Does Consumer Sentiment Accurately Forecast UK Household Consumption? Are there any comparisons to be made with the US?[*]

Joshy Z. Easaw[a+], Dean Garratt[b], Saeed M. Heravi[c]
[a]*Department of Economics, University of Bath, Bath, BA2 7AY,*
[b]*Division of Economics, The Nottingham Trent University, Nottingham, NG1 4BU*
[c]*Cardiff Business School, University of Wales, Cardiff CF1 3EU*

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[+] Corresponding author: Tel:*+44-1225-826-826 ext 5823*, E-mail: *J.Z.Easaw@bath.ac.uk*

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Abstract:

This paper investigates how well survey data depicting consumer sentiment forecasts household consumption behavior for the UK. We consider whether consumer sentiment is able to predict the growth of household consumption, in addition to the growth of labor income. The empirical analysis finds that Consumer Confidence Indices (CCI) do predict the household consumption of durable goods. We also draw comparisons with recent analysis for the US. In addition, we analyze whether both the UK and US CCI are accurate and useful predictors of household consumption growth using directional analysis. We find that the UK confidence indicators fare better the US.

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Since the 1990s, both the Bank of England and the US Federal Reserve Bank have closely monitored Consumer Confidence Indices (CCI) when conducting monetary policy (see Garratt, 1999). It is widely assumed that CCI reflect consumer sentiment and is a good indicator of household sector consumption behavior. The importance of accurately forecasting household consumption for policy-makers was underlined in Blanchard (1993) and Hall (1993). They identified the spontaneous fall in household consumption, in particular of durable goods, as an important determinant of economic recessions.

An obvious issue to consider is whether consumption function shifts over cycles are caused by animal spirits, or consumer sentiment. Blanchard (1993) argues that the spontaneous fall in US household consumption, especially of durable goods, in the early 1990s was caused by households' 'animal spirits'. Consumer sentiment, or relative optimism, therefore, becomes imperative when households make decisions about consumption. In his pioneering research George Katona (1968) distinguished between households' *ability* and *willingness* to consume. The latter may be informed by households' perception of their personal finances and general economic conditions. This distinction enables us to distinguish between households' incomes and preferences (or aspirations). He also maintains that households' 'willingness' is crucial for discretionary, or durable, consumption.

A possible test of households' consumer sentiment causing shifts in consumption behavior is to test the hypothesis that consumer sentiment predicts household consumption growth in addition to that explained by the growth of labor income. This paper investigates whether CCI predicts household consumption behavior for the UK. We consider how well CCI forecast variations in the growth of household consumption of total, non-durable (and services) and durable goods

respectively. Empirical analysis of the impact CCI on consumption behavior is well trodden for the US but less so for the UK. For instances, recent studies focusing on the US are to be found in Carroll et al (1994) Bram and Ludvigson (1998), Matsusaka and Sbordone (1995) Madsen and McAleer (2000) and Delorme et al (2001), while for the UK only Acemoglu and Scott (1994) investigate the relationship between consumer sentiment and household consumption behavior, but just concentrating on non-durable goods.

The present analysis extends previous research in two aspects, with respect to the UK. Firstly, we investigate the predictive powers of CCI for both durable and non-durable consumption. Secondly, we empirical investigate the accuracy, or directional rationality, and usefulness of the CCI as a forecast of the growth of household consumption. This paper, thus, considers the ability of CCI to predict consumption behavior using both quantitative and qualitative analysis. Such qualitative analysis has not been undertaken previously either for the US or UK. We, therefore, investigate for both the UK and US. Given the objective of policy-makers, that is, to predict turning points in household consumption cycles when conducting countercyclical policies, directional analysis would be crucial. The quantitative analysis closely follows Carrol et al (19994), where the ability of CCI to explain consumption growth in addition to labor income growth is investigated, while the qualitative analysis follows a non-parametric approach.

After briefly outlining the measures of CCI in the next section, in Section 2 we first assess empirically the ability of these CCI to predict household consumption types in the short-term using some reduced-form regressions. The procedure in effect test Hall's (1978) random-walk hypothesis of consumption behavior. Previous studies reject this hypothesis due to excess sensitivity with respect to income. The predictive

ability of both lagged CCI and current income growth imply the breakdown of the random-walk hypothesis. Subsequently, in sub-section 2.2 we consider the ability of CCI to predict the growth in household consumption in addition to labor income using the augmented Campbell-Mankiw "rules-of-thumb" model. This is estimated using instrumental-variables (IV) estimation. We test whether CCI explains the growth of household consumption of either durables or non-durables in addition to labor income. The evidence indicates that consumer sentiment does significantly explain UK durable consumption behavior. In Section 3, having established the near-term predictive powers of CCI, we use non-parametric directional analysis to assess their accuracy and usefulness as forecasters of household consumption growth. The investigation also includes US data. Finally, in Section 4 we compare and contrast the results between the US and UK, distinguishing between the quantitative and qualitative analysis.

2. Consumer Confidence Indices: *GfK* and *MORI*

The two best-known measures of UK consumer confidence or sentiment are compiled by the Martin Hamblin *GfK* organization (part of the German market research group GfK) on behalf of the European Commission and by *MORI* (Market and Opinion Research International). Both policy-makers and analysts are known to take a keen interest in these measures in their analysis of the macroeconomy and the housing market (see Garratt 1999 and 2000). The *GfK* survey is carried out amongst 2,000 members of the public aged over sixteen each month. Respondents are selected to ensure that the sample is representative in terms of sex, age, class and religion. Fieldwork is carried out using computer assisted telephone interviewing. *MORI* tracks the general public's perception of the general economic condition of the country as

part its monthly *Political Monitor*. *MORI* interviews a representative quota sample of close to 2,000 adults aged 18+ at around 200 sampling points across Great Britain. Data are weighted to match the profile of the population.

The headline *GfK* figure is an average balance over five questions. Two questions relate to household finances, two to the general economic situation and one to the perceptions of respondents as to the current desirability of making major purchases. The exact wordings of these questions are:

1. How does the financial situation of your household now compare with what it was 12 months ago?

2. How do you think the financial position of your household 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?

The responses to questions 1 to 4 are weighted:
(a) a lot better (+1); (b) a little better (+0.5); (c) the same (0);
(d) a little worse (-0.5); (e) a lot worse (-1)

The response to question 5 is weighted:
(a) yes, now is the right time (+1); (b) neither right nor wrong time (0); (c) no, wrong time, purchases should be postponed (-1).

The first four questions allow households to evaluate the development and expected development of their own finances and the general economic situation. The fifth question encapsulates elements of the first four questions and so captures the true worth to individuals of making large purchases at the current time. The permitted replies allow respondents some expression of the strength of their opinions. The headline *GfK* index is then a simple average of the five underlying indices.

The *MORI* confidence measure is a rather more straightforward index based on a single question relating to respondents' expectations of the economy over the coming 12 months. The exact wording as follows:

Do you think the general economic condition of the country will improve (+1), stay the same (0), or get worse (-1) over the next 12 months?

Therefore, respondents simply reply according to whether they expect to see deterioration, an improvement or no change in the general economy.

Figure 1 [about here]

Figure 1, shows the *MORI* index, the headline *GfK* measure and the UK GDP growth rate. Although both confidence measures follow each other to some degree, the MORI index fluctuates more. Any upturn or downturn tends to be greater for the *MORI* index. The fluctuations of the GDP growth rates for the corresponding period are less pronounced. The growth rates fluctuate between 6% and -2.3%. As highlighted in Figure 1, The Economic Cycle Research Institute[1] identifies a peak in the UK business cycle during the second quarter of 1990, but a trough at the end of the first quarter of 1992. Broadly speaking, the CCI followed the patterns of the GDP growth rate. Nevertheless, household confidence appears to over and under-react to turning points.

Table 1 [about here]

Table 1 above summarizes each of these measures over varying time frames. The CCI are at their lowest in the early 1990s just before the UK entered a recessionary period that followed the boom of the mid and late 1980s. The second half of the 1990s saw the confidence indicators average higher values than in the corresponding period of the 1980s. While there was sharp fall in consumer confidence during the 1998 Asian

[1] Further information can be found at http://www.businesscycle.com/research/intlcycledates.php#uk

crisis (as show in Figure 1), it is not long-lasting. In the case of the US, we use the index complied by the Survey Research Center, University of Michigan (*SRC*). A full description of *SRC* and how it is complied is found at *http://www.sca.isr.umich.edu*. and Bram and Ludvigson (1998)[2].

The remainder of the paper considers the correlation of the two CCI and household consumption behavior; how well they forecast personal consumption and what role they play in determining personal consumption behavior.

2. The Predictive Ability of the CCI: The Random-Walk Hypothesis and 'Rules Of-Thumb' Model.

This section assesses the ability of CCI to forecast household consumption. This is undertaken initially using some reduce-form regressions, consistent with the 'random-walk' version of the Life-Cycle and Permanent Income Hypothesis (LC-PIH) The key question to be answered is whether CCI predict the growth of household consumption types in addition to the growth of current labor income. The breakdown in the 'random-walk' version of LC-PIH necessitates that we consider an alternative specification of household consumption behavior. We, therefore, extend the Campbell-Mankiw 'rule-of-thumb' model to include consumer sentiment and empirically investigate whether it can explain durable or non-durable consumption or both.

2.1. The Random-Walk Hypothesis: Some Reduced-Form Regressions

[2] The research at the *SRC* was pioneered by George Katona and his collaborators and the *GfK* index closely resembles it. The Conference Board compiles another index for the US. This index, however, takes a different emphasis focusing on unemployment and local employment prospects (see Bram and Ludvigson (1998) for details) and, therefore, is not directly comparable with the UK indices.

A straightforward way of assessing the near-term forecastability of CCI is to examine the $\overline{R}^2$ of the estimated regressions where the growth of the various measures of household spending is regressed on lagged values of the CCI as follows:

$$\Delta lc_t = \beta_0 + \sum_{i=1}^{N} \beta_i S_{t-i} + \varepsilon_{1t} \qquad (1)$$

where Δlc_t denotes the growth rate of the respective real household consumption and S_t denotes the respective CCI. The three types of household consumption considered are total, non-durable and services and durable consumption. We then proceed to investigate the predictive powers of the CCI once controls are introduced. This is done using other variables available to the economic forecasters and the equations to be estimated take the following forming:

$$\Delta lc_t = \beta_0 + \sum_{i=1}^{N} \beta_i S_{t-i} + \sum_{j=1}^{M} \alpha_j^T X_{t-j} + \varepsilon_{2t} \qquad (2)$$

where α_j^T is a *1 x K* vector of coefficients (with *K* the number of control variables) and X_t is a vector of control variables.

Table 2 below gives the results of the respective estimations. While columns (1), (2) and (3) provides the results of estimated equation (1), the results of estimated equation (2) is given in Columns (1'), (2') and (3'). It reports the results using four lags of the CCI. Following Carroll *et al* (1994), the control variables used when estimating equation (2) includes four lags of the dependent variable and four lags of the growth of real labor income[3]. The table provides the $\overline{R}^2$ for the estimates of equation (1) and the incremental $\overline{R}^2$ when the CCI is introduced to equation (2). The

[3]As in Carroll et al (1994) the present analysis focuses on whether CCI explain household consumption behaviour in addition to labour income. Estimating a reduced-form regression with lagged dependent variable enables the control for other pertinent variables that may not be included in the analysis.

numbers in parentheses are *p values* of the joint significance of the lags of the respective CCI.

Table 2 [about here]

On its own the lagged values of the two main indicators, *GfK* and *MORI* have reasonably good explanatory power of the quarter-ahead variation in the growth of both total and durable personal consumption. This is indicated by columns (1) and (3). For both these consumption types, the joint significance test indicates that the probability that these powers are incidental is virtually nil. The *GfK* index explains as much as 23% quarter-head variation in the growth of total consumption and 13% of durable consumption. Conversely, the *MORI* index explains 15% variation in the growth of total consumption and 24% of the variation in the growth of durable.

When the control variables are introduced, the joint significance tests indicate significance at the 5% level or better for the personal consumption of durable goods for both *GfK* and *MORI*, as indicated in column (3'). The incremental $\overline{R}^2$ when the lagged *GfK* index is included turns out to be low. It adds only 6% to the $\overline{R}^2$ and, hence, the incremental predictive power is low. Nevertheless, a higher level of 13% is found for the *MORI* index.

The results confirm that the CCI on their own do explain some of the quarter-ahead variations in the growth of personal consumption, especially for total and durable goods. These predictive powers diminish slightly when lagged current income growth and dependent variables are introduced as controls. They, nevertheless, still predict some variations in the growth of durable consumption. The reduced-form regressions also indicate the 'random-walk' hypothesis of LC-PIH model breakdown. We now turn to the Campbell-Mankiw model that was proposed in the event of such a breakdown.

2.2. 'Rule-of-Thumb' Model: Instrumental Variables (IV) Regression:

The ability of CCI to predict, or forecast, personal consumption implies the breakdown of the simplest certainty-equivalence (CEQ) version of LC-PIH theories. An important development in household consumption theory that accounts for such a violation is found in a series of papers by Campbell and Mankiw (1989, 1990 and 1991). The "rule-of-thumb" theory introduces a simple modification to the LC-PIH theories. It argues that there are two types of householders. Some householders are strict life-cyclers, while others equate consumption to income and, hence, follow a "rule-of-thumb". Initially, we estimate this model and then investigate whether CCI are able to explain consumption behavior in addition to income. We follow an approach suggested in Madsen and McAleer (2000), where the 'rules-of-thumb' model is augmented to include consumer sentiment. Firstly, following the "rules-of-thumb" theory the aggregate consumption growth is a constant proportion of total income growth[4]:

$$\Delta lc_t = \lambda \Delta Y_t + \mu_{1t} \qquad (3)$$

It is well known that data at quarterly frequency is time averaged, hence, the error term follows an MA(1) process (*see* Christiano *et al* (1991)). The first order serial correlation in the error term may lead to inconsistent estimates if one-period lagged instruments are used. One possibility would be to estimate using a linear instrument-variables (IV) estimation that uses instruments lagged at least two periods[5]. The income regressor is instrumented using 1-3 lags of the instruments (the instruments used are listed in the notes of Table 3(a) and (b)). Equation (3) reduces to a loglinear

[4] Though the "rules-of-thumb" model largely related to the consumption of non-durables, Carroll et al (1994) shows that the interpretation of λ has to do with the level of durability.

[5] Another possibility would be to use a non-linear IV estimation suggested by Carrol et al (1994). It also explicitly estimates the error term that follows an MA(1). Estimates using this non-linear IV

LC-PIH when estimated $\lambda = 0$. The above "rules-of-thumb" equation is augmented to include consumer sentiment and real interest rates[6]:

$$\Delta lc_t = \alpha_0 + \lambda \Delta Y_t + \alpha_1 r_t + \sum_{i=1}^{4} \alpha_2 S_{t-i} + \mu_{2t} \quad (4)$$

Table 3a [about here]

Table 3a above provides the results of estimated equation (3) for the respective personal consumption expenditure types (PCE). As expected the estimates of λ increases with durability; λ is estimated at 0.660 and 2.037 for non-durable and durable consumption respectively. Indeed, the $\overline{R}^2$ is highest for durable goods as well. The test of overidentifying restrictions provides no evidence against the specification[7].

Table 3b [about here]

Table 3b gives the estimates for equation (4) for each CCI and personal consumption expenditure types. In the case of the CCI, we report the joint significance of the coefficients and the associated *p-values*. Once again the test of overindentifying restrictions provides no evidence against the specification and the Durbin-Watson test for first-serial correlation does not suggests an MA(1) process.

The *GfK* index does not indicate any significant correlation with personal consumption behavior. More importantly, none of the CCI correlates with either total or non-durable goods. The most interesting result is when the *MORI* representation of

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estimation indicate that the MA(1) coefficient is insignificant and similar to those using a linear IV, hence, not reported here.

[6] Following Michner (1984) and Madsen and McAleer (2000) real interest rates are included. Michner (1984) showed that intertemporal optimisation results in an endogenous interest rate response at an aggregate level. If consumers delay present consumption and increase savings, the real interest rate will decrease because the supply of loanable funds increases. Therefore, a failure to account for the endogeneity will result in an excess sensitivity of consumption to income.

[7] The test of overidentifying restrictions, an LM test statistic, is conducted by regressing the residual from the IV regression on the instruments. The $\overline{R}^2$ from the regression is multiplied be the sample size

consumer sentiment is used when estimating durable personal consumption behavior. In this instance, there is correlation between the consumption of durable goods and lagged consumer sentiment. The joint significance test indicates that the probability that this correlation is incidental is practically nil.

The results show that for the UK, non-durable personal consumption follows the "rules-of-thumb" theory where the growth of non-durable consumption is set equal to labor income. On the other hand, durable consumption is also affected by consumer sentiment. The results indicate that Katona's hypothesis, namely that aspirations do explain households' discretionary expenditure or expenditure on durable goods, is valid for the UK as well.

3. Consumer Confidence Indices as a Accurate and Useful Predictor: A Directional Analysis

Having established in the previous section the ability of CCI to forecast household consumption, we presently analyze the accuracy and usefulness of these predictions using directional analysis. Directional accuracy, or rationality, suggests ability for CCI to forecast turning points in consumption cycles. Directionally rational forecast, nevertheless, may or may not be useful. Stekler (1994, p. 495) defines a macroeconomic forecast as having value, "if it could change the user's prior distribution about the direction of change of the economy". The directional accuracy and usefulness of CCI with respect to household consumption would, therefore, be of particular use to policy-makers conducting monetary policy. We also investigate for

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(*T*), producing a test statistic that is distributed χ^2 with *K*-*N* degrees of freedom, where *K* is the number of instruments and *N* the number of independent variables (see Ludvigson, 1999)

the US using the SRC index. The first sub-section briefly outlines the statistical methods[8] used and, subsequently, the results are discussed in sub-section 3.2.

3.1. Directional Analysis: Statistical Methods

The framework for non-parametric tests on the direction of forecasts was developed by Merton (1981) and Henriksson and Merton (1981). This was undertaken in the context of whether a market-timing forecast, that is a forecast of when stocks will outperform bonds, or *vice versa*, would have value to an investor. Therefore, according to Merton (1981, p. 384), "a forecast is said to be *rational* if, given the forecast, no investor would modify his prior [distribution for the return on the market] in the opposite direction of the forecast."

Let $p_1(t)$ denote the probability of a directionally correct forecast conditional upon an actual downturn at t; let $p_2(t)$ denote the probability of a directionally correct forecast, conditional upon no actual downturn at t. Merton then shows that a necessary and sufficient condition for the forecast to be rational is that $p_1(t) + p_2(t) \geq 1$. A test of directional rationality for the CCI as a forecast therefore examines the null hypothesis that $p_1(t) + p_2(t) \geq 1$ against the alternative that $p_1(t) + p_2(t) < 1$. Estimates of probabilities $p_1(t)$ and $p_2(t)$ are obtained from our sample data. Henriksson and Merton (1981) demonstrate that the conditional distribution of these estimates is given by the hypergeometric distribution. We then use our data to calculate the probability of being in the tail of this hypergeometric distribution, and then test against the 5 percent significance level.

[8] A more detailed and technical explanation of the directional analysis and accuracy tests undertaken here is found in Ash et al (1998).

An accurate, or directionally rational, forecast may or may not be useful. Merton (1981) shows that a necessary and sufficient condition for a prediction to have no value is that $p_1(t) + p_2(t) = 1$, and, *assuming directional rationality*, a sufficient condition for positive value is that $p_1(t) + p_2(t) > 1$. (The larger is $p_1(t) + p_2(t)$, the more valuable are the forecasts. In the limit, forecasts which are always directionally correct have $p_1(t) = p_2(t) = 1$, so $p_1(t) + p_2(t) = 2$.) When the null of rational forecasts cannot be rejected, Henriksson and Merton therefore test the hypothesis that the forecasts have no value, i.e. $p_1(t) + p_2(t) = 1$, against the alternative that the forecasts are of positive value, i.e. $p_1(t) + p_2(t) > 1$, proceeding in a way similar to the rationality test.

We form the following contingency table to test for the independence of the predicted and actual changes, using two procedures: the χ^2 test and Fisher's Exact Test (Fisher, 1941) denoted in the table by FE. Fisher's Exact Test is the uniformly most powerful unbiased test for independence, and is identical to the Merton's test for predictive value.

		Forecast	
		< 0	≥ 0
Actual	< 0	$P_1(t)$	$1 - p_1(t)$
	≥ 0	$1 - p_2(t)$	$P_2(t)$

Pesaran and Timmerman (1992) have also developed a non-parametric test on the correct prediction of the signs of actuals and forecasts. They test for a significant difference between the observed, sample estimate of the probability of a correctly

signed forecast, and the estimate of what that probability would be under the null of independence between forecasts and outcomes. We denote their test statistic by S_n^2. When tabulating the results of all three tests, an asterisk denotes that the null hypothesis "H_0: the forecasts and outcomes are independent" is rejected at the five percent level: had they been made at the time, these forecasts would have had value to hypothetical users

3.2. Tests Results:

The results of the directional analysis undertaken for the three household consumption types: total, non-durable and durable, is given in Tables 4(a), 4(b) and 4(c) respectively. The ability of the CCI to forecast accurately the growth of personal consumption types is assessed using up to four lags of the respective CCI for the UK and US.

Table 4(a), 4(b) and 4(c) [about here]

For all cases we cannot reject the null hypothesis that the forecast are directionally rational, or accurate, at the 5 percent level of significance (indicated by the *p-values* reported in column (*s*)). The results for the Merton directional rationality are unequivalent and, hence, we conclude that the CCI accurately forecast all three household consumption types for the UK and US.

The usefulness, or value, of the forecasts is assessed using three tests statistics. Firstly, the Fisher's Exact Test (FE) which is identical to the significance test of the null hypothesis that $p_1(t) + p_2(t) = 1$, against $p_1(t) + p_2(t) > 1$. Secondly, χ^2 for association between the signs of predicted and actual changes, and, finally, the Pesaran and Timmerman S_n^2 test. We judge the value of a forecast on the basis of a majority verdict of two out of the three tests. In the UK, of the two CCI, the tests indicate that *MORI* is of some value as a forecast of total (for the third and fourth

lags) and durable consumption (for the first lag). The results, on the other hand, are less sanguine for the US. While we cannot reject the null hypothesis that the forecast are accurate, we can only identify one instance where it is a useful predictor. The *SRC* is a useful predictor of durable consumption growth a quarter ahead[9]. This is an important and useful finding for policy-makers conducting counter-cyclical policies.

4. CCI and Consumption Behavior: UK and US Compared

As highlighted earlier the quantitative analysis closely follows Carroll et al (1994). The Bram and Ludvigson (1998) analysis also follows the baseline equation approach, with broadly concurring results. Carroll et al (1994) find that CCI in the US can explain consumption growth independent of income growth. Similar to the results reported here, CCI on their own explain 14% and 17% of total and durable consumption growth. In the case of non-durables and services, the impact of CCI is slightly less. In the UK case, on the other hand, we find that consumer confidence indices have no significant impact for expenditures on non-durables and services. The US studies find that CCI have a smaller impact when lagged income and dependent variables are introduced as control variables. Carroll et al (1994) finds that CCI explain an additional 3% and 5% growth in total and durable consumption respectively. This also differs slightly from the present analysis for the UK where additional explanation is only found for durable consumption growth when control variables are introduced.

When using the augmented Campbell-Mankiw model, by and large, US studies find they are able to reject the hypothesis that lagged CCI affect consumption growth only through the income channel. Hence, sentiment is able to explain

[9] It is also a useful predictor of durable consumption growth for two and three quarters ahead at the 10

consumption growth in addition to labor income and this is found to be especially true of total and durable consumption. The present study, using the augmented Campbell-Mankiw approach, finds that for the UK the CCI denoted by *MORI* is also able to reject the hypothesis, but only with respect to durable consumption growth.

The qualitative analysis in the present analysis for the UK and US indicate similar patterns. Both the UK and US CCI are accurate predictors of all the consumption growth types. Neither the UK nor US consumer confidence indices are useful predictors of non-durable consumption. There is some evidence, on the other hand, that they are useful predictors of durable consumption growth. In addition, the UK's *MORI* index is a useful predictor of total consumption for three and four-quarters ahead. Broadly speaking, the quantitative and qualitative approaches show that in both the UK and the US sentiment best explains durable consumption growth.

5. Summary and Concluding Remarks:

This paper investigates empirically whether consumer sentiment indicators can predict accurately the growth of household consumption in the UK. We consider whether CCI predict growth of household consumption in addition to labor income growth and secondly, whether they are directionally rational and useful.

The quantitative analysis takes the form of a reduced-form baseline equation approach, following the 'random-walk' version of LC-PIH, and the augmented-Campbell-Mankiw model, based on the 'rules-of-thumb'. We find that consumer sentiment has little, or no, explanatory power of total UK household consumption. On the other hand, it does explain household consumption of durable goods, independently of labor income. This indicates that consumers' willingness is

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per cent significance level.

important in determining discretionary consumption for the UK. This is similar to US findings. As highlighted earlier, both *GfK* and *MORI* indicators are constructed differently, the former being more complex. However, the *GfK* index does not appear have greater ability than the *MORI* index in predicting the growth of household consumption.

The qualitative analysis is undertaken using a non-parametric directional approach. CCI measures prove to be directionally accurate with respect to all the household consumption types. In addition, the UK's *MORI* index is also a useful predictor of total and durable consumption; in the case of total household consumption three to four quarters ahead, but one quarter ahead for durables. This would be particularly useful to policy-makers when engaging in counter-cyclical policies. Once, again, the *MORI* index proves to be a more useful indicator. We conclude that consumer sentiment, in particular the *MORI* representation, does predict UK household consumption of durable goods. The results are less robust for the US as the *SRC* is a useful predictor only in one instance, that is, a quarter ahead durable consumption growth.

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Appendix 1

Description of Variables:

Δlc_t - growth rate of real household consumption in volumes. The household consumption types are total, non-durable and services and durable, and are deflated using the Consumer Expenditure Deflator, with the first quarter of 1995 as the base quarter.

r_t - real interest measured by UK 3-month inter-bank rate less inflation

ΔY_t - growth rate of real labor income as measured by real wage and salary bill (£million).

Source: Office of National Statistics(UK) and Bureau of Economic Analysis(US)

Figure 1: Consumer Confidence and GDP Growth Rates, 1982 to 1999

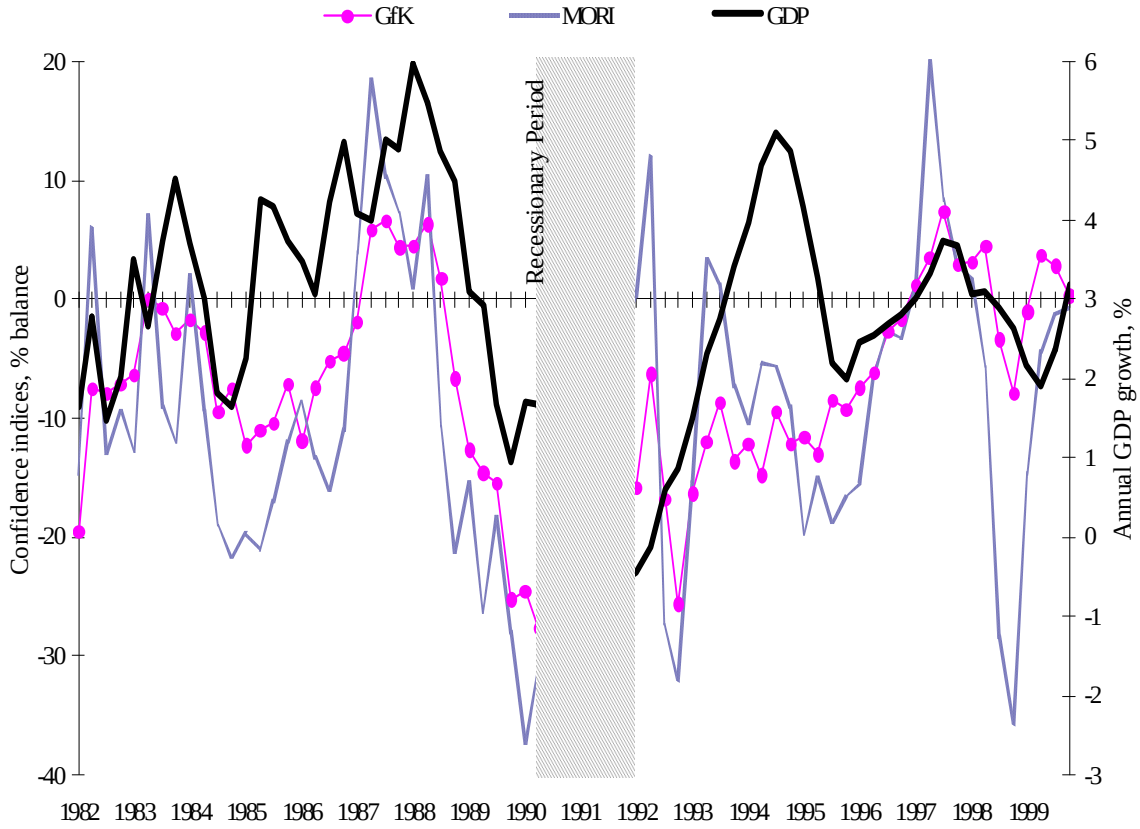

Table 1: Summary of Consumer Confidence Indices (1982Q1 to 1999Q4)

Year	Since 1982Q1	1985-89	1990-94	1995-99
MORI	-9.7	-9.4	-12.0	-8.2
Headline GfK	-7.6	-5.8	-16.6	-2.1

Source: *EC/GfK* and *MORI*

Table 2: Reduced-Form Regression Results: $\overline{R}^2$ and Incremental $\overline{R}^2$

		$\overline{R}^2$			Incremental $\overline{R}^2$	
	(1)	(2)	(3)	(1')	(2')	(3')
	TOTAL	NDUR	DUR	TOTAL	NDUR	DUR
GfK	0.23 [0.000]	0.03 [0.178]	0.13 [0.013]	0.02 [0.296]	0.01 [0.495]	0.06 [0.023]
MORI	0.15 [0.007]	0.04 [0.150]	0.24 [0.000]	0.04 [0.199]	0.06 [0.123]	0.13 [0.015]

Notes: Sample period; 1982:1 to 1999:4. The p-values of the joint significance of the lags of CCI are given in the parentheses [ ]. When estimating equation (2), the following control variables were: $\Delta Y_{t-1}, \Delta Y_{t-2}, \Delta Y_{t-3}, \Delta Y_{t-4}, \Delta lc_{t-1}, \Delta lc_{t-2}, \Delta lc_{t-3}, \Delta lc_{t-4}$ *. The following; TOTAL, NDUR and DUR denotes total, non-durable and services and durable personal consumption respectively.*

Table 3(a) "Rules-of-Thumb" Model Results

Category of real PCE	λ	$\overline{R}^2$	*DW*	*H*	χ^2
Total	1.127[a] (9.51)	0.07	1.78	2.08	10.12
Non-Durables	0.660[a] (4.93)	0.04	2.09	0.06	12.36
Durables	2.037[a] (4.61)	0.27	2.14	0.34	12.52

Notes: [a]Significance at the 5% or better level. [b]Significance at the 10% or better.
Sample period; 1982:1 to 1999:4 Absolute t-statistics are given in brackets.
DW, H and χ^2 *are the respective tests for first-order serial correlation (Durbin-Watson), heteroscedasticity (White's Heteroscedaticity Tests) and overidentification. The following instruments are used for* ΔY_t*:* $\Delta Y_{t-1}, \Delta Y_{t-2}, \Delta Y_{t-3}, \Delta lc_{t-1}, \Delta lc_{t-2}, \Delta lc_{t-3}, r_{t-1}, r_{t-2}, r_{t-3}$

Table 3(b) Sentiments Augmented "Rules-of-Thumb" Model Results

Category of real PCE	*CCI*	α_0	λ	α_1	$\sum_{i=1}^{n=4}\beta_i$	$\overline{R}^2$	*DW*	*H*	χ^2
Total	*MORI*	0.841[a] (3.35)	0.667[a] (3.56)	-0.048[b] (1.70)	1.572 [0.19]	0.49	1.78	1.16	10.60
	GfK	0.934[a] (2.60)	0.273 (0.68)	-0.012 (0.33)	1.224 [0.30]	0.42	1.59	0.79	9.45
Non-Durables	*MORI*	0.490 (1.51)	0.387 (1.57)	-0.30 (0.83)	1.722 [0.15]	0.20	2.26	0.62	11.16
	GfK	0.689 (1.36)	-0.270 (0.47)	0.031 (0.60)	1.017 [0.40]	0.06	1.84	1.30	7.58
Durables	*MORI*	2.828[a] (2.69)	1.737[a] (2.16)	-0.268[a] (2.25)	3.787 [0.00]	0.48	2.29	0.99	3.87
	GfK	1.776 (1.15)	2.759[b] (1.63)	-0.303[b] (1.91)	0.996 [0.41]	0.38	2.37	0.63	5.71

Notes: [a]Significance at the 5% or better level. [b]Significance at the 10% or better.

Sample period; 1982:1 to 1999:4. Absolute t-statistics and p-values are given in brackets and parentheses respectively. DW, H and χ^2 are the respective test for first-order serial correlation (Durbin-Watson),
heteroscedasticity (White's Heteroscedaticity Tests) and overidentification.
The following instruments are used for ΔY_t: $\Delta Y_{t-1}, \Delta Y_{t-2}, \Delta Y_{t-3}, \Delta lc_{t-1}, \Delta lc_{t-2}, \Delta lc_{t-3}, r_{t-1}, r_{t-2}, r_{t-3}$ [10].

[10] The Hausman tests for real interest rates could not reject the null hypothesis of exogeneity. The following instruments were used: $\Delta Y_{t-1}, \Delta Y_{t-2}, \Delta Y_{t-3}, \Delta lc_{t-1}, \Delta lc_{t-2}, \Delta lc_{t-3}, r_{t-1}, r_{t-2}, r_{t-3}$

Table 4(a): Directional Analysis: Total

CCI	N_1	N_2	$\hat{p}_1$	$\hat{p}_2$	$\hat{p}$	*s*	FE	χ^2	S_n^2
GfK_{t-1}	9	59	1.000	0.220	1.220	1.000	0.1290	1.23	2.49
GfK_{t-2}	9	58	0.889	0.207	1.096	0.875	0.4407	0.05	0.46
GfK_{t-3}	9	57	1.000	0.228	1.228	1.000	0.1197	1.32	2.60
GfK_{t-4}	9	56	0.889	0.196	1.085	0.861	0.4713	0.02	0.38
$MORI_{t-1}$	9	59	0.889	0.305	1.194	0.958	0.2156	0.65	1.48
$MORI_{t-2}$	9	58	0.667	0.276	0.943	0.498	0.7795	0.00	0.13
$MORI_{t-3}$	9	57	1.000	0.333	1.333	1.000	0.0368*	2.74	4.28*
$MORI_{t-4}$	9	56	1.000	0.339	1.339	1.000	0.0345*	2.83	4.38*
SRC_{t-1}	3	65	1.000	0.156	1.156	1.000	0.6108	0.01	0.56
SRC_{t-2}	3	64	1.000	0.141	1.141	1.000	0.6441	0.03	0.49
SRC_{t-3}	3	63	1.000	0.125	1.125	1.000	0.6786	0.07	0.43
SRC_{t-4}	3	62	1.000	0.109	1.109	1.000	0.7143	0.13	0.37

Notes:

N_1 number of outcomes which are negative.

FE Fisher's Exact Test.

N_2 number of outcomes which are non-negative.

χ^2 Chi-square test of independence $\hat{p}_1$ estimate of $p_1(t)$ of forecasts and outcomes.

$\hat{p}_2$ estimate of $p_2(t)$

S_n^2 Pesaran-Timmerman test.

$\hat{p}$ $= \hat{p}_1 + \hat{p}_2$

* Null hypothesis rejected at 5% level

s significance level testing H_0: $p_1(t) + p_2(t) \geq 1$ against H_1: $p_1(t) + p_2(t) < 1$.

Table 4(b): Directional Analysis: Non-Durables

CCI	N_1	N_2	$\hat{p}_1$	$\hat{p}_2$	$\hat{p}$	*s*	FE	χ^2	S_n^2
GfK_{t-1}	18	50	0.833	0.200	1.033	0.7368	0.5304	0.00	0.10
GfK_{t-2}	17	50	0.765	0.180	0.945	0.4291	0.8059	0.02	0.25
GfK_{t-3}	16	50	0.813	0.200	1.013	0.6685	0.6129	0.06	0.01
GfK_{t-4}	16	49	0.688	0.143	0.830	0.1271	0.9661	1.32	2.34
$MORI_{t-1}$	18	50	0.722	0.280	1.002	0.6191	0.6207	0.08	0.00
$MORI_{t-2}$	17	50	0.706	0.280	0.986	0.5701	0.6701	0.04	0.01
$MORI_{t-3}$	16	50	0.813	0.320	1.133	0.9133	0.2461	0.49	1.05
$MORI_{t-4}$	16	49	0.688	0.286	0.973	0.5353	0.7041	0.01	0.04
SRC_{t-1}	3	65	1.000	0.156	1.156	1.000	0.6108	0.01	0.56
SRC_{t-2}	3	64	1.000	0.141	1.141	1.000	0.6441	0.03	0.49
SRC_{t-3}	3	63	1.000	0.125	1.125	1.000	0.6786	0.07	0.43
SRC_{t-4}	3	62	1.000	0.109	1.109	1.000	0.7143	0.13	0.37

Table 4(c): Directional Analysis: Durables

CCI	N_1	N_2	$\hat{p}_1$	$\hat{p}_2$	$\hat{p}$	s	FE	χ^2	S_n^2
GfK_{t-1}	24	44	0.875	0.227	1.102	0.9147	0.2454	0.49	1.07
GfK_{t-2}	24	43	0.833	0.209	1.043	0.7685	0.4677	0.01	0.18
GfK_{t-3}	24	42	0.833	0.214	1.048	0.7824	0.4493	0.02	0.22
GfK_{t-4}	24	41	0.833	0.195	1.028	0.7263	0.5257	0.00	0.08
$MORI_{t-1}$	24	44	0.875	0.364	1.239	0.9936	0.0316*	3.29	4.46*
$MORI_{t-2}$	24	43	0.708	0.279	0.987	0.5639	0.6559	0.03	0.01
$MORI_{t-3}$	24	42	0.750	0.310	1.060	0.7855	0.4130	0.05	0.27
$MORI_{t-4}$	24	41	0.750	0.317	1.067	0.8030	0.3895	0.08	0.33
SRC_{t-1}	16	52	1.000	0.196	1.196	1.000	0.0515*	2.31	3.74*
SRC_{t-2}	16	51	1.000	0.176	1.176	1.000	0.0712	1.92	3.31
SRC_{t-3}	16	50	1.000	0.157	1.125	1.000	0.0976	1.55	2.89
SRC_{t-4}	16	49	1.000	0.137	1.137	1.000	0.1331	1.20	2.49