C_{it} = \beta_0 + \beta_1 \Delta \ln Y_{it} + \beta_2 r_t + \varepsilon_{it}$					(0.14)	(0.37)			
$\Delta \ln C_{it}^{nd}$					0.571***	-0.05	0.356	689	141.6
					(0.0340)	(0.07)			
Reduced Form Regression									
$\Delta \ln C_{it}^{t}$	0.240***	0.0312	-0.111	-0.131			0.019	650	3.503
	(0.07)	(0.07)	(0.07)	(0.22)					
$\Delta \ln C_{it}^{d}$	0.678***	0.331*	-0.198	-0.523**			0.025	650	4.760
$\Delta \ln C_{it} = \beta_0 + \sum_{j=1}^{4} \theta \Delta CCI_{t-j} + \varepsilon_{it}$	(0.21)	(0.19)	(0.21)	(0.22)					
$\Delta \ln C_{it}^{nd}$	0.129**	-0.0730	-0.0601	-0.0404			0.011	650	1.995
	(0.06)	(0.05)	(0.05)	(0.06)					
Incremental Regression									
$\Delta \ln C_{it}^{t}$	0.151**	0.0690	-0.0886	-0.112	0.636***	-0.02	0.270	650	32.96
	(0.067)	(0.061)	(0.06)	(0.06)	(0.04)	(0.11)			
$\Delta \ln C_{it}^{d}$	0.569***	0.389**	-0.158	-0.496**	0.849***	0.09	0.087	650	10.20
$\Delta \ln C_{it} = \beta_0 + \sum_{j=1}^{4} \theta \Delta CCI_{t-j} + \beta_1 \Delta \ln Y_{it}$	(0.21)	(0.197)	(0.21)	(0.21)	(0.14)	(0.35)			
$\Delta \ln C_{it}^{nd}$	0.0488	-0.0414	-0.0422	-0.0230	0.557***	-0.04	0.350	650	44.78
$+ \beta_2 r_t + \beta_3 X_{it} + \varepsilon_{it}$	(0.048)	(0.04)	(0.04)	(0.05)	(0.03)	(0.07)			

Notes:

Regression results for the full sample from Q1 1989 to Q1 2016 is reported in this table. θ_1, θ_2, θ_3, θ_4 are the coefficients of lag consumer confidence index measured by GfK, β_1 is the coefficient of changes in the logarithm of income, β_2 is the coefficient of real interest rate, and Obs is the number of observations. $\bar{R}^2$ is adjusted R-squared. $\Delta \ln C_{it}^{t}$ is changes in the total consumption, $\Delta \ln C_{it}^{d}$ is changes in the consumption of durable goods and services, $\Delta \ln C_{it}^{nd}$ is changes in the consumption of non-durable goods and services. Robust standard errors in parentheses. *** means significant at 1 percent, ** means significant at 5 percent, * means significant at 10 percent.

Chapter 3

The Marginal Propensity to Consume

for Different Socio-economic Groups

Abstract

This paper investigates the marginal propensity to consume for the UK households across different socio-economic groups. It uses the Family Expenditure Survey, a repeated cross-section of British Households, which reports expenditure, income, and household characteristics from quarter 1 of 1986 to quarter 1 of 2016. Since each household is interviewed only once we construct pseudo-panels based on the socio-economic status of the household head. We find that households with higher socio-economic status have lower marginal propensity to consume. We also find that the marginal propensity to consume increased after the 2007-2009 financial crisis. This study supports the hypothesis that credit constraints are more serious for lower-income groups.

Keywords: Marginal Propensity to Consume, Permanent Income Hypothesis, Socio-economic Status, Household Survey Data

JEL classification: D1, D9, D14.

3.1 Introduction

Estimates of the marginal propensity to consume from changes in income have usually found that households are more sensitive to changes in income than is predicted by the permanent income hypothesis. Hall (1978), for example, argued that 20 percent of households are "rule-of-thumb" consumers and spend a fixed proportion of their current income. A common explanation for this excess sensitivity to changes in current income is that some households are liquidity constrained (Flavin 1984). Such households are unable to smooth consumption since they are unable to borrow in periods where their income is below the desired level of consumption implied by the permanent income hypothesis. A key problem is to identify households likely to be credit constrained. Hayashi (1985), for example, argues households with low levels of savings are constrained, while Zeldes (1989) argues households with low assets-to-income ratios are constrained. They both find their constrained households are more sensitive to income changes and that around 15-20 percent of households do not follow the permanent income hypothesis.

In this paper, rather than use the level of savings or assets as a proxy for credit constraints, we will argue that there are differences in access to credit across socio-economic groups. Socio-economic status is an Office for National Statistics standard classification which provides an indication of the socio-economic position of households based on occu-

pation title combined with information about their employment status. We grouped the socio-economics categories into 4 groups; 'professionals', 'skilled', 'unskilled', and 'unoccupied'. These groups differ by the extent to which they are likely to be credit constrained. Professional households are not only likely to have higher and more stable income than low-skilled households, but they are also more likely to have access to credit. This paper will use British household data for 1986-2016 to estimate the marginal propensity to consume and compare the response to anticipated income changes for four different socio-economic groups. The key contribution of the paper is that it is the first paper that compares the marginal propensity to consume of different types of British household. It will examine how the four socio-economic groups differ and whether these differences are consistent with the hypothesis that lower socio-economic groups are more likely to be liquidity constrained, and hence more sensitive to changes in their income.

An important advantage of our data-set is that it includes the period before, during and after the 2007-2009 financial crisis; the period associated with major changes in borrowing criteria which restricted access to credit markets, (See: Bank of England Financial Stability Report, Sep 2008). This enables us to study the effect of the financial crisis on household expenditure. In this paper, we will explore how the marginal propensity to consume of the four different socio-economic groups differ before and after the financial crisis. We hypothesise that the crisis affected lower socio-economic groups more severely than those

households in higher socio-economic groups.

The paper proceeds as follows: Section 3.2 discusses the existing literature on the Permanent Income Hypothesis in more detail. Section 3.3 gives a detailed description of household data which is used in this study. Section 3.4 describes the empirical methodology while section 3.5 reports the results. The conclusions are described in section 3.6.

3.2 Literature Review

A large literature has been published on the marginal propensity to consume with many showing how household consumption responds to changes in economic resources. The permanent income hypothesis, as outlined by Milton Friedman (1957), suggests only permanent and unexpected income shocks result in a major revision in consumption. This theory suggests that people use borrowing and saving to smooth income fluctuations and they should not respond to changes in income that are fully anticipated. Therefore, an estimation of the marginal propensity to consume out of anticipated income changes should yield insignificant results. For example, an anticipated promotion at work, that can result in a change in income level, should not affect the marginal propensity to consume at the time it happens since the expectation of the income change is already included in the information set. Instinctively, when lagged consumption and income are included as instruments in regres-

sion a consumption decision is made based on information available at time $t - 1$. Hence, the marginal propensity to consume out of predictable changes in income based on past information should be statistically insignificant.

The theory also suggests that rational agents' desired consumption is determined by permanent income, while they have access to the credit market; suggesting that when households face a temporary reduction in income to continue consuming as before they need to have access to debt to finance this consumption. This is important because, for example, if a group of households are excluded from the credit market, they are likely to react strongly to anticipated changes in income.

The permanent income hypothesis has been tested and rejected over time with liquidity constraints as one of the main reason for rejecting the hypothesis. Hall (1978) demonstrates that given the inclusion of lagged consumption, no other variable observed in earlier periods should have any explanatory power for current consumption. He finds households respond differently to different sources of income variations and concludes that aggregate consumption should be modelled for the optimal choice of a single, fully rational, and forward-looking agent ie. Euler equation approach. Hall (1978) rejects the implications of pure life cycle-permanent income; arguing households display "excess sensitivity" to predictable changes in income. His results suggest 80 percent of households follow the permanent income hypothesis, but that 20 percent of households are "rule-of-thumb" consumers who consume a fixed proportion

of their current income. Hall (1978) does not mention the reason for the rejection of the hypothesis.

Similarly, Flavin (1985) tests the permanent income hypothesis using US Annual Aggregate data and shows marginal propensity to consume to be different from zero and reports excess sensitivity for the proportion of the population subject to liquidity constraints. This could not be attributed to myopic behaviour of the individual since the inclusion of the unemployment rate as the proxy for liquidity constraint changes the marginal propensity to consume both in magnitude and significance. Without the liquidity constraint proxy, she finds the marginal propensity to consume to be 0.37. After the inclusion of the unemployment rate as part of the information set, the marginal propensity to consume falls to 0.15; significantly different from the initial estimate. She states that a lack of access to the credit market and the myopic behaviour of individuals are the main reasons. Both these papers reject the version of the permanent income hypothesis with perfect capital markets. In both papers, predictable changes in income are shown to affect changes in current consumption.

Hayashi (1985) also argues the permanent income hypothesis applies to about 85% of the population and income changes explains only a small fraction of the movement in expenditure. He also shows households with high levels of savings are associated with lower excess sensitivity. Later, Altonji and Siow (1987) using PSID data finds including the coefficient of lagged income growth, that the marginal propensity to consume out of predicted

changes in income is statistically significant. Zeldes (1989) households' asset to income ratio as a measurement of liquidity constraints to confirm the excess sensitivity. He concludes that households with a higher asset to income ratio were consistently less sensitive to income changes. Poterba (1988), Wilcox (1989), and Campbell and Mankiw (1989) present an analysis of reactions to predictable changes in income using aggregate data. They show that periods in which consumption is high relative to income are typically followed by rapid growth in income. They find a significant marginal propensity to consume of between 0.32 and 0.71. Their findings suggest that while most households seem to follow the simple rule-of-thumb model of consumption, for a fraction of forward-looking households, their knowledge of future income growth is reflected in current consumption and hence they follow the permanent income hypothesis.

The relationship between liquidity constraint and consumption, in the light of the permanent income hypothesis, has received considerable attention from economists. It is worthwhile to look at some studies that consider evidence from individual households expenditure surveys. Runkle (1991) considered home-ownership status as a measure of ease of access to borrowing. He assumes that home-owners are less constrained and show less excess sensitivity. He directly tests for liquidity constraints using panel data on individual households and finds no evidence of liquidity constraints. He suggests that the failure of the permanent income hypothesis is due to aggregation bias. Jappelli et al (1998), exploited the Survey

of Consumer Finance to estimate the probability of a household being constrained. They studied food consumption changes in response to anticipated income changes from the Panel Study of Income Dynamics and found no evidence for much excess sensitivity associated with the possibility of constraints. Later, Jappelli et al. (2010) established the probability a household was denied access to credit and refused the permanent income hypothesis for households with lower probability of access to credit.

Shapiro and Slemrod (1995) interviewing households after the announcement of tax reduction concluded that 40% of people interviewed planned to spend the extra cash. Taking the predictable nature of this transitory income increase, Souleles (2002) exploited the anticipated income increase induced by pre-announced tax refunds to test the permanent income hypothesis. Given the predictable nature of this changes in income, it should thus not alter consumption in the year of its receipt, he finds that consumption is excessively sensitive to anticipated tax-cuts with a marginal propensity to consume of 35% to 60%. In a similar paper, Parker (1999), using the CEX[1], studied the reaction of household consumption to predictable changes in social security taxes using the security payroll cap, a predictable income decrease in January and increase in the middle of the year. The results show a 20 cents increase in non-durable consumption for each dollar increase in this anticipated income. He

[1]Consumer Expenditure Surveys (CEX) provides data on expenditures, income, and demographic characteristics of consumers in the United States.

also rejected the possibility of households being liquidity constrained since the sample only included high-income taxpayers. Similarly, Shapiro and Slemrod (2009) used 2008's tax rebate as a case of predictable income increase and showed that this mostly led to an increase in expenditure for 20% of survey respondents.

Few studies support the excess sensitivity for the households. For example, Browning and Collado (2001) is using ECPF Spanish panel data and institutionalized June and December extra wage payments to full-time workers as a case of anticipated income increase and finds no evidence of excess sensitivity suggesting bounded rationality as a reason why earlier researchers found large response of expenditure to predicted income changes. Hsieh (2003) used both annual payments from the state of Alaska's Permanent Fund and tax rebates as cases of predictable income increase and only finds evidence for excess sensitivity with respect to tax refunds but not with respect to payments from the state of Alaska's Permanent Fund.

The literature we have reviewed has largely rejected the permanent income hypothesis since changes in consumption are excessively sensitive to predictable changes in income. One major criticism of this literature is that many of papers are using national aggregate data. Attanasio and Weber (1995) argue that such data is subject to aggregation biases, and more importantly conceals the heterogeneity in consumption behaviour across different types of household. They advocate using household survey data where the income changes are traced for each family over time. Using such data allows us to capture the consumption behaviour of

households with different household characteristics. However, there are a limited number of household panel data sets available with a relatively small sample size that often experience attrition and non-response. Hence, most existing studies have been conducted using US data. The data used in our study is not a true panel. Instead, following Browning, Deaton and Irish (1985) and Attanasio and Weber (1995), we construct a Pseudo-panel. We group individuals who share the same socio-economic status into cohorts, and use the averages within these cohorts as observations in our pseudo panel.

A further criticism of this literature is the nature of proxy for the credit constraint. For example, McCarthy (1995) and Jappelli used the level of wealth, Pistaferri (2012) cash-on-hand, Zeldes (1989) used asset to income ratio, and Runkle (1991) used home-ownership to classify the households as constrained or unconstrained. These commonly used factors suggest a very narrow view of credit market conditions.

Several papers have explored how consumption changed during the 2007-2009 financial crisis. For example, Jensen et al (2017) using Danish household data show banks that reduced their lending caused a significant decrease in the borrowing and spending of their customers. They also find that borrowing remained lower after the crisis and spending foregone during the crisis has not recovered. Dutt et al (2009), using US data, find similar evidence when businesses are unable to borrow during and after the financial crisis. However, to the best of our knowledge, there is no paper which investigates the changes in the behaviour of

UK households; and in particular, how the marginal propensity to consume of households changed as a result of the crisis.

The aim is to see if the estimate of the marginal propensity to consume out of predictable changes in income varies across different socio-economic groups and if so, to see how they are affected, in both magnitude and statistical significance, during and after the financial crisis.

3.3   Data

This paper uses UK household data on consumption and income from 1986 Q 1 to 2016 Q 1. The Family Expenditure Survey (FES), compiled by the Office for National Statistics, has detailed information on the income and spending of a large number of individual households, covering mainland Britain and Northern Ireland, but excluding students in residential halls, the armed forces, people living in nursing and residential homes, prisoners and the homeless. As well as detailed responses to questions on income and expenditure, the survey also reports details on household characteristics such as age, household size, household composition, and socio-economic status. However, it does not include any information on households' level of education. Each wave of the FES reports the responses of around 6000 households. Households are interviewed continuously throughout the year, although each household is

only interviewed once (meaning the survey is not a genuine panel).

The FES was discontinued in 1994. Between 1995 and 2002 it was replaced by the Expenditure and Food Survey (EFS). Although it categorized the expenditure variables in a slightly different way, the main change is that the survey replaced paper questionnaires with directly digitally recorded responses. It is nevertheless comparable with the earlier FES survey. This survey was renamed the Living Costs and Food Survey (LCF) in 2002 when changes were made to make it comparable to other household surveys in the rest of the European Union. This last change resulted in some slight changes in the individual expenditure categories.

The use of FES is prompted by Attanasio and Weber (1995). They encourage the use of micro household data rather than the aggregate data commonly used hitherto in the study of household consumption and argue that the individuality of agents are better preserved in Survey data, hence, more useful when studying households' behaviour. Moreover, the use of household data allows us to separate durable and non-durable goods and services for each category of expenditure. The disaggregation of total expenditure into the three categories of consumption is to better reflect decision taking time to estimate consumer spending.

Additionally, we combine data from the FES, the EFS and the LCF surveys. Thus it will use data from 1986 to the first quarter of 2016. The data were combined using the 2001 consumption categories contained in the Living Cost and Food Survey (known as Classification

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of Individual Consumption by Purpose, COICOP). This allows us to construct a harmonized overall measure of total and non-durable consumption for each household that is constructed consistently between the surveys. Combining the surveys using identical definitions of the consumption categories enables us to have thirty years of data, a considerably longer period than each survey covers.

The questions on income are the same across all three surveys. There are separate questions on wages, second jobs, self-employed income, non-wage income and social transfers (e.g. benefits). The key question we exploit in our analysis is the question 'what is the normal weekly disposable income of the household?'. This formulation of the question has some advantages. While it is not necessarily the household's income in any particular week, it will be a measure of the household's normal (or expected) level of income, and thus, we claim, a good proxy for the households' permanent income. It is the changes in permanent income (or normal income) which should cause changes in the level of consumption of the household (according to the Permanent Income Hypothesis), rather than unpredictable and temporary changes in current income.

The survey data used in this paper is compared to the National Account data in figure 3.1. The figure shows the average level of overall consumption in the three household surveys (using the left-hand scale and plotted with a solid line), and average household consumption is given by the national account data (using the right-hand scale and plotted with a dashed

line).[2] The household survey data uses three different surveys, and the figure shows that there is a break in 1992 when the survey switched from the FES to the EFS, and a further break when the survey switched from the EFS to the LCF. Nevertheless, average household consumption grew steadily through most of the sample period. The data shows there was a small recession in the early 1990s and a small decline in 2007 (the height of the recession which resulted from the sub-prime crisis). The pattern of consumption in the three household surveys is similar that shown in the national account data. The major difference seems to be the sub-prime recession was longer and deeper in the national account data than in the LCF. Nevertheless, the similarities in the broad trends give us confidence that the use of the survey data is sensible.

3.3.1 Constructing Pseudo-Panel

Since households are only interviewed once in the household surveys, we can not construct a true household panel. This problem can be overcome by following the approach suggested in Browning, Deaton and Irish (1985); creating a pseudo-panel with the use of cohorts from repeated cross-sections where we create groups of households with shared characteristics.

[2]Note that the numbers are not completely comparable since the National Account data will include household spending by care-home residents, prisoners, military members, and tourists but excludes holiday spending. It will also include the spending made by unincorporated businesses.

In this approach, individuals sharing some common characteristic are grouped into cohorts and the average level of consumption and income within each period and for each cohort is constructed. Both Deaton (1985) and Attanasio and Weber (1995) used year-of-birth to define the cohorts, while Maki et al (2001) defined cohorts based on the level of education.

The key issue we investigate in our paper is the marginal rate of consumption for different groups. We will define groups which are likely to differ in the extent to which they are liquidity constrained. Kempson and Whyley (1999), looking at US data, argued that employment status and ethnicity were good determinants for whether a household is excluded from borrowing. Demirguc-Kunt and Klapper (2013) found that age and employment status are also good predictors of whether a household has access to credit markets. Unfortunately, the households do not report their level of education in each of the waves of the survey used in this study. Hence in this study, we will define the cohorts based on the socio-economic group of each household. We construct four socio-economic groups, "Professional", "Skilled", "Unskilled", and "Unoccupied"; households with higher socio-economic status are less likely to be liquidity constrained, and hence socio-economic groups are a good proxy for the level of financial exclusion the household experiences.

While the pseudo-panel is not a true panel, since the same households are not used in both periods, it nevertheless does have some advantages. The key advantage is that the sample response rate will not change over time, since, unlike a true panel, it will not suffer

from attrition. As a result, the results from using a pseudo-panel may well be reliable.

We then investigate the relationship between expenditure and income. Other important factors determining consumption including real interest rates, household characteristics such as the age of the household reference person, number of adults plus the number of children to make up the family size are also included in the consumption function as control variables.

Table 3.1 reports summary statistics of household disposable income and expenditure by socio-economic cohort. Household expenditure in each category of consumption as a percentage of disposable income is presented in parentheses for each socio-economic groups. The average weekly disposable income is shown in column 3. It is at the highest for the "Professional" households at £905.00 and the lowest for the "Unoccupied" households at £310.40. The weekly average total expenditure of households follows the same trend. It is reported in column 4 and it is the highest in value at £696.00 which is about 77% of disposable income for "Professional" households. It decreases to £567.00 for "Skilled" households, however, at 92% there is an increase as a percentage of disposable income for "Skilled" households compared to the "Professional" households. The average weekly expenditure decreases again for "Unskilled" households to £471.00, however, as the percentage of their disposable income, there is an increase to 97.5% compared to the "Skilled" households. Weekly average total expenditure is the lowest at £314.00 for the "Unoccupied" households. This socio-statistic group has the highest expenditure level as the percentage of their disposable income com-

pared to other groups at 105.7%.

This trend persists for the expenditure on non-durable goods that are reported in column 5 of table 3.1. Expenditure on non-durable goods and services consists of about 54.5% of households total expenditure out of disposable income. It is £489.50, 54.5% of their disposable income, for "Professional" households. There is an increase in spending on non-durable goods and services as a percentage of disposable income as the household socio-economic status moves from higher to lower-skilled employment. Expenditure on non-durable goods and services is £410.00, 66.5% of disposable income, for "Skilled" households. It is £351.80, 73.50% of disposable income, for "Unskilled" households and It is £237.45, 79.70% of disposable income, for "Unoccupied" households. This table shows that households in higher socio-economic groups consume a lower percentage of their disposable income in each category of expenditure compared to those in lower socio-economic groups. This is especially important results, since, by design, the households available funds after their normal average expenditure on goods and services are deducted, determines the amount of credit entitlement for the households. Therefore, as the percentage of expenditure out of the disposable income increases, the amount of credit a household can access decreases.

3.3.2 Financial Crisis

We believe that the 2007-2009 recession is likely to have had an important effect on the behaviour of households. Access to saving and borrowing is necessary for households to smooth their consumption. The ability of households to obtain credit was dramatically affected by the policy changes after the financial crisis. The Credit Conditions Survey by Bank of England[3] reports a fall in the availability of secured and unsecured credit to households since mid-September 2008 with a view to further reduction in the coming months, Bank of England (2008). This financial crisis transmitted into the real economy in October 2008 when the Bank of England started lowering the interest rate initially, from 5% to 4.5%, and eventually falling to 0.5% in March 2009.

Table 3.2 shows the timeline of events happened between 2007-2009 that resulted in one of the worst global financial crisis in history. while some academics were already warning of a credit and asset price boom, (See: Barrell and Davis, 2008), this information had not been absorbed by the general public. The notable warning signs came early in 2007 when

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[3]Credit Conditions Survey is a quarterly survey released by Bank of England in which Lenders are asked about secured and unsecured lending to households, to non-financial corporations, small businesses, and to non-bank financial firms in the past three months and the coming three months. The survey is used by the Bank of England's to assess the latest developments in bank funding and household and corporate credit conditions.

three major US mortgage providers folded during the sub-prime mortgage crisis. The crisis later spread across Europe, including the UK, causing volatility in the stock market. The UK government had to bail out faltering banks, including temporary nationalisation of the Northern Rock. The crisis deepened in the summer of 2008 when Lehman Brothers, after being refused a bailout by the US government, announced their bankruptcy. This incident caused panic amongst global bankers, leading to the Great Recession. The stock market crashed shortly afterwards. Banks become reluctant to loan and credit markets continued to tighten. Figure 3.2 shows how consumer credit fell sharply in 2007-2008. This slow down in credit hits the lowest in 2008.

It was thought that easy lending and mortgage default are a key reason behind the financial crisis, as well as the changes in interest rate. We have divided the sample into two periods, where the breaking point is at the end of the third quarter in 2008 as banks increasingly tightened their lending criteria. This follows Blinder (2013) who define the beginning of the credit crunch to be the bankruptcy of Lehman Brothers. This is the point at which the access to credit was harder and limited resulting in a reduction in credit to the household sector. This reduction in credit is likely to have affected the ability of households to smooth consumption; in particular, an ability to borrow during and after the financial crisis is expected to affect the capacity of households to manage temporary income declines.

We explore the effect of the financial crisis on household consumption. The aim is to

find out if households' marginal propensity to consume differs before and after the financial crisis to see whether the crisis resulted in a change in the households' marginal propensity to consume. We also investigate whether this change was larger for households in lower socio-economic groups compared to those in higher socio-economic groups. We expect a relatively low marginal propensity to consume for households in higher socio-economic groups, who are likely to be able to maintain the credit access before and after the financial crisis. In contrast, we expect the marginal propensity to consume for lower socio-economic households, who are more likely to be credit constrained, both have a higher marginal propensity to consume before the crisis, and to increase their marginal propensity to consume after the financial crisis when the borrowing becomes more difficult.

3.4   Methodology

This study aims to look at the marginal propensity to consume for UK households and investigate if it differs for households in different socio-economic cohorts. Analysing the data with a simple model we propose testing the hypothesis under the permanent income hypothesis. Within the permanent income hypothesis, marginal propensity to consume out of anticipated changes in income should be close to zero. If the hypothesis is rejected, consumption displays excess sensitivity.

Similar to much of the previous work on the permanent income hypothesis, we estimated the augmented version of the Euler Equation. We consider four different socio-economic groups and some control variables for household characteristics.

$$\Delta \ln C_{it} = \alpha + \sum_{i=1}^{4} \beta_i \Delta \ln Y_{it} + \gamma r_t + \lambda Z_{it} + \varepsilon_{it} \tag{3.1}$$

On the left-hand side, we have the change in the logarithm of the consumption, $\Delta \ln C$ for group i between periods $t-1$ and t.[4] On the right-hand side, we have the predictors of changes in consumption growth; the measure of predictable income changes, $\Delta \ln Y$, and the real interest rate, r_t and control variables for the household characteristics Z, ε is the error term. The subscript i denotes the socio-economic groups. These cohorts are defined for "socio-economic" status of the households; "Professional", "Skilled", "Unskilled", and "Unoccupied". The regression includes the real interest rate r_t reported by the BOE and a set of controls for household characteristics, Z. We follow Pistaferri (2001) and include time-varying components of family size and age.

The equation 3.1 is estimated for total consumption and consumption of non-durable goods and services. The key coefficient of interest is β, indicating the marginal propensity to consume out of anticipated changes in income. The implications of the permanent in-

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[4]Following Jensen's inequality, the arithmetic average of the logarithm of reported values are calculated for expenditure and income rather than the customary logarithm of the arithmetic average.

come hypothesis we expect $\beta \cong 0$. This, in turn, implies that changes in consumption are not predictable, thus delivering the well-known martingale consumption result (Hall, 1978). Previous income is certainly one of the most important determinants of household consumption and needs to be controlled in order to properly evaluate income change on consumption level. To overcome this problem we use the instrumental variable method of estimation to generate an unbiased estimation of β.

In the first stage, anticipated changes in income are regressed on the instruments to obtain coefficients that reflect the amount of variation in income changes attributable to this set of instruments.

The first stage estimated coefficient is used to generate predicted value for income changes. This predicted income contains all the information set held by agents up to time $t - 1$ that helps them make expenditure decisions. This predicted value of income changes is used to obtain an estimate of the relation of expenditure behaviour and changes in past values of income changes.

For the implementation of the GMM approach, following Blinder and Deaton (1985), Flavin (1981), and Hall (1978), we use as our instrument four lags of income changes. An invention in this paper is that we also use consumer confidence indicator, lagged once, as an instrument in addition to four lags of income changes. We are using the consumer confidence index constructed by the GfK Consumer Confidence Index; a survey designed to capture

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individuals' attitudes regarding the current and perceived near future economy status, it is affected by economic news, uncertainty, economic growth, and current economic situation amongst many other economic factors. The Consumer Confidence Indicator measures how confident people feel about their income's stability. Hence, it impacts households' economic decisions such as spending activity. As a result, consumer confidence is a key indicator of the overall shape of the economy. The inclusion of the lagged Consumer Confidence Index as a forward-looking variable is to capture the effect that is not included in economic fundamentals. Individual agents form rational expectations for future income subject to the individuals' information set at time $t-1$, Ω_{t-1}. Examples of such information could be the possibility of promotion at work or financial literacy of the agents that are hard to capture adequately from our data set.

We tested the power and validity of the instruments; four lags of income changes and consumer confidence indicator lagged once. The values of the F statistics is 35.93. The power of the instruments easily exceeds the conventional minimum standard of power of F = 10. Besides, Hansen's (1982) test for over-identification is consistent with the validity of our instruments. The J-statistic follows a chi-square distribution with 4 degrees of freedom. We fail to reject the null hypothesis that the instruments are valid.

The variables used in equation 3.1 are expected to capture the variation in the marginal propensity to consume for households in different socio-economic groups.

As well as reporting results for the full sample, we also report results for two sub-periods; before and after the financial crisis of 2007. This enables us to investigate whether the marginal propensity to consume changed during the financial crisis. We anticipate that the financial condition of household, borrowing and credit access, changed during the financial crisis due to the changes in the banks' lending policies. If households access to credit changed then it will affect their marginal propensity to consume after the crisis. Our data includes the Financial Crisis of 2007 during which a change in borrowing criteria and tightening of the financial conditions limited households' credit access significantly.[5] These changes were communicated with the public before implementation allowing the households to adjust consumption a few quarters before it occurs. As explained in section 3.2, we consider September 2008 as the point of expected tightening of the borrowing conditions. We then evaluate the marginal propensity to consume out of households' expected changes in income before and after the crisis.

3.5   Results

In this section, we report the results for the marginal propensity to consume for different socio-economic groups. We defined consumption as expenditure on all items except mortgage

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[5]See: Financial Stability Report by the Bank of England, October 2008.

and rent payments. The expenditure values are inflation-adjusted to 2015 price level. The regression equation 3.1 included income growth instrumented by four lags of changes in income growth and lag of changes in the consumer confidence index and it is augmented by controls for a set of household characteristics including family size, age, and the real interest rate. We established the marginal propensity to consume from predicted changes in income using the full sample, and two sub-samples, before and after the financial crisis of 2007. We ran separate regressions for the total expenditure and the expenditure on non-durable goods and services.

Results for the marginal propensity to consume out of the expected changes in income are reported in table 3.3. Results are shown for the full sample of households in columns 1-2, as well as the sub-samples from before the financial crisis in columns 3-4, and the sub-samples after the financial crisis in columns 5-6. The results suggest households have different levels of marginal propensity to consume depending on the households' socio-economic status.

Results for the change in total consumption for the full sample is reported in column 1. Results show that the marginal propensity to consume (MPC) out of expected changes in income is not statistically significant for the professional (socio-economic group 1) and the skilled (socio-economic group 2). The MPC is 0.94 for unskilled households (socio-economic group 3), and statistically significant at 1%. The MPC for unoccupied (socio-economic group 4) is 0.75 and significant at 5%. The results also indicate an increase in the MPC

out of expected changes in income for total household consumption as the socio-economic status increases; apart from the unusually high coefficient for the unskilled (socio-economic group 3). The existing literature, (See: Flavin, 1984 and Campbell et al, 1989), reports the MPC between 0.3 and 0.7. While our results for the professional and skilled households (socio-economic groups 1 and 2) at 0.53 and 0.59 are similar to the existing literature, the MPC seems to be much higher for unskilled and unoccupied households at 0.94 and 0.75 respectively.

The second column in table 3.3 reports the marginal propensity to consume (MPC) of non-durable goods and services out of expected changes in income for households in different socio-economic groups. Results are significant for all four categories of households with the lowest MPC of 0.47 for professional Households (socio-economic group 1). Except for the skilled households (socio-economic group 2) with MPC of 0.93, MPC gradually increases to 0.65 for unskilled and 0.80 for unoccupied households. Coefficients are statistically significantly different from each other.

These results indicate that households with different socio-economic firstly alter their expenditure when permanent income changes, secondly the degree at which they alter the expenditure is different in households with different socio-economic groups. These results are consistent with our belief that socio-economic status is a good proxy for households access to credit.

3.5.1 Financial Crisis

To explore the effect of the financial crisis, we divided our data into two sub-samples; the period up to 2008, and the period after 2008. If the financial crisis reduced the availability of credit to the household sector, then we would expect the marginal propensity to consume from predicted changes in income to increase after the crisis. Moreover, it is likely that the change is not the same for households in different socio-economic groups.

Results for changes in total consumption prior to the financial crisis is reported in column 3, in table 3.3. The marginal propensity to consume before the financial crisis of 2007 follows the same trend and magnitude of those for the full sample. The marginal propensity to consume out of changes in permanent income on non-durable goods and services are reported in column 4. There are insignificant differences between the coefficients for the full sample and the sub-sample prior to the financial crisis of 2007. Coefficients are different from each other for households in different categories of households and households in socio-economic group 1 have the lowest marginal propensity to consume compared to those in higher socio-economic groups.

Estimates of the marginal propensity to consume for total consumption after the financial crisis is reported in column 5. Except for the professional households in socio-economic group 1, the trend of increasing magnitude persists. However, the coefficients are different from those prior to the financial crisis shown in column 3, both in magnitude and statistical

significance. It is interesting results for professional households in socio-economic group 1 since the marginal propensity to consume has changed from 0.4 and statistically insignificant prior to the financial crisis to significant at 1% after the financial crisis of 2007. However, the coefficient is not significantly different from 1. The coefficient for households in group 2 and group 3 are not statistically significant. However, surprisingly, the marginal propensity to consume out of predicted changes in income on non-durable goods and services for unskilled households in socio-economic group 3 show significant decrease after the financial crisis. It is 0.54 and not statistically significant after the financial crisis compared to the marginal propensity to consume for the same group of households prior to the financial crisis of 2007 that was 0.93 and significant at 5%.

Marginal propensity to consume(MPC) out of predicted changes in income for non-durable goods and services after the financial crisis of 2007 is reported in Column 6, table 3.3. With the exception of unskilled households in socio-economic group 3, the marginal propensity to consume for non-durables follows the same trend as the total consumption. The marginal propensity to consume for the professional households in socio-economic group 1 has significantly increased to approximately one after the financial crisis of 2007, the same result is indicated for unoccupied households in socio-economic group 4. The results do not show the same increase across the households from higher to lower groups, however, the marginal propensity to consume is statistically different from each other for households in

different socio-economic groups.

3.6   Conclusion

This study aims to contribute to this growing area of research by exploring marginal propensity to consume for different socio-economic groups in the United Kingdom. Initially, we have estimated the marginal propensity to consume using UK Household Expenditure Survey and found evidence that the household expenditure pattern was significantly affected by the anticipated changes in income. These results are consistent with a significant proportion of households being credit constrained.

We have defined four different socio-economic groups, and considered the status as a proxy for credit market access: households with higher socio-economic groups are likely to be less liquidity constrained. The permanent income hypothesis was then tested for the four different groups and the response to predictable changes in income rejects the hypothesis for skilled, semi-skilled and unoccupied households. Results support the idea that professional households, who are least likely to be credit-constrained, are more likely to follow the permanent income hypothesis. It also confirms that households with lower socio-economic status have a higher marginal propensity to consume.

A basic assumption of the permanent income hypothesis is that individuals have free

access to the credit market, lending and borrowing at the same rate enabling households to smooth consumption as the current income level changes. According to the permanent income hypothesis predictable changes in permanent income should not alter consumption level; the coefficient, β, should be approximately zero.

Overall results show that for the most part professional and skilled households, indicate lower marginal propensity to consume compared to unskilled and unoccupied. While Hall (1978) states around 80% of the households plan their expenditure following the permanent income hypothesis, our results suggest this percentage to be around 50%, when investigating total expenditure. Results for the full sample expenditure on non-durable goods and services also rejects the permanent income hypothesis, indicating the marginal propensity to consume of more than zero and significant for all four socio-economic groups. Our findings are consistent with those of Flavin (1993), who is using unemployment as a proxy for liquidity constraints.

The financial crisis had a significant effect on households' expenditure behaviour. Prior to the 2007 financial crisis, the results suggest that around half of households were following the permanent income hypothesis. However, the results after the financial crisis shows only professional households that are a quarter of households follow the permanent income hypothesis.

Results for the consumption of non-durable goods and services is even more interesting as

it indicates the same drop in the percentage of households following the permanent income hypothesis when setting their expenditure level. The marginal propensity to consume for the households in socio-economic groups 1-2 is mostly in line with the permanent income hypothesis. After the crisis, it is unskilled household in socio-economic group 3 that are still following the permanent income hypothesis.

The evidence presented by this paper when using household data adds further support to earlier studies in the rejection of the permanent income hypothesis. Firstly, our findings show that households react to anticipated changes in income by altering their consumption. Secondly, and more interestingly, the marginal propensity to consume out of anticipated changes in income are significantly lower for households in upper socio-economic status. This gradually falls when moving from upper socio-economic groups to lower socio-economic groups.

This alteration in consumption is even more significant during and after a financial crisis, with the tightening of credit by banks as one possible explanation. This resulted in an increase in marginal propensity to consume, with the poorer household showing a higher increase in marginal propensity to consume in the aftermath of the financial crisis.

The second finding is of more significant consequences since it confirms that households that are excluded from the credit market by design, are unable to smooth consumption when income changes. Although the information on households' education level is not available in

the UK household expenditure survey, households in higher socio-economic groups (Professionals) are more likely to be better educated compared to households in lower socio-economic groups (unskilled and unoccupied).

Further study is required to explore the statistically significant coefficients larger than 1 for the professional households after the financial crisis. Further study is required to explore the statistically significant coefficients larger than 1 for the professional households after the financial crisis. We assume that households with marginal propensity to consume of greater than one finance this extra spending by borrowing. It is in line with our hypothesis that households in higher socio-economic groups have easy access to the credit market. After the financial crisis of 2007, many households had difficulty repairing their balance sheets. Since households must either dip into their savings or go into debt to fund the cost of their shortfalls.

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Figure 3.1: Households' Average Total Expenditure in the FES and National Accounts
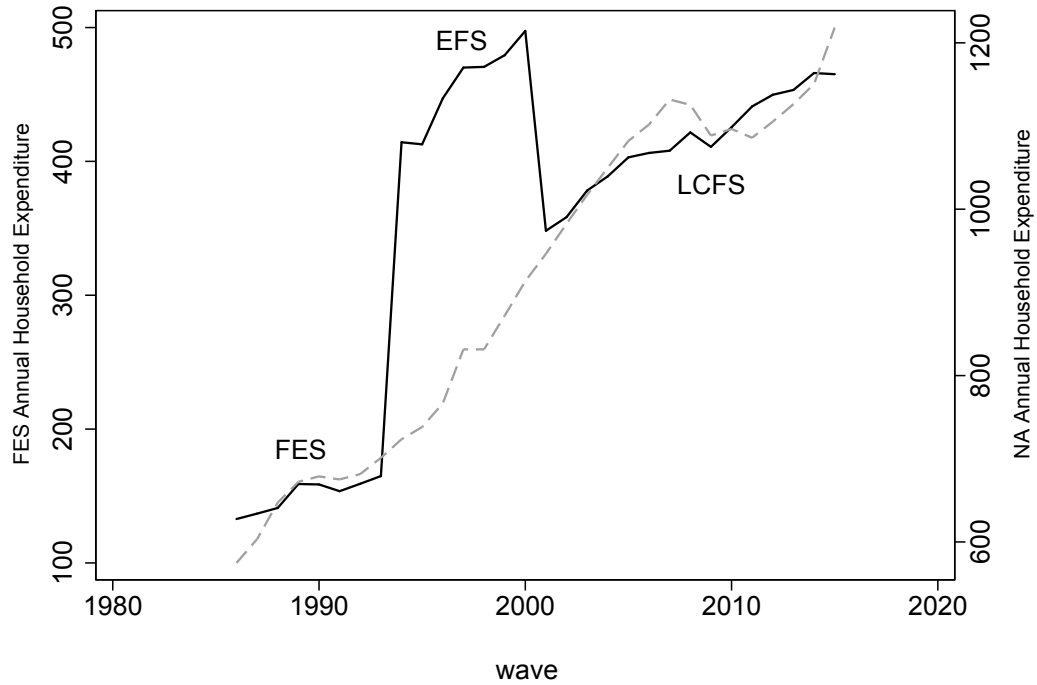
Notes: This figure plots the households' average expenditure in the Household Survey and National Accounts. The continuous black line representing the Household Survey data is our own calculation using UK household expenditure survey data from first quarter 1996 to the first quarter of 2016 for the survey-based line. The dashed grey line represents the National Accounts is from ONS for National Accounts data. The left axis is the households' average annual expenditure calculated using the Family Expenditure Survey. The right axis is the households' average annual expenditure from National Account data. The figure shows that there is a break in 1992 when the survey switched from the FES to the EFS, and a further break when the survey switched from the EFS to the LCF. In order to avoid spurious results, we created missing values at the

breakpoints.

Figure 3.2: UK Consumer Credit

Notes: Changes of total (excluding the Student Loans Company) sterling gross consumer credit lending to individuals (in sterling millions) seasonally adjusted. Source: Bank Of England.

Table 3.1: Summary Statistics, Households' Consumption by Socio-economic status

Socio-economic Group	Observations	Disposable Income	Total Consumption	Non-durables Consumption
Professional	40,107	905.00	696.00	489.50
			(77%)	(54%)
Skilled	34,378	590.00	567.00	410.00
			(96%)	(69%)
Unskilled	37,879	524.50	471.00	351.80
			(90%)	(67%)
Unoccupied	31,218	310.43	314.00	237.45
			(101%)	(76%)

Notes: Source: Own calculation using UK household expenditure survey data from first quarter 1996 to the first quarter of 2016. All values are in British Pounds. Prices are deflated using the BOE price index for the year 2015 to convert nominal prices to real prices. Expenditure as a percentage of disposable income in parentheses.

Table 2: Economic and Financial Events 2007-2009

Year	Month	Event	Description
2007	Jan	Sub-prime downgrade (US)	Ownit Mortgage Solutions Inc., American Freedom Mortgage, Inc., Mortgage Lenders Network USA Inc. folded.
	Feb	HSBC warning (US)	The bad debt provisions for 2006 to be 20% higher than expected to roughly $10.5 bn.
	Mar	Sub-prime collapse	Sub-prime lenders declared bankruptcy, including Accredited Home Lenders Hldg, New Century Fin., DR Horton & Countrywide Fin.
	Aug	UK stock market volatility (UK)	Banks begin to stop lending to each other due to market fears.
	Sep	Northern Rock crisis (UK)	Northern Rock sought emergency funding from the BOE, first run on a bank for more than a century.
2008	Feb	Nationalized Northern Rock (UK)	Struggling Northern Rock is to be nationalized for a temporary period.
	Mar	Bear Stearns Bailout (US)	The firm was bought out by JP Morgan
	Sep	**Lehman Brothers Bankruptcy (US)**	Government protection for Lehman's $60 bn in uncertain mortgage assets was rejected.
		Nationolized Fortis (EU)	European banking and insurance giant was partly nationalized to ensure its survival.
		Bradford Bingley (UK)	The government takes control its £50 bn of mortgages and loans. Savings operations and branches are sold to Spain's Santander.
		HBOS crisis (UK)	It had to be rescued by Lloyds TSB after a huge drop in its share price.
		Washington Mutual and Wachovia (US)	Two more American banks collapsed.
		Irish banking crisis	The first European country to drift into recession, promise from Gov to underwrite the entire Irish banking system, ultimately unable to uphold.
		AIG Nationalized (US)	A bailout of $150 bn to insure loans and mortgages against default.
		Credit Markets Froze	Banks hoarded cash ($160 bn) to write-down bad mortgages and withdrawals that led to a cash shortage; resulting in Zero interest rate.
	Oct	Lowering Interest Rate (UK)	The Bank of England cuts interest rate by 0.5% to 4.5% to ease the financial crisis.
		Troubled Asset Relief Program (US)	$700 Bn Bailout bill was set up to purchase toxic mortgages from banks.
		RBS, TBS, and HBOS Bailout (UK)	The three banks received Government rescue package of £37 bn.
	Nov	End of Investment Banking (US)	Goldman Sachs and Morgan Stanley became regular commercial banks. End of an era of deregulation and high risk.
		Stock Market Crash	Market plummeted due to Congress rejection of $60 bn the bank bailout bill.
	Dec	More government bailouts (US)	Citigroup and the auto industry also received bailouts.
2009	Jan	Blue Monday Crash (UK)	British banking shares collapsed.
		Bank of America Bailout (US)	Provided with $20bn from $700 bn financial rescue fund to help it with the losses incurred when it bought Merrill Lynch.
	Feb	RBS folds (UK)	RBS reports a loss of £24.1bn for 2008, the biggest in British corporate history, made to give up an annual pension worth about £700,000.

Notes: Source: Own calculation. In this table we present a timeline of the key events in the world financial crisis between 2007-2009. The most intense phase of the credit crisis was in September 2008, when the major US investment bank Lehman Brothers filed for bankruptcy.

Table 3: Regression Results

VARIABLES	Full Sample		Year<=2008 Q3		Year>2008 Q3	
	Δc_{it}	Δc_{it}^{nd}	Δc_{it}	Δc_{it}^{nd}	Δc_{it}	Δc_{it}^{nd}
$\Delta \ln Y_{1t}$	0.537	0.466*	0.401	0.348	1.892***	1.454**
	(0.345)	(0.270)	(0.380)	(0.277)	(0.581)	(0.630)
$\Delta \ln Y_{2t}$	0.594	0.975***	0.638	0.952*	0.261	0.762*
	(0.570)	(0.369)	(0.764)	(0.516)	(0.627)	(0.414)
$\Delta \ln Y_{3t}$	0.942***	0.651**	0.931**	0.729**	0.541	0.269
	(0.328)	(0.266)	(0.369)	(0.330)	(0.520)	(0.381)
$\Delta \ln Y_{4t}$	0.757**	0.801***	0.746*	0.705**	0.837**	1.045***
	(0.312)	(0.211)	(0.421)	(0.291)	(0.427)	(0.259)
r_t	0.202	0.0544	0.240	-0.0541	-0.357	-0.283
	(0.177)	(0.124)	(0.352)	(0.206)	(0.604)	(0.472)
se1	0.00494	-0.0305	-0.00178	-0.0446	0.0979	0.0669
	(0.0315)	(0.0231)	(0.0379)	(0.0272)	(0.0648)	(0.0487)
se2	0.00214	-0.0324	-0.00455	-0.0483*	0.0850	0.0606
	(0.0311)	(0.0220)	(0.0386)	(0.0265)	(0.0592)	(0.0427)
se3	-0.0149	-0.0219*	-0.0173	-0.0292**	-0.00784	-0.00551
	(0.0162)	(0.0118)	(0.0207)	(0.0148)	(0.0271)	(0.0209)
Av. Age	-0.0925	-0.135***	-0.119	-0.176***	0.0134	0.00129
	(0.0687)	(0.0503)	(0.0881)	(0.0652)	(0.119)	(0.0806)
Av. Age Sq.	0.0162	0.0212***	0.0203	0.0275***	0.00389	0.00398
	(0.0107)	(0.00785)	(0.0141)	(0.0105)	(0.0182)	(0.0125)
Av. Family Size	0.0258	0.0683**	0.0393	0.0934**	-0.0827	-0.0543
	(0.0420)	(0.0306)	(0.0517)	(0.0374)	(0.0805)	(0.0550)
Observations	424	424	304	304	120	120
Test of overid. res. (P-value)	(0.6)	(0.53)	(0.86)	(0.70)	(0.33)	(0.52)

Notes: In this table results are reported for pooled regression and full sample. The LHS variable is the growth in total consumption Δc_{it} and the growth in non-durable consumption Δc_{it}^{nd}. The variable $\Delta \ln Y_{it}$, $i = 1 - 4$ representing four socio-economic groups, represents the change in logarithm of income at time t. $\Delta \ln Y_t$ is instrumented with four lags of income, and lagged changes in confidence index $dCCI_{t-1}$. se1-se3 are dummy variables for different socio-economic groups where "se1" is the "Professionals" "se2" is the "Skilled", and "se3" is the "Unskilled" households. r_t is the BOE real interest rate. Regression is estimated using GMM for the period from Q1 1986 to Q1 2016. Robust standard errors in parentheses. In the table *** means significant at 1 percent, ** means significant at 5 percent, * means significant at 10 percent. Rank Test:F(5, 424)=35.

Chapter 4

Consumption response to

unanticipated changes in income:

Gambling Gains

Abstract

This paper investigates the marginal propensity to consume for UK households when the household receives an unexpected one-off income shock. It will use households' Gambling gains from Family Expenditure Survey data from quarter 1 of 1986 to quarter 1 of 2016, as the measure of unanticipated income changes. Using a pseudo-panel constructed from this cross-section data, we conduct a cohort study based on the head of households' age and socio-economic status. The results show some households do alter their consumption when income changes unexpectedly. Further, we investigate the marginal propensity to consume out of gambling gains before and after 2007-financial crisis. Households that are likely to be credit constraint after the financial crisis due to structural changes in credit available to households by lending entities alter their consumption on the recipient of gambling gains. We find the marginal propensity to consume for these group of households to be small in magnitude.

Keywords: Unanticipated income changes, Permanent Income Hypothesis, UK Household Expenditure Survey

JEL classification: D14, G21.

4.1 Introduction

This paper presents the findings from a study on households' response to income changes resulting from gains acquired through gambling. We use the Permanent Income Hypothesis (PIH) as our main conceptual framework of consumption behaviour. The Permanent Income Hypothesis suggests that individuals smooth consumption over their lifetime. They aim to set the consumption level based on the life-time income and avoid altering consumption when their predictable income changes. The main implication of this is that households react only to unexpected changes. In reality, many households receive income shocks. Some of these shocks are expected and some are unexpected with respect to both the timing and the size of the shock. In this paper, we examine the unanticipated transitory changes in income.

We consider the households' gambling gains from UK household survey data an unanticipated income shocks. Thus, if the Permanent Income Hypothesis holds, the change in consumption should be altered by the annuity value of the present discounted value of change in the unanticipated changes in incomes. Smoothing consumption requires that households are able to borrow money when there is a fall in income.

For this paper, we are using the UK household Food and Expenditure Survey (FES) from Q1 1986 to Q1 2008. The UK Family Expenditure Survey (FES) includes detailed measures of households' winnings from gambling gains. We consider gambling gains both unanticipated and uncertain changes in income; therefore, they are treated as transitory income shocks. We expect that consumption should moderately respond

to these changes in income.

Since UK household Food and Expenditure Survey (FES) does not contain panel data, we create a 'synthetic" panel, then we use cohort techniques to study the dynamic behaviour of household consumption. Thus, instead of following the same individual over time, we follow the average behaviour of a group of individuals who share the same characteristics that are constant over time. We define cohorts based on the age and socio-economic status of the household reference person. We assume households within the same age range and socio-economic status have similar access to the credit market.

Further, we explore the effect of the financial crisis in 2007-2009 on consumption changes as a result of transitory income changes. As mentioned earlier, the main assumption of the Permanent Income Hypothesis is that there are no liquidity constraints, in the sense that an individual can borrow and lend at a constant interest rate. However, during the financial crisis, there was a reduction in the level of credit available to the household sector. Our data include the period before and after this crisis enabling us to study the effect of the financial crisis on household expenditure. Our hypothesis suggests that this added credit constraint will have a more severe impact on lower-income households.

This study shows that households with lower socio-economic status adjust their consumption to a greater extent than what is suggested by the Permanent Income Hypothesis. The remaining households do not alter their consumption.

This paper is organised as follow: Section 4.2 discusses some literature on the

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Permanent Income Hypothesis and the unanticipated shocks in income. Section 4.3 presents a detailed description of the dataset. Section 4.4 discusses the methodology used in the study. Section 4.5 presents the empirical results of this study, and shows that evidence from UK Households Survey data fails to support the permanent income hypothesis. It also confirms the possibility that changes in consumption depends on a household's socio-economic status. Section 4.6 presents our conclusions.

4.2 Literature Review

A key element of Milton Friedman's permanent income theory of the consumption function is that consumers maximise utility over a long—term horizon. He states that under the null only income surprises should matter for consumption growth and households should not react if the changes are predicted. He suggests the test of "Excess Sensitivity" by decomposing the consumption and income function to their permanent and transitory components. It estimates the sensitivity of consumption to expected changes in permanent income. The test shows if households do react to these predictable changes. If the Permanent Income Hypothesis is true, consumers are to alter consumption only when the unanticipated component of income is changing.

Jappelli and Pistaferri (2006) consider the implications that the Permanent Income Hypothesis imposes on the mobility matrix of household consumption and income. Using Italian data from the Italian Survey of Household Income and Wealth, they find considerably less insurance against income shocks than in the U.S. applications

(the marginal propensity to consume out of permanent shocks is approximately 1 and that with respect to transitory shocks is approximately 0.3). These results are confirmed in a subsequent paper (Jappelli and Pistaferri 2008) using more recent data, which also points out that the marginal propensity to consume out of transitory income shocks is higher among households with lower education (0.315) than among those who completed high school (0.121), suggesting that people with higher education have easier access to the credit markets to smooth income fluctuations.

Blinder and Deaton (1985), using aggregate national account data, implement the 'excess sensitivity' test suggested by Friedman. They argued that there is some evidence that consumption is, in fact, less sensitive to news about income than the model predicts. In a follow-up paper, Deaton and Campbell (1987) examine the uni-variate time-series properties of smoothness paradox, the sharp shocks to income do not seem to cause similarly large shocks to consumption, and employ a range of different techniques so that the consumption changes are exactly those warranted by the revision to permanent income as perceived by consumers. They argue that consumption fails to respond sufficiently to innovations in income; consumption is excessively smooth.

Blundell et al. (2008), decompose the change in the variance of consumption into a component that depends on the variance of permanent income shocks and one that depends on the change in the variance of transitory shocks. They re-confirm excess smoothness in consumption.

Pistaferri(2001) exploited the Panel of Italian Survey of Households Income and

Wealth(SHIW) between 1989 to 1991 and established that consumers save most of the transitory shocks and very little of the permanent shocks. Their results support the Permanent Income Hypothesis.

Jappelli and Pistaferri (2006) using the 1987-95 panel of the Italian Survey of Household Income and Wealth (SHIW), exploited the implications of the theory on the transition matrix of consumption and rejected simple representations of the consumption decision rule, and revealed that households smooth income shocks to a lesser extent than implied by the PIH.

Given the Permanent Income hypothesis, households plan consumption based on their permanent income. Households, then, tend to "smooth" consumption in response to income fluctuations. That depends on the nature of the change in income; consumption responds to unpredictable permanent changes in the income. Therefore, it is crucial to determine how much of the income change is transitory and unanticipated. These papers did not identify a specific shock to income. Overall, the branch of literature that uses household-level micro-data set to evaluate response to unanticipated income shocks using a specific shock to income is limited, mainly because the episodes of truly unanticipated income shocks are not easily identifiable in household data sets. The existing literature frequently considers income shocks as a result of unemployment, disability, illnesses; and, in the context of developing countries, weather changes as transitory income shocks.

Blundell, Pistaferri and Preston (2008) constructed a consumption and income panel by merging data from the CEX and the PSID 1980-1992. They used this data

set to estimate the extent to which households alter consumption against transitory income shock when the individual was laid off or fired from a permanent job less than one year before the interview. They find that households smooth consumption by less than that suggested by the Permanent Income Hypothesis.

Other forms of unanticipated shocks are considered in the literature trying to study the effect of transitory income changes and household consumption. A few episodes of transitory income shocks such as weather changes and tax refunds are spotted in some survey database. Wolpin (1982) explored panel of rural Indian households from 1968 to 1971. He argues farmers experience income due to transitory factors in agriculture e.g. weather shocks. Weather shocks are unanticipated and directly affect the farmers' income. He estimates income elasticity range from 0.91 to 1.02; much higher than suggested by the Permanent Income Hypothesis. Contradicting these results, in a similar paper, Paxson (1992) supports the PIH using Socio-economic Survey(SES) in Thailand. She also considers deviation from normal weather condition as a case of unanticipated income shocks. Her results show that farmers have a very high marginal propensity to save out of transitory but also a marginal propensity to save out of permanent shocks above Zero.

A second approach to study the marginal propensity to consume out of transitory income changes is to examine data for signs of change in behaviour around tax policy changes that result in a tax refund. Shapiro and Slemrod (2003) and Souleles, Parker and Johnson (2006) studied the extent to which households spend the tax rebate that arose from the Economic Growth and Tax Relief Reconciliation Act of 2001. The Act,

approved in June 2001, was designed to provide a short-run stimulus following the short recession that occurred just prior to the Act. Households received the payment between July and September of 2001: $300 for single filers with no dependants; $500 for single parents; and $600 for married couples. Shapiro and Slemrod (2003) finds that 21.8 percent of respondents who received a rebate report that they will mostly spend their rebate. From this response, they calculated an average marginal propensity to consume from the tax rebate of 'about one third'. This is consistent with findings of Souleles, Parker and Johnson (2006) who report a marginal propensity to consume of between 20% and 40% on non-durables.

Similarly, Parker et al. (2013) exploit the 2008 Economic Stimulus Act (ESA) to measure the change in household spending directly caused by the receipt of the 2008 tax rebate. The rebate affected approximately 130 million US tax filers to and was designed to stimulate the economy following the 2007 financial crisis. The size of the rebates was similar to those of the Economic Growth and Tax Relief Reconciliation Act of 2001; most taxpayers received a rebate of at least $300 per person, with $600 for married couples filing jointly, and a further $300 per dependent child under the age of 17. They find that on average households spent about 12% to 30% of their stimulus payment on non-durable consumption goods and services during the three-month period in which the payments were received. Since these changes in income are unanticipated and transitory income changes, according to the Permanent Income Hypothesis, households should consume at most the annuitized value of this transitory increase. However, if households had anticipated the tax rebate then the Permanent

Income Hypothesis predicts that these households would not alter their consumption when they received the tax rebate.

Criticism of current literature is the episodes of income changes may not be truly unanticipated and/or temporary. Although most Responses to income changes as a result of a tax refund is also commonly considered one-off 'temporary' income change. In fact, tax refund is always pre-announced and therefore, it is not truly unanticipated. Moreover, Tax rebates are almost always as a result of a pre-announced tax system reform. The effect of tax reform resulting in tax rebate is more likely to change households' after-tax-income permanently. Additionally, these payments were anticipated, therefore, they should already be incorporated in the consumers' budget plans, and hence should not be regarded as unexpected shocks when they are received.

We do not believe that cases of disability and job displacements are entirely transitory income shocks without any permanent component. This line of literature ignores the permanent effect of these shocks; although unanticipated in nature, job loss, can have severe effects on the long-run income prospects of displaced/disabled households. The job displacement literature finds that earnings fall by 25% to 40% following an unemployment spell, (See: Stevens, 1997) and by roughly 15% who become work-limited disabled regardless of whether the disability is acute, chronic, or intermittent (See: Charles, 1997). It also ignores the role of private information; information known to the individual that is not captured by the hard data. Individuals are likely to have information contributing to an income shock, such as a promotion at work, factory closure, and job loss.

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In our paper, we will identify gambling gain as an item of transitory income shock to the household. The gain is the result of games of chance or wagers on events with uncertain outcomes. Gambling income includes any money earned from gambling, whether it be winnings from casinos, lotteries, raffles, and horse and dog races, bingo, betting pools or sweepstakes. In this paper, we measure the marginal propensity to consume out of this transitory income changes as an obvious way of testing the Permanent Income Hypothesis. This short-lived income changes are uncertain and unanticipated, hence qualifies as unexpected transitory income shock. Such test of the Permanent Income Hypothesis was suggested by Friedman (See: Friedman, 1971).

Several papers have explored households' gambling gains, however, the focus of these papers have been on the income elasticity and gambling expenditure rather than the marginal propensity to consume,(See: Friehe and Mechtel, 2015) or on the participation behaviour (See: Humphreys, Lee and Soebbing, 2010 and Heffetz, 2011).

The major objective of the paper is to estimate marginal propensities to consume out of unanticipated transitory income for different socio-economic groups of households. Then, we investigate whether these values vary, in both magnitude and statistical significance, before and after the financial crisis. It is known that the access to the credit market was limited by banks. We are expecting the marginal propensity to consume to be higher after the financial crisis, and the change to be greater for households in lower socio-economic groups. A finding that these marginal propensities are (1) significantly lower than one implies that the households, within the framework of PIH, save most of the unanticipated income shock and are partially able to insure

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their permanent income shocks. (2) significantly different from each other indicates that households in different socio-economic groups face different levels of liquidity constraints.

To the best of our knowledge, the gambling gains for UK households have not been explored as a form of transitory income shock and therefore, we consider this as our main contribution.

4.3 Data

For the empirical work in this paper, we use the Family Expenditure Survey (FES) which collects data on consumption and income. We use the data from Q1 1986 to Q1 2016, compiled by the Office for National Statistics. The Family Expenditure Survey (FES) is a cross-section survey conducted on about 6000 households in mainland Britain and Northern Ireland. The survey reports detailed responses to questions on income, about 700 types of expenditure and household characteristics such as age, household size and composition, socio-economic status. The amount reported covers the two weeks prior to the interview period. This survey does not contain any information on households' education level or information on households' savings. This survey was replaced by Expenditure and Food Survey (EFS) in 1994, and once more by the Living Costs and Food Survey (LCF) in 2002, with slight changes in expenditure and income categories. Great care has been taken to make income and expenditure variables consistent and comparable across the three surveys. This allowed us to construct

data from the first quarter of 1986 to the first quarter of 2016.

The choice of household survey data (micro-data) was prompted by Attanasio and Webber (1995), discussing that aggregation bias can induce spurious excess sensitivity in aggregate data even when there is no such sensitivity in the underlying micro-data. Also, only at the micro-level one can explore if and how some households are affected by unanticipated income shocks more than others.

The key variable that we exploit in this study is income from gambling and lottery winning. We view this as a measure of the households' unexpected income shock in any particular week. Friedman's definition of transitory income is income which is viewed by the recipient unit as the result of chance or accidental factors. The gambling income measure used in this study, is the sum of winnings from the households participating in the games of chance, such as bingo, national lottery, football pools, horse racing, raffles, sweepstake, and instant scratch cards. The average value in the sample for gambling gains received, reported by the households, was approximately £6, an amount relatively small in terms of the households' overall income. This survey data does not include large amounts won by 'jackpot' winners.

For the purpose of this paper, we constructed measures of durable and non-durable consumption from these data. Household consumption is then defined as the value of goods and services a household spending on. Thus the expenditure on total goods and services is one measure of consumption and expenditure on non-durable goods and services is our second measure of consumption. Non-durable expenditure excludes expenditure on gambling. All income and consumption variables are in real, 2015 pound.

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Since the households included in the survey are interviewed only once, the data used in our study is not a true panel. Instead, following Browning, Deaton and Irish (1985) and Attnasio and Weber (1995), we create a pseudo-panel from these repeated cross-sections by constructing cohorts sharing the same characteristics, and use the averages within these cohorts as observations in our pseudo panel. This technique allows us to study the dynamic of households consumption in the absence of a true panel data. The big advantage of group averages is that the dataset suffers less from non-random attrition; that is the biggest issue with panel data where the same household is tracked over many years.

Then, following Jensen's inequality, the arithmetic average of the logarithm of reported values are calculated rather than the customary logarithm of the arithmetic average. Thus, 2,178 monthly observation are created, 363 for each age and socio-economic status cohort. Table 4.1 reports summary statistics of households' lottery gains at level for each cohort.

Commonly education is considered as the proxy for the households' income level. However, since education level is not reported in these surveys, we use socio-economic status as a proxy income. For this paper, we grouped the households based on their age and socio-economic status. We assume households in the same group have similar access level to the credit market. One advantage of Family Expenditure Survey data set is that the pseudo panel created using age cohort is a balanced one and cohorts are not dropped at any point during the sample period.

Households are, therefore, grouped into three age cohorts; the 'Young' with the

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household reference person's age of 25-34 years old, the 'Middle Age' with the household reference person's age of 35-54, and the 'Old' with the household reference person's age of 55-70. The resulting age profiles will cover the entire life cycle of a given cohort, since the available sample period is longer than any of the micro data set. Households are then grouped into two different cohorts based on their socio-economic status. In general, employment status and income level are good determinants whether a household has access to credit markets (See: Kempson and Whyley, 1999 and Demirgüç-Kunt and Klapper, 2013). Hence, four groups are created. Group one are the "Rich" households classed as "Professional and Skilled" with a higher socio-economic status who are likely to have easier access to credit market. The second group is the "Poor" households classed as "Unskilled and Unoccupied" with lower socio-economic status who are likely to have limited access to the credit market.

Other important factors determining consumption including real interest rates, household characteristics such as number of adults plus the number of children to make up the family size are also included in the consumption function as control variable. We assume that the rate of time preference is equal to the base rate reported by the Bank of England.

Our basic regression reports results for the households' response to gambling winnings. In the absence of credit- constraints, unexpected transitory changes in income will affect permanent consumption only by its annuity value. Therefore, households should spend an amount less than or equal to the annuity value of gambling winnings if they alter their consumption.

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4.3.1 Financial Crisis

A key event in our sample period is the financial crisis of 2007-2009. Hence, we will explore how it affected households' consumption. Since the onset of the financial crisis, consumption has dropped. Figure 4.1 shows the average consumption at each point in time for immediate years before and after the financial crisis, showing a decline in consumer spending after 2008. This fall in consumption coincides with the significant decline in the availability of consumer credit when banks reported tightening their lending standards. Reported by the Bank of England, figure 4.2 shows credit availability by the British banks. As shown in the figure, there is a substantial drop in the availability of consumer credit during the financial crisis, with the major drop happening in 2008 resulting in households becoming credit constrained. Credit or liquidity constraints are a commonly cited explanation for the decline in household spending during the 2007 crisis (See: Jappelli and Pistaferri 2010). If this holds, households whose access to credit is likely to be affected by post-crisis policy changes are more likely to depress consumption growth during and after the crisis.

Consumption behaviour of households is very likely to be affected by the aftermath of the 2007 financial crisis. A fall in availability of credit to households by the Bank of England was reported in September 2008, with a view to further restrictions, (See: Credit Condition Survey report, 2008). Although banks have been facing major problems since July 2007, until October 2008, borrowing was not as restricted. Many banks have become conservative in their lending decisions. Bank of England's lend-

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ing survey in October 2008[1] demonstrated a significant increase in the tightening of credit standards for loans in the third quarter of 2008. Thus, the households' ability to access credit was affected by the policy changes after the financial crisis. The real economy was later affected by these policies when the interest rate was rapidly lowered from 5% to 0.5% between October 2008 and March 2009 and lending declined at a fast rate. However, between the summer of 2007 and the first quarter of 2008 households could also rely on the credit facilities that had been arranged before the credit crisis began. Therefore, we consider 2008, quarter 3 as our breakpoint of the financial crisis after which access to credit was restricted and credit to the household sector was reduced. This reduction is likely to affect the degree at which households can smooth consumption. The ability to borrow during and after the financial crisis is expected by households to manage temporary income declines. Once the households are excluded from the credit sector, they are likely to consume a higher percentage of the transitory income during the crisis when unexpected income loss is at its highest rate as a result of the financial crisis.

We explore the effect of these policy changes on households' expenditure out of transitory income shock. Following Blinder (2013) we consider the third quarter 2008 as the break for the financial crisis. We split the sample into two periods; before and after 2008, quarter 3. This is when the availability of households' credit was at its lowest. (See: Bank of England report 2008, Q3).

According to the Permanent Income Hypothesis, consumption responses only to

[1]See: Financial Stability Report, October 2008, Issue No. 24

the changes in the households' permanent income, Hence, households are to save all of the unexpected transitory income they receive. And if spending, the marginal propensity to consume out of this unexpected income shock in 'perfect' capital markets, where individuals can lend or borrow against expected future income at the same interest rate, is to be about the interest rate (See: Flavin, 1985).

We aim to find out if the marginal propensity to consume out of households' unanticipated income shocks differ before and after the financial crisis. We expect that the marginal propensity to consume for households with difficulties to access the credit market to increase in order to smooth the decline in permanent income that happens as the result of the financial crisis.

4.4   Methodology

In this paper, in order to estimate the marginal propensity to consume out of the households' unanticipated income shocks for households with different characteristics we make use of the 'Simple Euler Equation' introduced by Hall (1978) with integrated household characteristics.

We directly identify and estimate the impact of the gambling gains on consumption growth using the fact that the unanticipated income shocks are uncorrelated with each other as well as with households' expectation errors and any other unobserved factor. If the Permanent Income hypothesis holds, the coefficient of the unanticipated income shocks should be large in magnitude while statistically significant.

Our main estimating equation is the standard linearised Euler equation:

$$\Delta lnC_{it} = \alpha + \beta \Delta lnY_{it}^{\tau} + \zeta \Delta lnY_{it} + \lambda r_t + \varphi Z_{it} + \varepsilon_{it} \qquad (4.1)$$

where ΔlnC_{it} represents changes in the logarithm of consumption, between periods $t-1$ and t for group i, ΔlnY^{τ} is the measure of transitory income, ΔlnY_{it} is the measure of normal income at time t (this is considered the households' permanent income), r_t is the real interest rate, and Z contains a set of demographic variables for household-level characteristics that change over time. The variables we include are changes in the average family size of the household, changes in the average family size of the household squared, the average age of the household reference person, average age squared. The subscript i denotes the cohorts. These groups, i, are defined for 'socio-economic' status and age of the households. The error term is ε.

The coefficient of transitory income, β, is the key coefficient of interest. It indicates the marginal propensity to consume out of the transitory changes in income. The marginal propensity to consume is expected to be significantly different from zero if households react to their unexpected transitory income shocks. The regression is estimated for households' total consumption and consumption of non-durable goods and services.

We use the Ordinary Least Square(OLS) for estimating the unknown parameters. The present data set contains all information available at the end of the period $t-1$ on income expectations held by households. Therefore, ε_{it} consists of new information the household receives in period t about income, real rates, and preference shocks.

Hence, the forecast error is uncorrelated with any information that is known to the household at the end of the period t. As new information about the household's future income becomes available over time, households incorporate that information in their consumption decision-making process. Gambling winnings as the measure of unexpected and transitory income changes reflect new information received at t, and is therefore uncorrelated with anything that was known at time $t - 1$.

4.5 Results

In this paper, we calculated the marginal propensity to consume from gambling winnings for the UK households: a finding that these marginal propensities are low would indicate that households are not excessively sensitive to unanticipated transitory income changes when they smooth consumption. Then we explored how the 2007 financial crisis affected the marginal propensity to consume for the households. Two categories of consumption were used in the empirical analysis: total consumption of goods and services; c_{it} and consumption of non-durable goods and services; c_{it}^{nd}. Households' winnings from participating in games of chance such as Bingo and lottery are considered as transitory income; Y_{it}^{τ}, for the purpose of this paper. These variables are derived from UK household data collected by the National Office of Statistics (ONS). This data set is adjusted for the changes made over time by ONS to the categories of expenditure and the method of data collection to ensure consistency over time.

Table 4.6 reports the OLS cross-section regression estimates of equation 4.1 for each

socio-economic status/age cohort for the full sample. An important implication of the Permanent Income Hypothesis is that consumption should respond to unpredictable changes in the variables about which the consumer is uncertain.

Two regressions were computed for the full sample: for the first regression, consumption was defined to include expenditure on all consumer goods and services. For the second regression, consumption was defined to include only expenditure on consumer non-durable goods and services. Column 1 in table 4.6 reports the results for the first regression. The marginal propensity to consume out of the gambling winning for the six different categories of households, 'Rich' and 'Young', 'Poor' and 'Young','Rich' and 'Middle-Aged', 'Poor' and 'Middle-Aged', 'Rich' and 'Old', 'Poor' and 'Old' households; reported in rows 1-6 respectively, are not statistically different from zero.

The marginal propensity to consume out of normal disposable income, reported by the households, is statistically significant at 1% with a coefficient of about 0.6. We will not discuss this result any further since we have discussed consumption changes in response to permanent income shocks in chapter 2 in details.

Column 2 in table 4.6 reports the results for the second regression where consumption includes only expenditure on consumers' non-durable goods and services. Rows one to six reports the marginal propensity to consume out of gambling winning for the six cohorts of households, 'Rich' and 'Young', 'Poor' and 'Young','Rich' and 'Middle-Aged', 'Poor' and 'Middle-Aged', 'Rich' and 'Old', 'Poor' and 'Old' households, respectively. For each cohort, there is a positive relationship between gambling

gains and household expenditure on non-durable goods and services, but the marginal propensity to consume out of gambling gains is only statistically significant for households classed as 'Middle-Aged' and 'Poor'; the coefficient is 0.01 and statistically significant at 10%. This is shown in column 2, row 4. These coefficients are very small but different from zero and in line with the permanent income hypothesis. It would appear that the unanticipated changes in income affects on households' consumption of the non-durable goods and services for the households grouped as 'Middle-Aged' and 'Poor' and not the rest of the households. This coefficient is also small enough to comply with the Permanent Income Hypothesis. It is possible that in this case, the greater part of these income shock would be saving, as predicted by the Permanent Income Hypothesis.

The marginal propensity to consume out of changes in normal income is 0.86 and statistically significant at 1%, and Age squared of the households' reference person is the only household characteristic that is statistically significant at 1%.

4.5.1   Before and After the Crisis

Recall that in section 4.2 we showed that there was a major cut in the supply of credit immediately following the financial crisis of 2007. Bank of England quarterly reports between 2008 to 2009 confirms households faced a more challenging environment for accessing credit; rejection rates were significantly higher in the period from 2008 onwards, which indicates tighter credit criteria for households. This has implications for households reaction to unexpected income shock. To investigate this we divide

our sample into two parts: a pre-crisis period up to quarter 3, 2008 and a post-crisis period after quarter 3, 2008.

Two regressions were computed for the sub-samples: first regression computes the marginal propensity to consume out of the gambling gains on total consumption which includes expenditure on all consumer goods and services. The second estimates the marginal propensity to consume on consumer non-durable goods and services. The two regressions are estimated for the periods pre-crisis and post-crisis separately. Table 4.6 reports the marginal propensity to consume for different groups of households for the two periods: pre-crisis reported in columns 3 and 4, and post-crisis reported in columns 5 and 6.

Column 3 are the results for the pre-crisis period and the total consumption. Results show that prior to 2008, quarter 3, the marginal propensity to consume out of gambling gains, reported in rows 1-6 for the six different groups of households, 'Rich' and 'Young', 'Poor' and 'Young','Rich' and 'Middle-Aged', 'Poor' and 'Middle-Aged', 'Rich' and 'Old', 'Poor' and 'Old' households respectively, is not different from zero implying that prior to the financial crisis, the extra income was saved fully. Normal disposable income, ΔY_{it}, is statistically significant at 1% and the coefficient is 0.6. Real rate of interest and the family size is not statistically significant. The age squared of the households' reference person is statistically significant at 5%.

Column 4 are the results for the pre-crisis period and the consumption of non-durable goods and services. Pre-crisis, results for the marginal propensity to consume out of the unanticipated income shocks, gambling gains, on non-durable goods and ser-

vices for the 6 different groups of households, 'Rich' and 'Young', 'Poor' and 'Young', 'Rich' and 'Middle-Aged', 'Poor' and 'Middle-Aged', 'Rich' and 'Old', 'Poor' and 'Old' households are reported in rows 1 to 6 respectively. The marginal propensity to consume is not statistically significant for any of the groups of households. Suggesting again that households save the unanticipated income sum as the result of gambling gains. The marginal propensity to consume out of normal income shocks, reported in column 2, row 7, is statistically significant at 1% and the coefficient is 0.55. This coefficient is the same as those reported by Deaton and Browining, and Irish (1985). The real interest rate and the size of households are not statistically significant, that is not following the households' consumption literature. the age squared of the households' reference person is significant at 5% level.

Columns 5 and 6 reports the results of households' marginal propensity to consume out of gambling gains post-crisis period. Column 5 is the results for regression on the total consumption of goods and services. Interesting results reported in column 5, for marginal propensity to consume on total expenditure are those of households grouped as 'Rich' and 'Young' in row 1 and households grouped as 'Rich' and 'Middle-Aged' in row 3. Results show that after 2008, Quarter 3, the marginal propensity to consume for these two groups of households are statistically significant. A change from results prior to the financial crisis.

Similar results are obtained for the marginal propensity to consume on non-durable goods and services. It is reported in column 6. Results for households grouped as 'Rich' and 'Young', 'Rich' and 'Middle-Aged', and 'Poor' and 'Middle-Aged', are reported

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in row 1, row 3 and row 4 respectively. The marginal propensity to consume out of gambling gains are statistically significant after 2008, Quarter 3 though the coefficients are very small in magnitude.

These results, complying with the Permanent Income Hypothesis, confirms that prior to 2008, Quarter 3, all different groups of households are saving all of the income from gambling gains. The marginal propensity to consume for all categories of expenditure for all households in the full sample is not significantly different from zero prior to 2008, Quarter 3. After 2008, Quarter 3, Group 1, 'Rich' and 'Young' households, and group 3, and 'Rich' and 'Middle-Aged' households, and group 4, 'Poor' and 'Middle-Aged' households exhibit a marginal propensity to consume out of the gambling winning, that is considered unanticipated income shock that is statistically significant, however, the coefficients are small enough to comply with the Permanent Income Hypothesis.

4.6 Conclusion

This paper uses unique data spanning over 30 years that accounts for UK households expenditure and income to examine the marginal propensity to consume out of the unanticipated changes in income. We have argued that consumers respond differently to changes in their economic resources; consumers alter their consumption by smaller amounts if they perceive the income change as temporary rather than permanent. Consumption will respond to unanticipated income changes and that the response will

depend on the persistence of the shock and the ability of the household to mitigate the shock using credit and insurance market. The evidence presented by this paper when using monthly household data shows that in the episodes in which income changes unexpectedly, consumption rose significantly only for those group of households who were most likely to be credit constrained. The marginal propensity to consume for households grouped as 'Middle-Aged and Poor' show significantly different from zero, confirming the hypothesis that households who are likely to be credit constraint have a higher marginal propensity to consume and show excess sensitivity.

A number of papers have previously investigated the effect of one-off income changes on consumption. For example, both Wolpin (1982) and Paxon (1992) looked at the effect of weather shocks on rural farmers in developing countries, while Souleles (1999) and Shapiro and Slemrod (2003) looked at tax rebates in the US. A key discussion in this literature is the extent to which these 'income shocks' are truly unexpected and transitory. In contrast gambling winnings, which we use in this paper, are clearly, by their nature, both unexpected and transitory. Nevertheless, this literature has shown households react to income shocks. However, only Souleles (1999) discusses the role of credit- constraints. He suggests liquidity constraints play an important role since constrained households increased their consumption of non-durables far more than unconstrained households did.

Our results also showed the regulatory changes of the 2007-2009 Financial crisis that targeted household consumer credit significantly altered households' expenditure out of unanticipated income changes. 'Middle-Aged and Poor' households are most

affected by the crisis. We identify that the expenditure rose primarily in non-durable consumption as well as the total consumption. These results suggest that credit constraints are important.

A key problem in this literature is that finding episodes of unexpected transitory income changes documented by hard data is difficult to find. In this paper, we used the households' gambling gain as a measure of unanticipated income changes. However, the gambling gains are often very small in magnitude. It is then difficult to study the contribution of these income changes to consumption variability. Nevertheless, we found our results support commonly cited explanation of how households respond to transitory income shocks, as the spending response of the likely credit-constrained consumers are significantly different from those who are likely to have access to borrowing through the credit market.

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Table 4.1: Summary statistics - Lottery Gains

	Obs	Mean	Std. Dev.	Min	Max
Professional and Skilled (Rich)					
Young (25-34)	29,170	1.70	33.90	0	5000
Middle Age (35-54)	30,035	1.90	38.80	0	6269.60
Old (55-70)	13,400	2.25	31.90	0	2218.43
Unskilled and Unoccupied (Poor)					
Young (25-34)	23,688	1.70	35.30	0	5000
Middle Age (35-54)	24,066	2.37	25.60	0	2557.5
Old (55-70)	35,558	1.52	11.70	0	673.37

*Notes*: Summary statistics households' lottery gains. Source: own calculation, using

UK household Survey Data conducted by the Office of National Statistics

Table 2: MPC out of unexpected transitory income shocks: Gambling Gains

| VARIABLES	Full Sample		Year<=2008 Q3		Year>2008 Q3	
	Δc_{it}	Δc_{it}^{nd}	Δc_{it}	Δc_{it}^{nd}	Δc_{it}	Δc_{it}^{nd}
$\Delta lnY_{YR,t}^{\tau}$	-0.00495	-0.00590	-0.000727	-0.00324	-0.0343***	-0.0237**
	(0.00634)	(0.00514)	(0.00709)	(0.00574)	(0.0128)	(0.00935)
$\Delta lnY_{YP,t}^{\tau}$	-0.00458	-0.00185	-0.00794	-0.000370	-0.000280	-0.00405
	(0.00657)	(0.00544)	(0.00907)	(0.00739)	(0.00949)	(0.00813)
$\Delta lnY_{MR,t}^{\tau}$	0.0129	0.0131	0.00793	0.00994	0.0311**	0.0250**
	(0.0102)	(0.00818)	(0.0123)	(0.00982)	(0.0120)	(0.0110)
$\Delta lnY_{MP,t}^{\tau}$	0.0123	0.0117**	0.0111	0.00753	0.0148	0.0210*
	(0.00773)	(0.00592)	(0.00971)	(0.00703)	(0.0126)	(0.0110)
$\Delta lnY_{OR,t}^{\tau}$	0.00623	0.00577	0.0138	0.0119	-0.0173	-0.0134
	(0.0102)	(0.00901)	(0.0126)	(0.0113)	(0.0109)	(0.00871)
$\Delta lnY_{OP,t}^{\tau}$	-0.00467	-0.00515	-0.00275	-0.00215	-0.00890	-0.0124
	(0.00802)	(0.00666)	(0.00993)	(0.00828)	(0.0131)	(0.0106)
ΔY_{it}	0.618***	0.543***	0.628***	0.548***	0.605***	0.538***
	(0.0264)	(0.0218)	(0.0339)	(0.0284)	(0.0357)	(0.0276)
Real Interest Rate	0.0607	-0.0107	0.109	-0.00565	-0.164	-0.110
	(0.0614)	(0.0504)	(0.0819)	(0.0665)	(0.199)	(0.160)
Av. Family Size	9.067	9.858	14.94	12.94	-4.836	2.456
	(12.99)	(10.98)	(16.66)	(14.29)	(18.50)	(14.92)
Av. Family Size Sq.	1.390	0.209	-1.938	-1.429	9.226	3.786
	(7.699)	(6.466)	(9.675)	(8.231)	(11.76)	(9.575)
Av. Age	-4.943**	-4.291**	-5.762**	-4.601**	-2.729	-3.484
	(2.155)	(1.805)	(2.750)	(2.316)	(2.881)	(2.395)
Av. Age Squared	0.680***	0.599***	0.778**	0.642**	0.417	0.479*
	(0.248)	(0.210)	(0.320)	(0.272)	(0.321)	(0.269)
Constant	-1.438	-2.180	1,524	1,524	530	530
	(5.528)	(4.635)	(6.985)	(5.911)	(8.009)	(6.506)
Observations	2,054	2,054	1,524	1,524	530	530

Notes: In this table results are reported for pooled regression and full sample, as well as two sub-samples; periods before and after the 2007 financial crisis. The LHS variable is the growth in total consumption Δc_{it} and the growth in non-durable consumption Δc_{it}^{nd}. The ΔlnY_{it}^{τ} represents the change in logarithm unexpected transitory income. i denotes the households cohorts: YR for 'Young and Rich", YP for 'Young and Poor", MR for 'Middle age and Rich", MP for 'Middle age and Poor", OR for 'Old and Rich", OP for 'Old and Poor". The variable ΔY_{it} represents the change in logarithm income at time t, while r_t is the BOE real interest rate. In the table *** means significant at 1 percent, ** means significant at 5 percent, * means significant at 10 percent.

Figure 4.1: Total household expenditure at financial year ending 2015 price
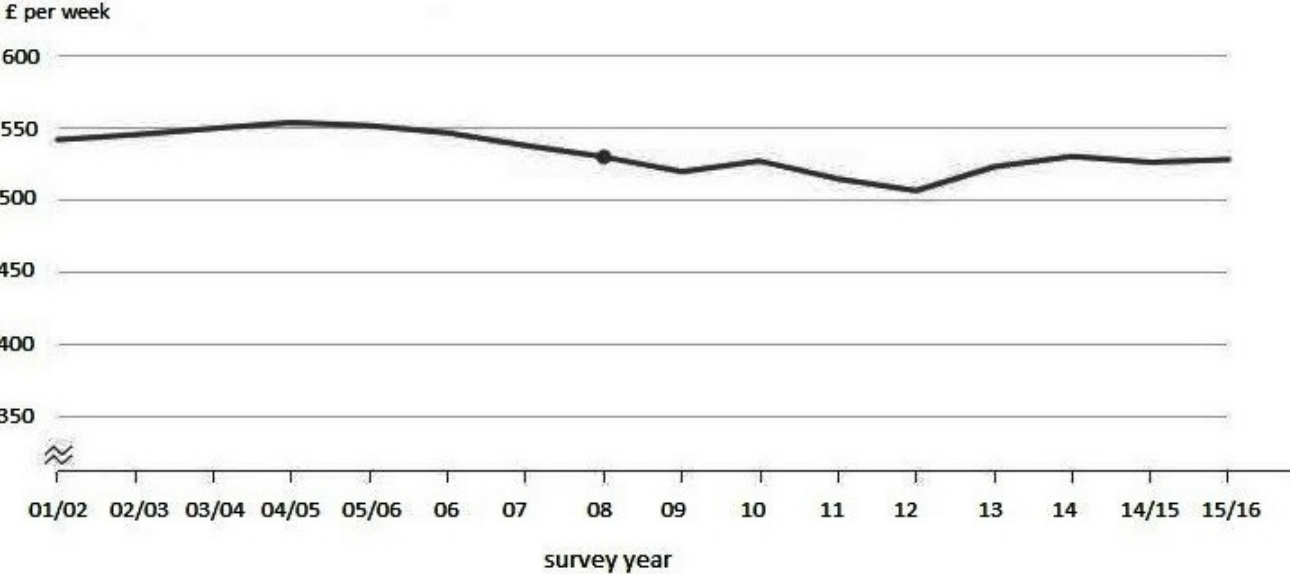
Notes: UK, Financial year ending 2002 to financial year ending 2017. The graph shows a

sharp decline in household expenditure around the Financial crisis in 2008. Source: Office

of National Statistic

Figure 4.2: Household Consumer Credit Availability
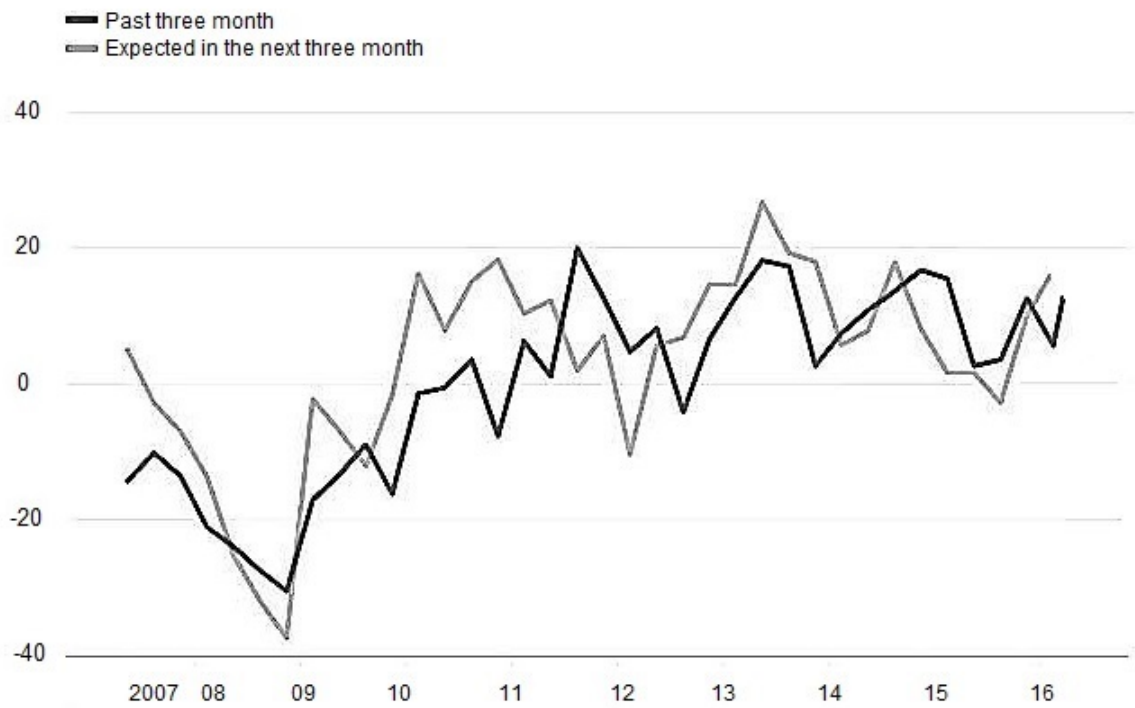
Notes: % of lenders reporting higher availability less those reporting lower availability. Source: Bank Of

England

Chapter 5

Concluding Remarks and Recommendations for Further Work

5.1 Summary and Conclusions

With the standard permanent income hypothesis as our framework, we investigated the link between UK households' consumption and income. The initial aim of the research reported here was to obtain an estimate of the marginal propensity to consume using the UK households expenditure survey data. A number of studies have shown that consumption responds to income changes over and above what is implied by the permanent income hypothesis suggesting liquidity constraints play an important role in this failure. We sought to explore these

questions by exploring our data for unique episodes of income shocks that can be defined as permanent or transitory:

First, does Consumer confidence index alter consumption behaviour; Is consumption following a random walk?

Second, does household consumption respond to anticipated permanent changes in income?

Third, does household consumption respond to unexpected transitory income changes?

Our main contribution lies in the use of the UK households' Survey data when addressing these questions. We succeeded in constructing a pseudo-panel using three different household expenditure dataset spanning over 30 years. In addition, the paper was successful in identifying specific episodes of transitory/permanent and anticipated/unanticipated income changes by exploring the UK households' expenditure survey data. Further, we used households' socio-economic status as a proxy of liquidity constraint and included the GfK consumer confidence index, the leading survey-based consumer confidence indicator, as a forward-looking variable in our analysis to capture information not reflected in hard data. To our knowledge, there are no similar studies conducted on UK expenditure survey data.

In the first paper presented in the second chapter, we found that including the lagged consumer confidence index modestly improves the ability to predict changes in total consumption. The predictive power for the consumer confidence index though small, is statistically significant. The effect is not significant in the case of non-durable goods and services.

In our second paper presented in the third chapter, the response of consumption to households' permanent income shocks were explored. This paper stands out in the way we recognize the permanent income shock, as well as how we grouped households based on their socio-economic status as a proxy for their access to the credit market. We find, first, that households in different groups have different marginal propensity to consume out of these permanent shocks, second, households who are likely to have limited access to borrowing, have higher marginal propensity to consume.

In our third paper presented in the fourth chapter, we used households' gambling gains as a measure of unanticipated, transitory income shocks. We used a cohort study by grouping households based on their age and socio-economic status, two factors determining their level of access to the credit market. We find that the UK households' marginal propensity to consume out of the unanticipated transitory income shocks are higher than suggested by the permanent income hypothesis, especially for sub-groups of the households that are less likely to be able to access credit markets

In addition, the credit access requirements for households have been restructured and households' ability to borrow was greatly affected by changes in lending criteria in response to the financial crisis of 2007. Our data allowed us to explore the effect of these changes on the marginal propensity to consume out of households' income shocks. In the case of the UK households, we found evidence that except for a small group of households who are

likely to maintain their access to the credit market, the majority of households exhibit larger marginal propensities to consume out of income changes after the financial crisis of 2007, compared to the period before the crisis. Overall our results support the hypothesis that credit constraints are likely to affect households' expenditure decision-making process.

Our findings are important to the policymakers because they indicate that households across different socio-economic groups respond differently to income changes. Understanding the differences within socio-economic groups play an important role in consumption studies that contribute to the modification of effective stabilization policies, such as tax or welfare reforms, consumer credit supply, or other economic stimuli. In addition, Policymakers in the UK should seek to develop and enhance anti-discrimination legislation and mechanisms aimed at lenders to assess the creditworthiness of borrowers, such as credit scoring techniques. This is to demonstrate that lenders are not discriminating against certain groups from the credit market and reduces the possibility for credit assessments to be tainted by personal prejudices.

5.2 Suggestions for Future Work

This thesis studies UK households' consumption changes in response to income change; expected and unexpected. The research that has been undertaken has highlighted a number

of issues on which further research would be beneficial. In the second chapter we, innovatively, have augmented the Euler equation to include past values of consumer confidence index and found significant evidence that the consumer confidence index can help predict consumption changes for some households in the UK. Consumer Confidence Index is measured carefully across Europe, where household survey data is also available. It would be interesting to verify whether the conclusions obtained using UK survey data are confirmed for other European countries at the micro-level. On this topic, another trend to watch is possible evidence of international transmission of shock. For example, the financial crisis of 2007 that started in the US and it developed into an international crisis. It is intriguing to explore the effect of US confidence shock on consumption behaviour in the UK and other European countries. Most important topic for future research is developing a theoretical household consumption model incorporating consumer confidence index. Such a model can help predict consumption, hence, economic fluctuations.

In the third and fourth chapter, we explored the effect of expected and unexpected income changes on household consumption. We showed that households who have limited access to consumer credit alter their expenditure when income changes. More research will, in fact, be necessary to refine and further elaborate on our findings. The study could be extended by distinguishing between situations in which consumers expect an income decline and those in which they expect an income increase. On this trend, a further distinction that can be

useful is between large and small income changes, as consumers might react mostly to the former and neglect the impact of the latter.

An unexpected opportunity for future research has come up recently with the outbreak of the Covid-19 pandemic. In chapter 4, we investigated the effect of unexpected transitory income changes on consumption by exploring households' gambling gains as episodes of unexpected transitory changes in households' income. To gain further insights into the response of consumption to income changes the recent Covid-19 Pandemic looks like something very interesting to investigate, since it is undoubtedly both unanticipated and a very large shock that has thrown global economies into turmoil. Our ability to observe household-level income and expenditure prompts future work examining the impact of COVID-19 pandemic. It is certainly interesting to explore how households behave in response to uncertainty about how the future would play out. We expect that users' spending will be radically altered by these events.

The UK household survey data is a very informative data on individuals' expenditure as well as the creditworthiness of borrowers. Another interesting field of further research is exploring the creditworthiness of households in order to investigate the consumption behaviour of consumers who are restricted in their ability to borrow to finance consumption. Such a study may help to derive an appropriate policy rule for consumption given that borrowing is not allowed, or at least cannot exceed some fixed limit.