

Consumer Sentiment: Income Expectations or Preference Shocks?

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Abstract

Consumer sentiment has repeatedly been shown to predict changes in consumption expenditures. In contrast to the view that sentiment is a mere forecast of future income, I argue that sentiment measures preference shocks which *cause* fluctuations in consumption. The Hall residual, which is a theoretically well-founded measure of aggregate preference shocks, is strongly related to the Michigan Index of Consumer Sentiment and its components. I further show that preference shocks generate quite large impact responses on consumption in an SVAR model.

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1 Introduction

Christopher D. Carroll, Jeffrey C. Fuhrer, and David W. Wilcox (1994) - henceforth CFW - ask the question whether consumer sentiment forecasts household spending and answer with a clear yes. Other studies (Daron Acemoglu and Andrew Scott 1994, Tassos Belessiotis 1996, E. Philip Howrey 2001, Nicholas S. Souleles 2004, Andy C.C. Kwan and John A. Cotsomitis 2004, 2006, Cotsomitis and Kwan 2006) confirm that consumer sentiment indicators predict future consumption growth in different countries. While there is also some opposing evidence, Sydney C. Ludvigson (2004) concludes that consumer confidence has at least some incremental forecasting power for some consumer spending categories. It is of course an important result that consumer confidence forecasts consumption growth, because it is of practical interest to macroeconomic forecasters and it is a rejection of the famous Hall (1978) hypothesis and as such a challenge for economic theory. But at least as important is the related question also asked by CFW: Why does consumer confidence forecast household spending?

There is consensus in the aforementioned empirical literature that a part of this forecasting power of consumer confidence results from its ability to forecast future income. If households for some reason primarily consume out of their current income, a variable which correctly predicts future income will also predict future consumption spending (see John Y. Campbell and N. Gregory Mankiw 1990, 1991). Another explanation is that consumer sentiment measures consumers' degree of uncertainty about the future and is therefore related to precautionary saving (see

Carroll 2001). Yet the empirical support for this explanation is rather weak (Ludvigson 2004).

In this paper I want to advocate a third possible explanation also suggested by CFW: Consumer sentiment could also be an independent driving force of consumption, reflecting shocks to preferences. While CFW do not discuss this possibility any further and the subsequent literature on consumer sentiment focuses on its predictive capacity, there is a theoretical literature on the importance of preference shocks for business cycles (Valerie R. Bencivenga 1992, Allison Holland and Andrew Scott 1998, Lilia Maliar and Serguei Maliar 2004, Tomoyuki Nakajima 2005, Yi Wen 2006). This literature shows that aggregate demand or preference shocks seem to be important in RBC models to match the data. Different suggestions are made concerning the sources of aggregate preference shocks. Nakajima (2005, p. 1332) rejects the most straightforward interpretation to take the aggregate demand shocks at face value as shocks to preferences of the representative household. He regards this interpretation as implausible, because this would require individual preferences to change similarly over time. In a model with incomplete asset markets and individuals with idiosyncratic employment shocks, he shows that stochastic shocks in aggregate preferences appear through aggregation although individuals do not have preference shifts. Similarly, in Maliar and Maliar (2003) aggregate preference shocks result from aggregation in a model with complete markets and agents with identical non-stochastic preferences, but idiosyncratic labor productivity shocks. Bencivenga (1992) interprets aggregate preference shocks as the result from shocks to household production or from changes in relative prices.

In contrast to Nakajima's view, it might not be so implausible to interpret aggregate preference shocks as actual shocks to individual preference. Preference shocks could be correlated among many individuals, possibly because they are triggered by political or social events affecting many people at the same time or because many people's views are synchronized or reinforced by mass media. In this paper I argue that there are good reasons to believe that consumer sentiment in part measures preferences shocks which cause changes in household spending. Consumer sentiment is likely to be more than a mere predictor of aggregate consumption.

The strategy of this paper is as follows. First, I discuss the Index of Consumer Sentiment (ICS) published by the University of Michigan, which is based on George Katona's theory of ability to buy and willingness to buy. One determinant of willingness to buy are consumers' attitudes, which may be interpreted as preferences. In the second step, I introduce the *Hall residual* as a theoretically sound measure of changes in aggregate consumer preferences, which Robert E. Hall (1997) demonstrates to be important for the explanation of stylized business cycle facts. Simple correlations and regression analysis show that the Hall residual and the ICS evolve very similarly over time and that the Hall residual is especially strongly correlated with willingness to buy. Finally, I estimate several structural VAR models and calculate the responses of consumption to the structural shocks. The impulse-response functions of VAR models with subjective variables from the Michigan survey and of models with objective measures of disposable income changes, GDP expectations, and the Hall residual are very similar. Both willingness

to buy and the Hall residual have relatively large impact effects on consumption, supporting the view that preference changes are one reason why the ICS predicts consumption.

2 The University of Michigan Index of Consumer Sentiment

The Survey Research Center at the University of Michigan publishes every month three indexes reflecting consumers' economic sentiment and expectations: The Index of Consumer Sentiment (ICS), the Index of Consumer Expectations (ICE), and the Index of Current Economic Conditions (ICC). With regard to public attention and scientific interest in this context, the ICS is probably the most important one, so that I restrict my analysis to this index. The ICS is constructed from the answers to the following five out of 21 questions the Survey Research Center poses to about 500 respondents:

Q1: "We are interested in how people are getting along financially these days. Would you say that you (and your family living there) are better off or worse off financially than you were a year ago?" [1 Better now, 2 Same, 3 Worse, 4 Don't Know]

Q3: "Now looking ahead - do you think that a year from now you (and your family living there) will be better off financially, or worse off, or just about the same as now?" [1 Will be better off, 2 Same, 3 Will be worse Off, 4 DK]

Q10: "Now turning to business conditions in the country as a whole - do you think that during the next 12 months we'll have good time

financially, or bad times or what?" [1 Good Times, 2 Good with qualifications, 3 Pro-con, 4 Bad with qualifications, 5 Bad Times, 6 DK]

Q11: "Looking ahead, which would you say is more likely - that in the country as a whole we'll have continuous good times during the next 5 years or so, or that we will have periods of widespread unemployment or depression, or what?" [open-ended question, categorized into 1 Good Times, 2 Uncertain, 3 Bad Times, 4 DK,NA]

Q16: "About the big things people buy for their homes - such as furniture, a refrigerator, stove, television, and things like that. Generally speaking, do you think now is a good or a bad time for people to buy major household items?" [1 Good, 2 Pro-Con, 3 Bad Time to Buy, 4 DK]

The respondents choose from the given answers and the responses are then summarized as relative scores, which are the proportions of respondents giving favorable answers minus the proportions giving unfavorable responses plus 100. The aggregate indexes are scaled averages of the relative scores of the respective questions.

These five questions of the ICS can be divided into three categories. Question 1 asks for a comparison of the households' current financial positions compared to the financial positions one year before. This question is retrospective and aims at the evolution of disposable incomes of households. If the question is valid, its relative score will track the movements of private disposable income per household. Questions 3, 10, and 11 concern households' economic expectations. While question 3 asks for the

change in personal disposable income within the following year, question 10 and question 11 refer to business conditions in the country as a whole, in other words macroeconomic expectations, within the following year and during the following five years respectively.

The most interesting question for the purpose of this paper is question 16 asking for an assessment whether times are good or bad to buy major household items. The interpretation of this question is more difficult than in the cases before as it is not clear a priori what "a good or a bad time" means to respondents. The Survey Research Center interprets this question as one for market conditions (see Richard T. Curtin 1982) and complements this question by an open-ended question for the reasons of the answer given. The reasons mentioned by respondents are then assigned to the answer categories "prices are low, good buys available", "prices will increase", "interest rates are low, credit is easy", "borrow in advance of rising interest rates", "times are good, prosperity" for favorable answers and "prices are high", "interest rates are high, credit is tight", "times are bad, can't afford to buy", and "bad times ahead, uncertain future" for unfavorable answers. As Table 1 shows, these nine categories of reasons explain almost all of the variance in the relative score of question 16. But it is not imperative to interpret all of those reasons as descriptions of market conditions only. Among the reasons for favorable buying conditions, "prices are low", "interest rates are low", and "times are good" make no sense without some point of reference, and the same is true for "prices are high", "interest rates are high", and "times are bad". Of course, such a reference point could be future market conditions such as future prices, interest rates, or future

income, but then there would be no difference to "prices will increase" and "borrow in advance of rising interest rates". Another plausible reference point could be the marginal rate of substitution between current and future consumption or between consumption and leisure. But in this case the reasons mentioned can be understood as a description of current preferences.

[Table 1 about here]

The theoretical basis of the ICS is Katona's distinction between *ability to buy* and *willingness to buy* (see Katona 1951, 1968, 1975, also Curtin 1982). While the former refers to the households budget constraint including access to credit, the latter concept acknowledges that especially for the purchase of consumer durables, households have latitude whether and when to buy. Willingness to buy depends on households *expectations* and *attitudes* and interacts with ability to buy. Since George Katona was director of the Survey Research Center at the University of Michigan and its consumer sentiment research program, it is natural to interpret the ICS in terms of Katona's theory. In order to measure and to predict when consumers will make discretionary purchases, it is necessary to measure their ability to buy given by wealth or income (question 1), their expectations (questions 3, 10, and 11), and their willingness to buy (question 16). It should be clear, however, that changes in willingness to buy cannot be equated with changes in preferences, since willingness to buy also comprises economic expectations. It is rather what Katona labels "attitudes" that comes close to preferences.

3 The Hall residual

Hall (1997) derives an observable measure of changes in the preferences of the representative household. Assume that the economy is populated by a large number of households with identical preferences which can be represented as the utility function of a representative household:

$$U_t = x_t \log c_t - \frac{n_t^{1+\phi}}{1+\phi}, \quad (1)$$

where c_t is consumption and n_t is labor. Of the preference parameters, x_t may vary stochastically. Different values of x_t can be interpreted as shocks to preferences which alter the marginal rate of substitution between consumption and labor. Let production be described by an aggregate production function of the Cobb-Douglas type with labor and capital as inputs

$$y_t = \frac{z_t}{\alpha} n_t^\alpha k_t^{1-\alpha}, \quad (2)$$

where z_t is total factor productivity. According to the first order condition of the intratemporal household optimization problem, the marginal rate of substitution between labor and consumption must equal the real wage, which is equal to the marginal product of labor if the labor market is competitive:

$$\frac{c_t n_t^\phi}{x_t} = z_t \left(\frac{k_t}{n_t} \right)^{1-\alpha}. \quad (3)$$

Solving (2) for z_t , we can eliminate z_t from (3). Taking logs and solving for $\ln x_t$, we obtain an equation for the preference shifts in terms

of observable variables only:

$$\ln x_t = \ln c_t - \ln y_t + (1 + \phi) \ln n_t - \ln \alpha. \quad (4)$$

The *Hall residual* $\ln x_t$ accounts for changes in the relationship between consumption and employment which are not due to changes in the real wage, making it reasonable to interpret the residual as a preference parameter.

I calculate the Hall residual using U.S. data on total real personal consumption expenditures¹ and real gross domestic product² and hours worked. Hours worked are computed using the BLS monthly series of average weekly hours of all persons in all private industries³ divided by $24 * 7 = 168$, which gives the average share of total time provided to the labor market. This number is multiplied by the civilian employment population ratio⁴ also provided as a monthly series by the BLS, and finally averaged over quarters. Following Hall (1997), I use the values of 1.7 for ϕ and 0.7 for α .

4 Consumer sentiment and preference changes

In Figure 1, we see a remarkable relation between the Index of Consumer Sentiment and the Hall residual. The contemporaneous correlation between the two series is 0.61 (see Table 2). Most interestingly, the Hall residual is strongly correlated with the willingness question (Q16) among the components of the ICS, but not significantly correlated with the me-

¹Quarterly series PCECC96 provided by the BEA, 1960:q1 - 2005:q4.

²Quarterly series GDPC1 provided by the BEA, 1960:q1 - 2005:q4.

³Series ID AWHNONAG, 1964:m1 to 2005:m12.

⁴Series ID EMRATIO, 1964:m1 to 2005:m12.

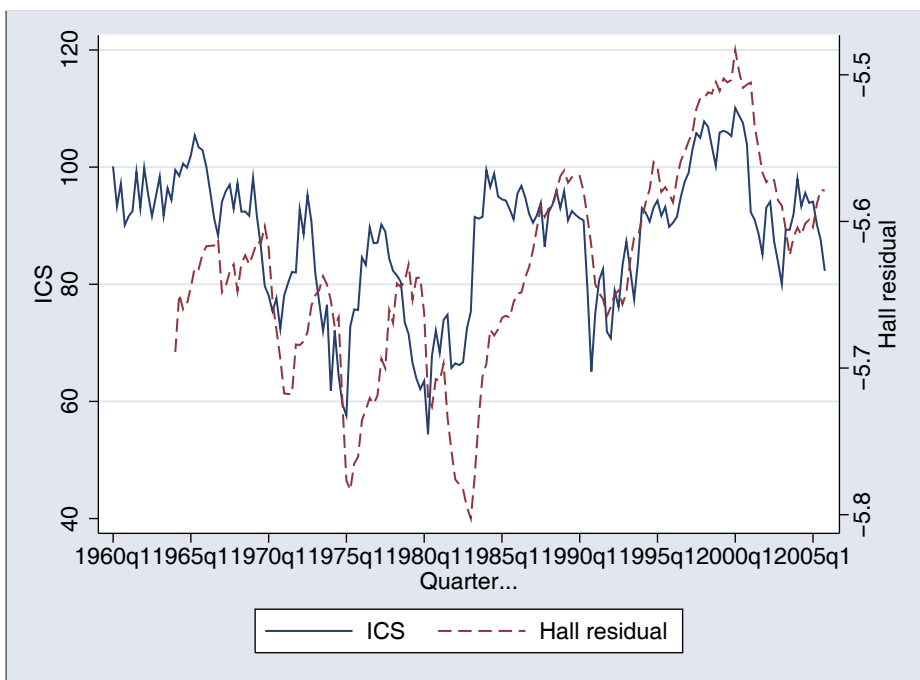


Figure 1: Index of Consumer Sentiment and Hall residual

dian one-quarter-ahead forecast of real GDP growth by professional forecasters⁵. The correlations between the professional GDP growth forecast and ICS and its components⁶ are also relatively low. Table 2 also shows that the components of the ICS are strongly correlated with each other, especially Q1, Q3, Q10, and Q11.

[Table 2 about here]

In order to learn something about the forces driving the Index of Consumer Sentiment, I regress the index and its components on the growth rate of real disposable income⁷, the median one-quarter-ahead

⁵Philadelphia Fed's Survey of Professional Forecasters, series median growth: dngdp3-dpgdp3, 1968:q1 to 2005:q4

⁶Quarterly series, 1960:q1 to 2005:q4

⁷Quarterly series DPIC96, divided by averages of monthly series POPTHM both provided by BEA, 1960:q1 - 2005:q4.

forecast of real GDP growth by professional forecasters, and the Hall residual. All series are normalized to have a mean of zero and a standard deviation of one, which makes it possible to compare the magnitude of the estimated coefficients. The growth rate of real disposable income is meant to capture the retrospective component of the ICS, the professional forecast is a measure of income expectations, and the Hall residual is interpreted as changes in aggregate preferences. The results of this simple exercise are presented in Table 3. The ICS is well explained by these three variables. Both the magnitude and the significance of the income growth coefficient are fairly low. The coefficients of expectations and the Hall residual are more precisely estimated and the coefficients - especially those of the Hall residual - are larger. The same pattern holds for the components, except that income growth is significantly related to Q1 and Q10. Notice that with the exception of Q10, the most important variable is always the Hall residual. In the regressions of Q1 and Q16, the coefficient of the Hall residual is more than twice as large as the coefficient of expectations. These regressions also have the largest R^2 .

[Table 3 about here]

5 Sentiment and consumption

As all of the components of the ICS are strongly interdependent, it suggests itself to perform a VAR analysis to see how aggregate consumption reacts to the structural innovations to the ICS components. I will estimate several VAR models with income retrospections, income expectations, willingness to buy, and consumption and the corresponding

responses of orthogonalized impulses on consumption⁸. It is natural to assume a recursive structure of the model,

$$\begin{pmatrix} 1 & 0 & 0 & 0 \\ b_{12} & 1 & 0 & 0 \\ b_{13} & b_{23} & 1 & 0 \\ b_{14} & b_{24} & b_{34} & 1 \end{pmatrix} \begin{pmatrix} \varepsilon_t^r \\ \varepsilon_t^e \\ \varepsilon_t^w \\ \varepsilon_t^c \end{pmatrix} = \begin{pmatrix} u_t^r \\ u_t^e \\ u_t^w \\ u_t^c \end{pmatrix} \quad (5)$$

where the residual in the income retrospection equation, u_t^r , is equal to the structural shock to the income retrospection, ε_t^r . If expectations are formed in some extrapolative manner, the income retrospection shocks will also affect expectations. As was discussed earlier, Katona viewed willingness to buy as a function of expectations and attitudes and also of income which is the reason to put the willingness variable at the third position. Finally, consumption is a function of the perceived evolution of income and the intervening variables expectations and willingness.

By construction, all variables with the exception of aggregate consumption expenditures must be stationary. The KPSS test does not reject the stationarity of Q1, Q3, Q10, and Q11 at the 5-percent level, but strongly rejects level stationarity for Q16 and the Hall residual. The Phillips-Perron test and the ADF test are unable to reject the unit root for $\ln(x)$, but deliver mixed results for Q16. Since a unit root is implausible, I perform the Clemente-Montañés-Reyes (1998) unit-root test with a single mean shift (innovative outliers). The test detects mean shifts with $p < 0.01$ in 1982:q1 for Q16 and in 1982:q4 for the Hall resid-

⁸I do not estimate VAR models with all five components of the ICS for two reasons. First, I do not want to lose too many degrees of freedom. Second, it is not clear, how to identify the structural shocks with several expectational variables.

ual, which I remove from the series by regressing the series on a dummy variable and taking the residuals.

Consumption is measured by total real personal consumption expenditures and by real personal consumption expenditures on durable goods⁹. Theoretically, expenditures on durable goods is the appropriate variable, because here consumers have most discretion about their expenditures. Total consumption is used for comparison. Of both series only the cyclical components obtained by the HP-filter are used. For expectations, I use Q11 instead of Q3 or Q10, because this variable has the largest bivariate correlation with the ICS¹⁰. All variables are standardized to have a mean of zero and a standard deviation of one. The lag order of all VAR models is one, as suggested by the SBIC and the HQIC¹¹.

[Table 4 about here]

The upper part of Table 4 presents the responses of one-standard-deviation shocks to the four variables on total consumer expenditures and on expenditures on consumer durables. Expectation shocks (Q11) do not generate significant responses. The responses of retrospections (Q1) are significant at the 5-percent level. Their impact effect is small compared to the significant impact effects of willingness shocks (Q16). While the strength of the responses to retrospection impulses tends to grow over time, the responses to willingness shocks are largest on impact and then decrease over the following quarters. The forecast error

⁹Quarterly series PCDGCC96 provided by the BEA; 1960:q1 - 2005:q4.

¹⁰The results are qualitatively identical, if Q3 or Q10 are used.

¹¹In some cases the AIC chooses two lags. The results of models with two lags are qualitatively identical.

variance decompositions in the lower part of Table 4 confirm this picture. The largest share of variation comes from consumption itself, but within the first three quarters, the second largest contribution stems from willingness, while expectations do not play a role.

[Table 5 about here]

As an indirect test on whether the shocks to the three components of the ICS really measure shocks to income retrospections, expectations, and willingness to buy (or preferences), I repeat the impulse-response exercise using objective variables. Income retrospections are measured by the year-to-year growth rate of real disposable income, expectations are proxied by the one-quarter-ahead expected real GDP growth rate of professional forecasters, and instead of the willingness variable I use the Hall residual. This approach is reasonable as the first canonical correlation between the two sets of variables is rather high (0.76).

The results in Table 5 are strikingly similar to the results in Table 4. The qualitative pattern of income growth and preferences is virtually identical to retrospections and willingness, but in contrast to consumers' expectations, the expectations of professionals produce significant and relatively large consumption responses after one or two quarters. In the forecast error variance decompositions, however, expectations are still irrelevant.

I conclude that both income retrospections and willingness to buy really measure the past change in disposable income and changes in preferences respectively. Households form different expectations than experts. In total, at least in the very short run, preference shocks have

the largest effects on consumption expenditures and consumer durables, while households' expectations do not move consumption. The Index of Consumer Sentiment is therefore interesting as measure of preference shocks rather than of consumers' income expectations.

6 Concluding remarks

This paper contributes to two strands of the macroeconomic literature, which did not intersect in the past. Research on consumer sentiment has shown that sentiment predicts consumption, but has not systematically analyzed why this is the case. Recent work in the real business cycle literature has recognized an important role for shocks to aggregate preferences of the representative household for fluctuations in consumption and labor supply. But this literature is reluctant with the interpretation of these demand shocks as actual preference shocks and rather seeks to find other explanations for the stochastic movements in aggregate demand. The main point of this paper is to link these approaches.

In line with the RBC literature, I argue that shocks to aggregate preferences cause changes in consumption expenditures. The Hall residual, which is a theoretically well-founded measure of changes in aggregate preferences, is strongly correlated with the ICS and its components, especially with the willingness-to-buy component. Changes in the Hall residual have a much larger impact on the ICS than changes in real disposable income growth or changes of expected GDP growth. Shocks to the willingness-to-buy component and to the Hall residual have relatively large impact effects on consumption expenditures supporting the view that they are causal for changes in consumption.

Likewise, I argue that the aggregate demand shocks measured by the Hall residual can be interpreted literally as shocks to preferences. The Michigan consumer sentiment survey was set up on the basis of Katona's theory which explicitly expresses the role of changing consumer attitudes for expenditures on consumer durables. Together with expectations and ability to buy, attitudes influence consumers' willingness to buy, which is measured by the respective question in the survey. As this survey was designed in a context quite different from current consumer theory and directly aims at eliciting subjective factors, the large correlation, especially of the willingness-to-buy question, with the Hall residual makes it plausible to interpret the Hall residual as a subjective variable. It may not be necessary to look for microeconomic derivations of the Hall residual which avoid the possibility of changing preferences. It is an interesting task for future work to model when and how the preferences of many individuals change simultaneously.

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Tables

Table 1: Reasons why time is good or bad to make major purchases

	(1)	(2)	(3)
Q16	good times	bad times	relative score
prices are low	0.60 (9.75)		0.34 (15.48)
prices will increase	0.45 (5.38)		0.33 (13.32)
interest rates are low	0.35 (5.74)		0.19 (8.38)
borrow in advance	0.04 (0.97)		0.07 (4.99)
times are good	0.42 (8.70)		0.17 (6.87)
prices are high		0.50 (13.34)	-0.50 (-14.33)
interest rates are high		0.27 (7.24)	-0.14 (-5.33)
times are bad		0.35 (8.74)	-0.12 (-4.08)
bad times ahead		0.24 (6.50)	-0.18 (-8.58)
<i>adj R</i> ²	0.90	0.96	0.97

Notes: beta coefficients and $\text{adj } R^2$ from OLS estimations; t-statistics from Newey-West, standard errors in parentheses, constant not shown, 184 observations

Table 2: Correlation matrix

	Q1	Q3	Q10	Q11	Q16	ICS	ln(x)
Q3	0.80						
Q10	0.77	0.78					
Q11	0.79	0.85	0.92				
Q16	0.78	0.63	0.53	0.57			
ICS	0.91	0.88	0.91	0.93	0.80		
ln(x)	0.66	0.53	0.38	0.52	0.73	0.61	
exp	0.31	0.39	0.53	0.38	0.23	0.41	-0.15 ⁱⁿ

Notes: all coefficients significantly different from 0 at the 5-percent level, except $\text{corr}(\text{exp}, \ln(x))$; ICS: 184 observations; Hall residual, $\ln(x)$: 168 observations; one-quarter forecast of GDP growth by professional forecasters, exp: 149 observations

Table 3: Determinants of consumer sentiment and its components

	(1)	(2)	(3)	(4)	(5)	(6)
	ICS	Q1	Q3	Q10	Q11	Q16
$\Delta RDPI$	0.17 (0.10)	0.21* (0.09)	0.04 (0.10)	0.23* (0.10)	0.15 (0.11)	0.03 (0.09)
exp	0.47* (0.05)	0.36* (0.05)	0.49* (0.10)	0.45* (0.05)	0.40* (0.06)	0.38* (0.06)
ln(x)	0.71* (0.08)	0.74* (0.08)	0.64* (0.10)	0.44* (0.07)	0.59* (0.10)	0.82* (0.08)
adj. R ²	0.73	0.71	0.57	0.62	0.61	0.69

Notes: OLS regression with Newey-West standard errors for autocorrelated errors up to lag 10 in parentheses; $\Delta RDPI$: growth rate of real disposable income; exp: professional forecast of GDP growth; $\ln(x)$: Hall residual; 149 observations; * significantly different from zero at the 5-percent level; all variables have a mean of zero and a standard deviation of one

Table 4: Orthogonalized impulse responses and forecast error variance decompositions from 4-variable VARs with ICS components

Response variable	Total consumption				Consumer durables				
Impulse variables	Q1	Q11	Q16	C	Q1	Q11	Q16	CD	
Quarter	0	0.09 (0.04)	0.05 (0.04)	0.14 (0.04)	0.44 (0.02)	0.10 (0.05)	-0.01 (0.05)	0.23 (0.04)	0.72 (0.08)
	1	0.15 (0.04)	0.04 (0.04)	0.14 (0.04)	0.35 (0.03)	0.16 (0.05)	-0.01 (0.05)	0.20 (0.05)	0.35 (0.06)
	2	0.17 (0.04)	0.04 (0.04)	0.14 (0.05)	0.28 (0.04)	0.16 (0.05)	0.01 (0.05)	0.16 (0.05)	0.18 (0.05)
	3	0.18 (0.04)	0.05 (0.04)	0.12 (0.05)	0.22 (0.04)	0.14 (0.05)	0.03 (0.04)	0.11 (0.05)	0.10 (0.04)
	4	0.17 (0.04)	0.06 (0.04)	0.11 (0.05)	0.17 (0.05)	0.12 (0.04)	0.05 (0.04)	0.08 (0.04)	0.05 (0.03)
		FEVD				FEVD			
	1	0.04 (0.03)	0.01 (0.02)	0.09 (0.04)	0.86 (0.06)	0.02 (0.02)	0.00 (0.01)	0.09 (0.03)	0.89 (0.04)
	2	0.08 (0.05)	0.01 (0.02)	0.10 (0.05)	0.81 (0.07)	0.05 (0.03)	0.00 (0.01)	0.12 (0.04)	0.83 (0.06)
	3	0.11 (0.06)	0.01 (0.02)	0.11 (0.06)	0.76 (0.08)	0.07 (0.04)	0.00 (0.01)	0.14 (0.05)	0.79 (0.07)
	4	0.15 (0.07)	0.01 (0.03)	0.12 (0.06)	0.72 (0.09)	0.09 (0.05)	0.00 (0.01)	0.15 (0.06)	0.76 (0.07)
adj R ² of VARs	0.76	0.85	0.65	0.77	0.76	0.84	0.65	0.42	

Notes: Q1: retrospections; Q11: expectations; Q16: willingness to buy; C: aggregate consumption; CD: expenditures on consumer durables; bootstrapped standard errors in parentheses (300 replications); 183 observations

Table 5: Orthogonalized impulse responses and forecast error variance decompositions from 4-variable VARs

Response variable	Total consumption				Consumer durables				
Impulse variables	$\Delta RDPI$	exp	$\ln(x)$	C	$\Delta RDPI$	exp	$\ln(x)$	CD	
Quarter	0	0.12 (0.04)	0.05 (0.05)	0.19 (0.04)	0.44 (0.03)	0.08 (0.07)	-0.02 (0.08)	0.28 (0.05)	0.78 (0.08)
	1	0.15 (0.05)	0.14 (0.05)	0.16 (0.04)	0.38 (0.03)	0.15 (0.07)	0.10 (0.06)	0.18 (0.04)	0.43 (0.08)
	2	0.16 (0.06)	0.20 (0.06)	0.13 (0.04)	0.31 (0.04)	0.15 (0.07)	0.15 (0.06)	0.11 (0.04)	0.22 (0.07)
	3	0.15 (0.07)	0.23 (0.06)	0.10 (0.04)	0.25 (0.05)	0.14 (0.06)	0.17 (0.06)	0.06 (0.04)	0.11 (0.05)
	4	0.14 (0.06)	0.23 (0.07)	0.07 (0.04)	0.19 (0.06)	0.11 (0.05)	0.17 (0.06)	0.03 (0.04)	0.04 (0.04)
		FEVD				FEVD			
	1	0.06 (0.04)	0.01 (0.02)	0.15 (0.05)	0.78 (0.08)	0.01 (0.02)	0.00 (0.02)	0.11 (0.05)	0.88 (0.05)
	2	0.08 (0.05)	0.05 (0.04)	0.14 (0.05)	0.73 (0.09)	0.03 (0.03)	0.01 (0.02)	0.12 (0.05)	0.85 (0.06)
	3	0.10 (0.06)	0.10 (0.06)	0.13 (0.05)	0.68 (0.10)	0.05 (0.04)	0.03 (0.03)	0.11 (0.05)	0.81 (0.07)
	4	0.11 (0.07)	0.15 (0.07)	0.12 (0.05)	0.63 (0.11)	0.06 (0.05)	0.06 (0.05)	0.11 (0.04)	0.77 (0.08)
adj R ² of VARs		0.56	0.69	0.93	0.79	0.56	0.68	0.93	0.43

Notes: ; $\Delta RDPI$: growth rate of real disposable income; exp: professional forecast of GDP growth; $\ln(x)$: Hall residual; C: aggregate consumption; CD: expenditures on consumer durables; bootstrapped standard errors in parentheses (300 replications); 148 observations