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Forecasting private consumption by consumer surveys

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Discussion Papers

1066

Christian Dreger • Konstantin Kholodilin

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Consumer Surveys**

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Forecasting private consumption by consumer surveys

Christian Dreger and Konstantin Kholodilin¹

Abstract: Survey-based indicators such as the consumer confidence are widely seen as leading indicators for economic activity, especially for the future path of private consumption. Although they receive high attention in the media, their forecasting power appears to be very limited. Therefore, this paper takes a fresh look on the survey data, which serve as a basis for the consumer confidence indicator (CCI) reported by the EU Commission for the euro area and individual member states. Different pooling methods are considered to exploit the information embedded in the consumer survey. Quantitative forecasts are based on Mixed Data Sampling (MIDAS) and bridge equations. While the CCI does not outperform an autoregressive benchmark for the majority of countries, the new indicators increase the forecasting performance. The gains over the CCI are striking for Italy and the entire euro area (20 percent). For Germany and France the gains seem to be lower, but are nevertheless substantial (10 to 15 percent). The best performing indicator should be built upon pre-selection methods, while data-driven aggregation methods should be preferred to determine the weights of the individual ingredients.

JEL: E21, C22

Keywords: Consumer confidence, consumption, nowcasting, mixed frequency data

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1 Introduction

Survey-based confidence indicators are often seen as leading signals for real economic activity. The attention these indicators receive in the media refers to the potential information they provide regarding current and future economic developments. As such, the consumer confidence indicator (CCI) reported by the EU Commission for the euro area and individual countries is widely used by economic agents to assess the future path of private consumption (Dominitz and Manski, 2004). Monitoring consumption spending is extremely important for policy makers and firms, as these expenditures represent 50 to 60 percent of GDP. Significant changes in the CCI can provide valuable information for businesses, to which extent households are willing to make new purchases. If the indicator is on a declining trend, households are expected to reduce their spending. If manufacturers anticipate that consumers plan to reduce purchases for durable goods, they might decrease inventories and production in advance and delay investing in new facilities. Banks can prepare for lower credit applications. Building firms will take a decline in the construction and renovation of homes into account. Governments have to manage a decline in tax revenues. On the other hand, a rise in the CCI indicates that households will raise their demand for consumption products. In anticipation of that change, firms can increase production and inventories. Banks may plan for higher lending and mortgage activities, and builders of homes can prepare for improved housing construction. The government can expect higher tax revenues due to the increase in consumer spending.

Despite the great fanfare blown when they are published, there is no consensus with regard to the actual contribution of the CCI to predict private consumption. In fact, its impact on consumption almost vanishes, if the forecasting equation is extended by

macroeconomic fundamentals known at the time of the forecast. Carroll, Fuhrer and Wilcox (1994) and Bram and Ludvigson (1998) have provided evidence that lagged values of the CCI can improve short-term forecasts for consumption spending in the US to a minor extent, while Acemoglu and Scott (1994) and Easaw, Garratt, and Heravi (2005) have reported similar results for the UK. Ludvigson (2004) has argued that much of the survey information is already included in other economic and financial indicators, such as labour income growth, real share prices, and short-term interest rates. Likewise, Croushore (2005) had shown that the levels of sentiment indicators are not able to add any additional information to the nowcast of US private consumption. As a result, the CCI may have only incremental power in conditional regression models. According to Nahuis and Jansen (2004), the forecasting performance can be improved in some cases, if the CCI is combined with measures of retailer confidence. Hence, not only the perceptions of buyers should be taken into account, but also the perceptions of the sellers of the consumption products.

Although the predictive ability of consumer confidence appears to be very limited, the CCI is available on a timely basis and could therefore provide a preliminary estimate of year-on-year consumption growth in the current period. Moreover, the information embedded in the consumer survey may be exploited in different ways. Therefore, a modest forecasting performance might reflect inappropriate pooling methods. In fact, the CCI is obtained as an index of the responses of households to different questions. According to Jonsson and Lindén (2009), a micro indicator based on questions related to the individual household situation might be able to outperform the CCI. Households seem to have better knowledge of the own economic situation compared to the general economic situation.

This paper takes a similar route, as it derives a composite indicator, where alternative pooling methods are applied to the raw response data of the consumer survey. Evidence is based upon a comprehensive analysis for the large euro area countries, i.e., Germany, France, and Italy, as well as for the aggregate. Given that the information is available at the monthly frequency, whereas private consumption is published only at the quarterly frequency, different strategies are available to link them. A popular method refers to bridge equations by aggregating the survey data to the quarterly frequency. Alternatively, information can be used as soon as it is available by employing mixed-data sampling (MIDAS) equations. Here, monthly data are directly used to predict current-quarter consumption growth.

The information is extracted in the best possible way to render the optimal indicator in terms of its forecasting performance. Weighting schemes refer to simple averages of the forecasts implied by the individual questions of the consumer survey, principal components, and weights according to past correlation or forecast accuracy. In addition, pre-selection methods are applied.

As a general result, the CCI does not outperform an autoregressive benchmark in many cases. However, carefully constructed indicators can increase the forecasting performance. In particular, composite indicators based on data-driven weighting methods turn out to be useful to predict private consumption growth. The gains are particularly striking for Italy and the whole euro area (20 percent). For Germany and France the gains seem to be lower, but are nevertheless substantial (10 to 15 percent). The forecasts for Germany can be also improved, but the gains are less pronounced in this case (10-15 percent).

Overall, this result does not mean that accurate forecasts for private consumption can be derived from the survey information alone. It only implies that the CCI of the EU commission can be definitely improved, if the survey data are exploited in a more appropriate way. To achieve this result, the composite indicator should be built on pre-selection methods, while data-driven aggregation methods should be applied to determine the weights of the individual ingredients.

The rest of the paper is organized as follows. The next section reviews the arguments on why an impact of consumer confidence on private consumption should be expected. The approach to measure consumer confidence in the euro area is discussed in section 3. Section 4 presents the econometric methodology, and section 5 reports the empirical results. Finally, section 6 concludes. The questionnaire for the consumer survey is included as an annex.

2 Consumer confidence and private consumption

The role of consumer confidence in explaining the development of private consumption is not obvious. A long-run impact can be ruled out in advance, as households cannot be excessively confident forever. Therefore, any impact is restricted to the short run, implying that consumer confidence behaves like a stationary variable. But even an influence in the short run can be doubted. According to the life cycle permanent income hypothesis, private consumption depends on permanent rather than on current income. If agents form their expectations in a rational way, changes in consumption cannot be anticipated, since they are purely random (Hall, 1978). Hence, confidence does not play any role to forecast consumption.

Nonetheless, previous research has pointed to substantial deviations from the permanent income hypothesis, see the seminal contributions of Flavin (1991), Campbell and Mankiw (1991) and Deaton (1992). Eppright, Arguea and Huth (1998) have discussed psychological arguments on why consumer confidence may affect consumption behavior. In the presence of liquidity constraints, for example, confidence may increase in advance of consumption owing to the delay in obtaining credit for consumption spending to take place. Since consumer confidence focuses on the willingness to pay, it can provide some information that is not embedded in other variables. Due to the liberalization of financial markets over the past decades, however, liquidity constraints have become less binding, leading to a decline of the impact of consumer confidence on consumption, see Al Eyd, Barrell and Davis (2009) on this argument. On the other hand, tighter credit standards might have been introduced in the aftermath of the financial crisis.

Sentiment might be also important to explain changes in consumption in periods characterized by high uncertainty and extraordinary events. In particular, the CCI can reflect the expected impact of shocks, when no or only insufficient information can be extracted from the past experience. Negative shocks can worsen confidence because of self-fulfilling prophecies: the more pessimistic the consumers are, the worse a recession becomes, which, in turn, worsens the opinions of consumers about the future. To underline this point, Howrey (2001) has reported some predictive power of the CCI for the probability of a recession. Furthermore, the desire of private households to have a buffer stock of savings can justify an impact of consumer confidence. A fall in confidence caused by higher income uncertainty can lead to an increase in precautionary savings. Consumption is forced to decline as consumers plan to rebuild their stock of assets, see Carroll, Fuhrer and Wilcox (1994). Provided that habit formation prevents consumption

from adjusting fully and instantaneously, consumption expenditures could be reduced for an extended period of time. Hence, confidence and changes in consumption should be positively correlated.

3 Measuring consumer confidence

As it is a psychological concept, consumer confidence is difficult to measure. In collaboration with national partners and institutions, the European Commission (2007) conducts a harmonized survey of private households to collect the opinions of consumers in each EU member state regarding past, current, and future developments. Overall, 2,000 German, 2,000 Italian, 3,300 French, and 23,000 euro area households participate in the survey. Results are obtained at the level of individual countries. The survey is carried out on a monthly base and comprises 12 questions (11 for the euro area), which are organized around 4 topics: financial situation of the household, general economic situation, savings, and intentions with respect to major purchases. The questionnaire is included in the annex. A five option ordinal scale is the rule for the answer scheme (conditions have or will become a lot better, better, the same, worse, a lot worse). The answers are aggregated as balances of positive over negative results per question, where the extreme answers receive double weight. Euro area series are constructed as a weighted average of the aggregate country replies, where the weights reflect the country share in area wide private consumption at constant prices.

The balanced series are then used to construct a composite indicator for the euro area as well as for individual countries. The CCI is based on the balances of four forward looking questions in the survey: expected change in financial situation, expected change in

general economic situation, expected change in unemployment, and expected change in savings. Expectations refer to the 12 months period ahead. Neither questions related to the past and the current state of the economy, nor price expectations, nor major purchases intentions are considered. The CCI is the simple average of the (seasonally adjusted) balances of answers to the respective questions (Gayer and Ganet, 2006). The balanced series are not standardized prior to the aggregation, i.e., the highly volatile series plays a larger role in the overall indicator.

4 Design of the forecasting exercise

The delayed release of many time series in the national accounts is a serious impediment to assess the current state of the economy. However, monthly indicators are readily available and might be exploited to predict the variable under study. The gap between the monthly indicator and the series of the national accounts is closed by the so-called bridge equations. In the bridge equations applied in the forecasting exercise, the monthly indicator is aggregated to quarterly averages and used to forecast private consumption growth in the respective quarter. Although this is a coincident indicator by construction, it has actually a lead of 1.5 months because of the publication delay of national accounts.

As an alternative to the bridge equations, monthly information is employed directly to forecast consumption growth using a MIDAS approach (Ghysels, Sinko, and Valkanov, 2007). In this setting, private consumption growth is directly related to the consumer confidence measure of a particular month. Three specifications can be compared in case of quarterly data. Forecasts for consumption are derived with information on consumer

confidence for the first, second, and third month within the respective quarter. Thus, it can be examined whether a specific month is useful to make the predictions. Compared to bridge equations, the first two models have a real lead with respect to private consumption growth.

The forecasts considered exploit different subsets of the survey information. As a preliminary step, the forecasting performance is explored for each of the single questions (Q1 to Q12) in the consumer survey. The aim of this exercise is to check whether particular questions have a better forecasting performance. Afterwards, combined forecasts are derived. It is well known from many previous studies, that the combination of forecasts can increase the accuracy relative to the individual predictions, see for example Dreger and Schumacher (2005) on leading indicators for the business cycle. One strategy to combine forecasts is to pool all the questions in the consumer survey. As an alternative, the aggregate is constructed on the basis of the best performing questions. To identify these questions the Model Confidence Set (MCS) suggested by Hansen, Lunde and Nason (2005) has been employed. Here, a confidence set is selected from the individual models, which should contain the best performing model according to some specified level of confidence.

Different pooling methods are applied. Besides the CCI from the EU Commission, simple averages (SA), principal components (PC), correlation-weighted (CW), and forecast-weighted (FW) averages are used. Regarding the factor analysis, the first two components represent 70 to 80 percent of the overall variance of the individual questions in the consumer survey. As this share increases rather modestly if further factors are considered, only the first two components are extracted (PC1 and PC2). The weights in the CW forecast correspond to the squared maximum correlation coefficients between the

growth rate of private consumption and the respective question in the consumer survey, while the FW weights are equal to the inverse of the root mean square forecast error (RMSFE) of the individual questions. Thus, questions with a lower individual forecasting record are downweighted.

5 Out-of-sample forecasting performance

For the MIDAS approach as well as for the bridge equations, the forecasting exercise is based on the equation

$$(1) \quad \Delta^4 y_t = \alpha + \beta(L)\Delta y_t + \gamma(L)c_t + \varepsilon_t,$$

where $\Delta^4 y_t$ (Δy_t) is the year-on-year (quarter-on-quarter) growth rate of real private consumption; c_t is a confidence measure, and ε_t is a disturbance term that should fulfill the white noise assumptions. Furthermore, $\beta(L)$ and $\gamma(L)$ are lag polynomials, where the lag length is determined by the Schwarz Bayes information criterion. Due to quarterly frequency of the data, the maximum lag length is set to 4. The benchmark is an autoregressive process, with no confidence measures included. Because of the lag structure, it might be also seen as an approximation to a fundamental economic model.

The forecasting performance is evaluated in an out-of-sample exercise. This mimics the actual situation the forecaster is confronted with. In particular, the forecasts are conducted in a recursive manner. The first estimation subsample is 1996q1-2006q4 and the forecast subsample is 2007q1-2010q1. After the first estimation, the forecast for 2007q1 is produced. Then, the estimation subsample is extended by one quarter to 1996q1-2007q1 and the forecast for 2007q2 is made. This process is repeated until the end of

the sample is reached (2010q1). Hence, the recent financial crisis is covered by the exercise. However, the results are not critically influenced by this event. In fact, two specifications have been tried for the estimation window: a rolling and an expanding window. Although the rolling window can be useful especially in periods of structural breaks such as the financial crisis, higher forecasting accuracy is generally obtained for the models with an expanding window. To save space only the results for the expanding estimation window are shown. All results not on display are available from the authors upon request.

The forecast accuracy is evaluated by the RMSFE criterion. A relative RMSFE below 1 points out to a better forecast than the benchmark, while a relative RMSFE larger than 1 indicates a worse forecast. The results obtained for the single questions are exhibited in table 1, where the different parts of the table refer to the euro area (A), Germany (B), France (C) and Italy (D).

-Table 1 about here-

The CCI from the EU commission outperforms the autoregressive benchmark only in the case of France. Its inclusion worsens the forecasting performance for Italy and especially for Germany where losses of 13 percent should be expected. However, this result does not imply that survey information is irrelevant to predict private consumption growth, as it might reflect inappropriate pooling methods.

One piece of evidence can be obtained from the MIDAS procedure. In fact, the forecasts will become more precise, if the prediction is based on the data available in the later

months within a quarter. Looking at the second question for the euro area data, for example, the average RMSFE in the first month is 0.381, compared to 0.357 in the second and 0.330 in the third month. As a consequence, the forecasting power of that question is improved by 13 percent ($0.330/0.381$) within a quarter, if the later data are used. The bridge equation produces an intermediate forecast accuracy (0.352). However, this picture is not robust. For questions Q6 to Q8 (inflation, unemployment, and major purchases), the errors remain constant or become larger, if the forecasts are based on data for subsequent months. Here, the best alternative refers to the forecast based on the first month observation. In other words, survey information related to inflation, unemployment, and major purchases might have better leading properties.

The questions Q2 (expected change in the financial situation) and Q5 (households view regarding past inflation) are able to outperform the benchmark consistently. For example, the gain in terms of forecasting accuracy exceeds 20 percent, if the growth rate of private consumption is predicted solely on grounds of Q2. All the other individual questions produce similar or even larger forecast errors.

The results for the euro area do not generalize to individual countries. This might be due to an aggregation effect, as idiosyncratic fluctuations are removed in the euro area variables. For example, Q4 (expected general economic situation) and Q6 (price expectations) are especially useful for predicting the change in private consumption in France. The forecasting gain is about 20 percent. However, forecasts based on Q4 cannot outperform the benchmark in Germany and Italy. Instead, Q10 (current conditions to save) appears to be more favourable. These findings correspond to differences in the short-run dynamics of private consumption that can be detected across euro area member states (Dreger and Reimers, 2009).

Next, combinations of forecasts are considered. In this exercise, the principal components are calculated at each step of the iterations. Likewise, the weights for the composite indicators CW and the FW are continuously updated, and the MCS is revised each round.² This implies that the set of best performing questions selected by the MCS approach might change during the iterations. Nonetheless, all the settings utilize only the information available at the time the forecast is made. The results of the selection exercise are exhibited in Figure 1, which depicts the frequencies, with which each consumer survey question is selected into the MCS and which are averaged over the whole forecasting period. These graphs allow to see, what are the questions, which are relevant for the forecasting the private consumption. Table 2 holds the results of the forecast comparison, where the different parts of the table refer to the euro area (A), Germany (B), France (C) and Italy (D).

-Figure 1 and Table 2 about here-

The forecasting performance of the composite indicators is not markedly superior compared to the benchmark, given that the aggregate is constructed from all the questions in the consumer survey, i.e., no pre-selection is applied. Although the combined forecasts are able to outperform the benchmark, the gains are usually small. However, the picture improves, if the questions are filtered by the pre-selection process (MCS). If the composite indicator is based only on the best performing questions, the increase in the forecasting accuracy is notable, provided that the weights are determined by a data-driven

² The MCS test has been carried out using the MulCom package for Ox written by Hansen and Lunde. The confidence level is set to 50 percent, the block-length parameter, d , is equal to 2 and the number of bootstrap re-samples is 10,000.

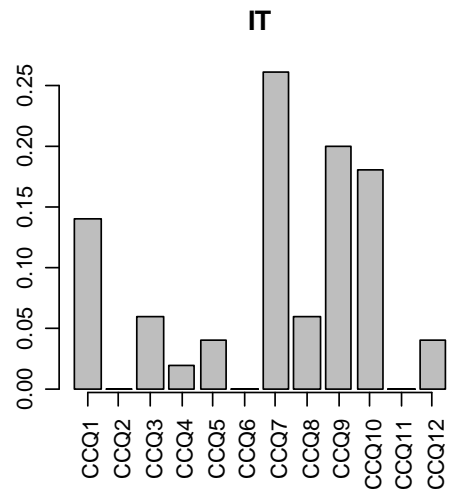
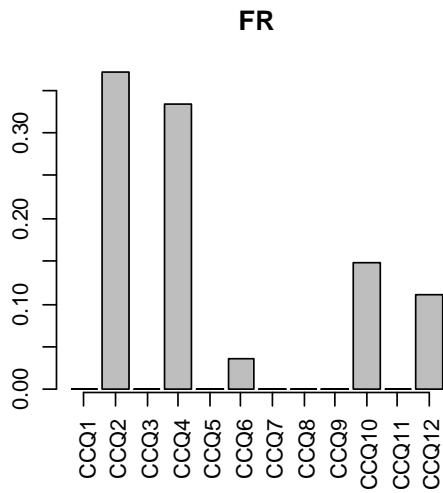
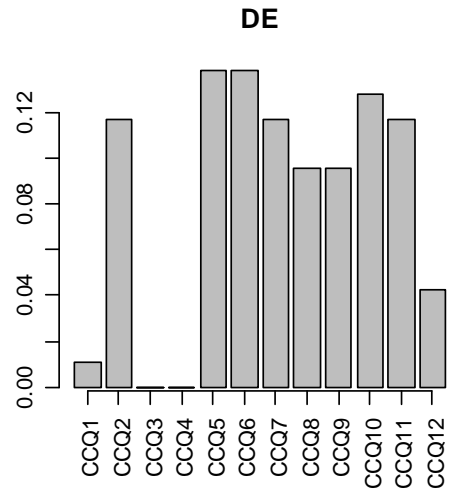
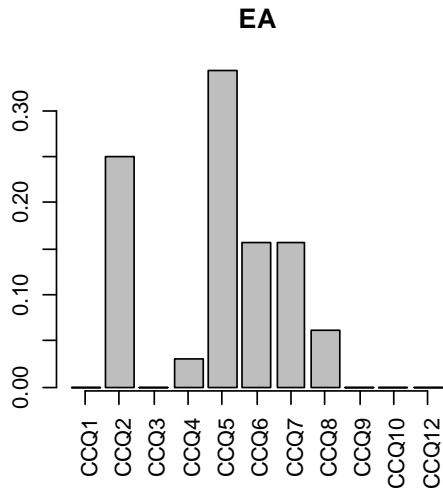
approach. The gains are especially striking for Italy and the euro area (20 percent). The forecast for the French and German consumption growth can be also improved, but the gains seem to be less pronounced in this case (10-15 percent).

6 Conclusion

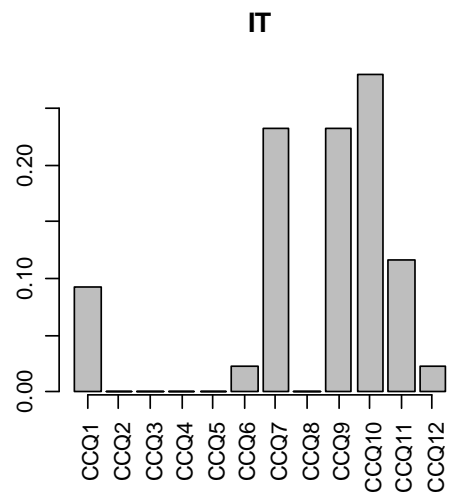
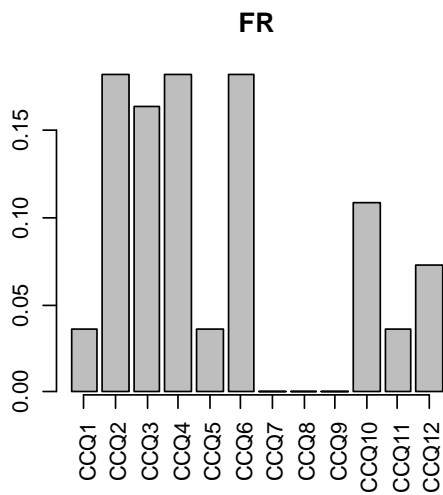
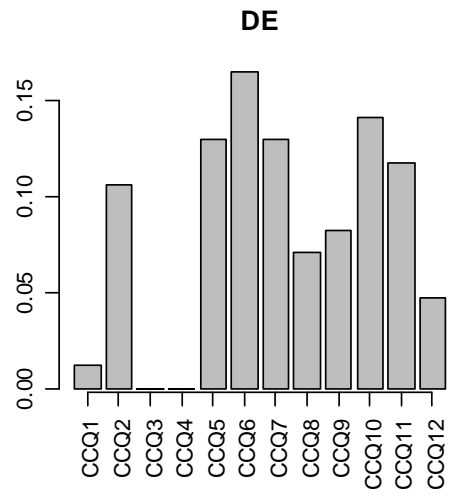
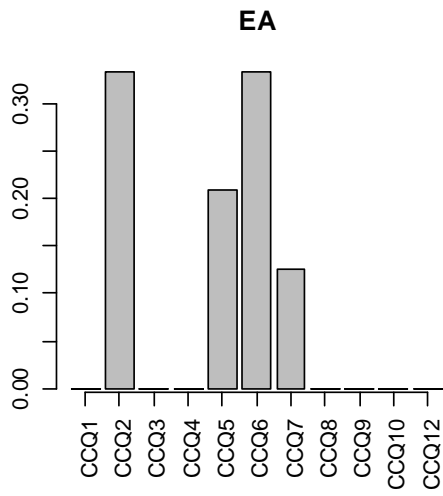
Survey-based indicators, such as the consumer confidence, are widely seen as leading indicators for economic activity, especially for the future development of private consumption expenditures. Although they receive high attention in the mass media, their forecasting power appears to be very limited. Therefore, this paper takes a fresh look on the survey data which serves as a basis for the CCI reported by the EU Commission for the euro area and individual countries. Different methods are applied to take advantage of the information embedded in the consumer survey. A MIDAS approach is applied and compared to the outcome of bridge equations. The analysis shows that the forecasting performance could be increased. The gains are striking especially for Italy and the entire euro area (20 percent). For France and Germany, the gains appear to be lower, but nevertheless substantial. This result does not mean that reasonable forecasts for private consumption can be derived from the survey information alone. It only implies that the CCI can be improved, if the survey data are exploited in a more reasonable way. To arrive at this result, the composite indicator should be built upon pre-selection methods, while data-driven aggregation methods should be applied to determine the weights of the individual ingredients.

Figure 1: Frequency of selected questions

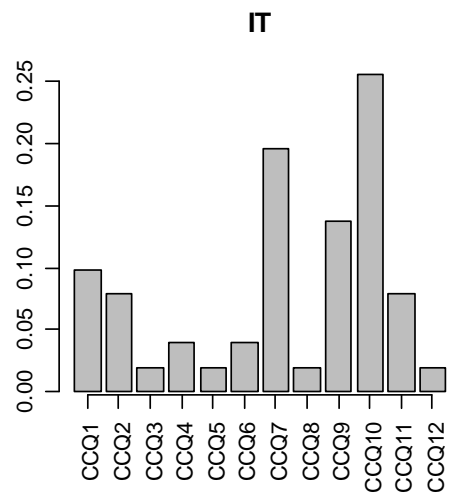
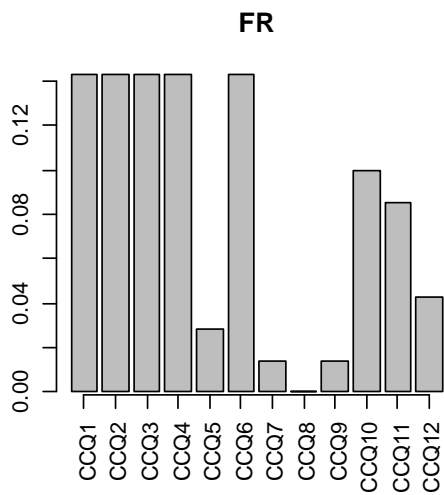
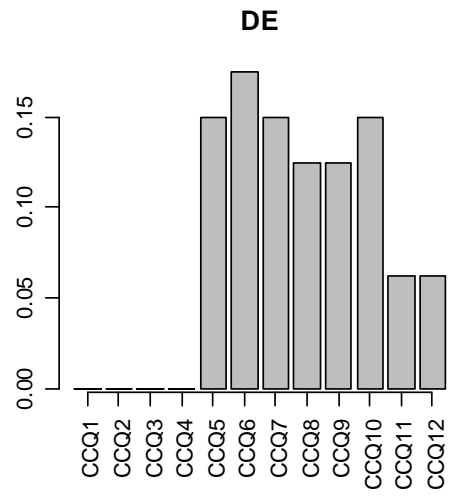
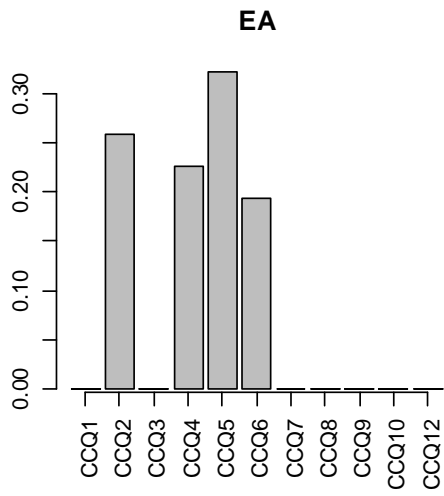
A First month MIDAS equation



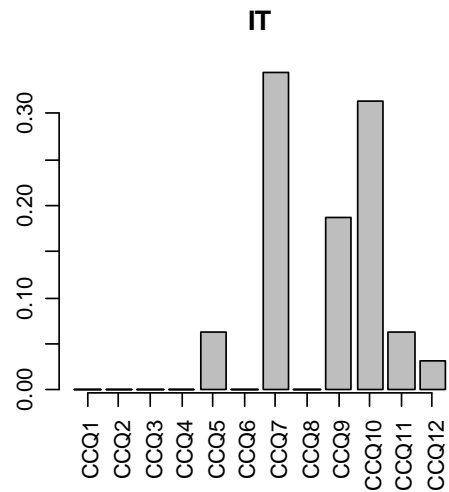
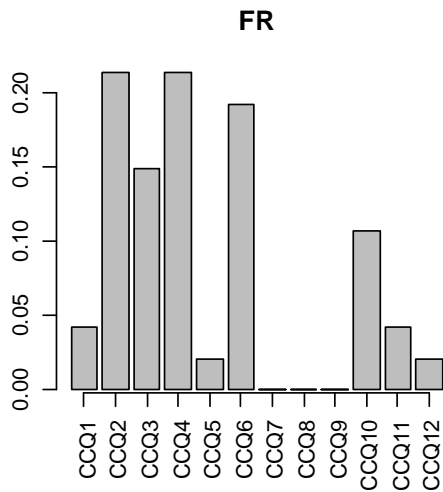
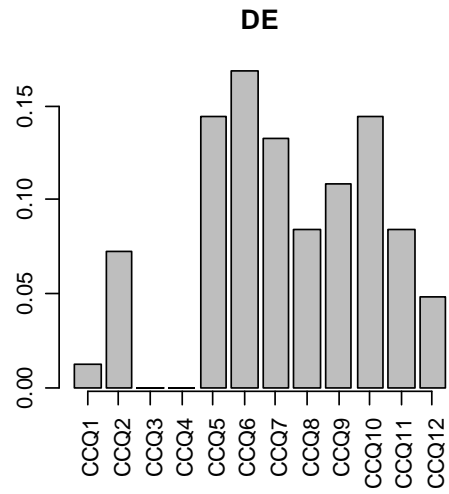
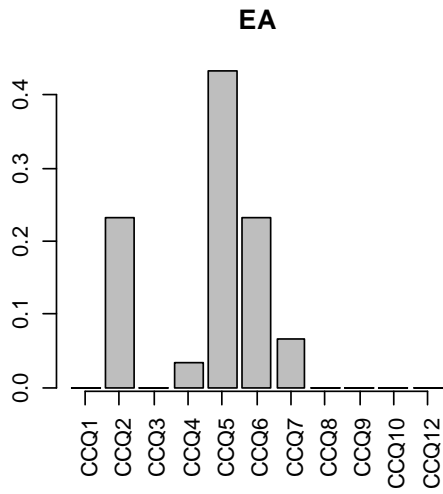
B Second month MIDAS equation



C Third month MIDAS equation



D Bridge equation



Note: Pre-Selection of questions according to the Model Confidence Set suggested by Hansen, Lunde and Nason (2005). Selections are made each round of the forecasting exercise.

Table 1: Out-of sample performance of individual questions in the consumer survey

A Euro area

	MIDAS						Bridge	
	Month 1		Month 2		Month 3			
AR	0.453	1.000	0.453	1.000	0.453	1.000	0.453	1.000
CCI	0.449	0.991	0.427	0.942	0.391	0.862	0.422	0.931
Q1	0.432	0.952	0.432	0.953	0.420	0.927	0.427	0.943
Q2	0.381	0.841	0.357	0.787	0.330	0.727	0.352	0.776
Q3	0.477	1.053	0.470	1.038	0.452	0.996	0.468	1.032
Q4	0.439	0.967	0.417	0.919	0.383	0.844	0.409	0.902
Q5	0.380	0.839	0.380	0.837	0.350	0.771	0.348	0.767
Q6	0.464	1.023	0.463	1.021	0.467	1.030	0.466	1.029
Q7	0.455	1.003	0.466	1.028	0.463	1.021	0.461	1.018
Q8	0.413	0.911	0.425	0.938	0.424	0.935	0.418	0.922
Q9	0.457	1.007	0.455	1.003	0.456	1.005	0.456	1.005
Q10	0.423	0.934	0.397	0.876	0.386	0.852	0.401	0.884
Q12	0.489	1.078	0.489	1.079	0.477	1.052	0.488	1.077

B Germany

	MIDAS						Bridge	
	Month 1		Month 2		Month 3			
AR	0.987	1.000	0.987	1.000	0.987	1.000	0.987	1.000
CCI	1.108	1.123	1.111	1.126	1.112	1.127	1.116	1.131
Q1	1.082	1.096	1.104	1.119	1.134	1.150	1.116	1.131
Q2	1.041	1.055	1.051	1.065	1.072	1.086	1.059	1.073
Q3	1.231	1.248	1.232	1.249	1.219	1.235	1.234	1.250
Q4	1.166	1.182	1.160	1.176	1.163	1.179	1.171	1.187
Q5	1.083	1.097	1.071	1.085	1.035	1.049	1.065	1.080
Q6	1.094	1.108	1.084	1.099	1.063	1.077	1.083	1.098
Q7	1.106	1.121	1.105	1.120	1.097	1.111	1.104	1.119
Q8	0.993	1.006	0.950	0.962	0.935	0.947	0.954	0.966
Q9	0.973	0.986	0.971	0.984	0.974	0.988	0.972	0.986
Q10	0.935	0.948	0.910	0.922	0.886	0.898	0.900	0.912
Q11	0.957	0.970	0.967	0.980	0.964	0.977	0.959	0.972
Q12	1.111	1.126	1.121	1.136	1.098	1.112	1.116	1.131

France

	MIDAS						Bridge	
	Month 1		Month 2		Month 3			
AR	0.437	1.000	0.437	1.000	0.437	1.000	0.437	1.000
CCI	0.394	0.901	0.389	0.888	0.370	0.845	0.379	0.867
Q1	0.392	0.895	0.364	0.833	0.352	0.804	0.367	0.838
Q2	0.348	0.796	0.342	0.781	0.358	0.818	0.344	0.786
Q3	0.384	0.878	0.372	0.851	0.359	0.821	0.370	0.846
Q4	0.363	0.830	0.361	0.826	0.360	0.824	0.353	0.807
Q5	0.443	1.012	0.438	1.003	0.434	0.991	0.438	1.002
Q6	0.366	0.837	0.326	0.745	0.344	0.787	0.340	0.778
Q7	0.422	0.964	0.426	0.973	0.428	0.978	0.425	0.971
Q8	0.425	0.971	0.433	0.990	0.442	1.011	0.431	0.986
Q9	0.438	1.002	0.419	0.958	0.428	0.980	0.428	0.979
Q10	0.483	1.104	0.464	1.061	0.457	1.044	0.469	1.072
Q11	0.479	1.096	0.468	1.069	0.475	1.086	0.474	1.084
Q12	0.436	0.997	0.431	0.984	0.414	0.947	0.426	0.975

Italy

	MIDAS						Bridge	
	Month 1		Month 2		Month 3			
AR	0.751	1.000	0.751	1.000	0.751	1.000	0.751	1.000
CCI	0.797	1.061	0.804	1.071	0.798	1.063	0.802	1.069
Q1	0.715	0.952	0.734	0.978	0.723	0.964	0.723	0.964
Q2	0.759	1.011	0.759	1.011	0.719	0.958	0.748	0.997
Q3	0.743	0.990	0.763	1.017	0.784	1.044	0.762	1.015
Q4	0.794	1.058	0.824	1.098	0.858	1.143	0.829	1.105
Q5	0.775	1.033	0.760	1.012	0.790	1.052	0.788	1.050
Q6	0.747	0.995	0.740	0.985	0.732	0.976	0.738	0.984
Q7	0.719	0.958	0.736	0.981	0.729	0.971	0.728	0.970
Q8	0.757	1.009	0.757	1.009	0.760	1.013	0.758	1.010
Q9	0.701	0.933	0.720	0.959	0.709	0.945	0.707	0.942
Q10	0.704	0.937	0.697	0.929	0.682	0.909	0.688	0.917
Q11	0.795	1.059	0.734	0.978	0.735	0.980	0.753	1.003
Q12	0.932	1.242	0.932	1.241	1.001	1.333	0.967	1.288

Note: For the design of the out-of forecasting exercise, see the discussion in the text. Initial forecasting period is 2007.1-2010.1. Entries show the RMSFE (left column) and the relative RMFSE (right column) for the MIDAS and bridge equations. The relative RMSFE is the ratio of the RMSFE of a particular forecast to the RMSFE of the autoregressive benchmark.

Table 2: Out-of sample performance of combined questions in the consumer survey

A Euro area

	MIDAS						Bridge	
	Month 1		Month 2		Month 3			
CCI	0.449	0.991	0.427	0.942	0.391	0.862	0.422	0.931
PC1	0.428	0.944	0.413	0.911	0.388	0.856	0.410	0.904
PC2	0.462	1.020	0.463	1.021	0.463	1.022	0.462	1.019
SA	0.420	0.925	0.412	0.908	0.394	0.868	0.406	0.894
CW	0.416	0.918	0.406	0.896	0.385	0.849	0.399	0.879
FW	0.420	0.926	0.412	0.909	0.395	0.872	0.405	0.892
SA_MCS	0.415	0.915	0.410	0.904	0.373	0.823	0.376	0.830
CW_MCS	0.354	0.781	0.361	0.796	0.298	0.658	0.333	0.734
FW_MCS	0.356	0.785	0.363	0.801	0.304	0.670	0.334	0.736

B Germany

	MIDAS						Bridge	
	Month 1		Month 2		Month 3			
CCI	1.108	1.123	1.111	1.126	1.112	1.127	1.116	1.131
PC1	1.115	1.130	1.116	1.131	1.113	1.128	1.107	1.122
PC2	1.080	1.094	1.070	1.084	1.050	1.064	1.043	1.057
SA	1.026	1.040	1.025	1.039	1.022	1.036	1.026	1.039
CW	1.033	1.047	1.031	1.045	1.022	1.036	1.030	1.044
FW	1.019	1.033	0.990	1.004	1.043	1.057	1.012	1.025
SA_MCS	1.033	1.047	0.995	1.009	0.980	0.993	0.992	1.005
CW_MCS	0.950	0.962	0.965	0.978	0.943	0.956	0.971	0.984
FW_MCS	0.935	0.948	0.956	0.969	0.938	0.951	0.961	0.974

France

	MIDAS						Bridge	
	Month 1		Month 2		Month 3			
CCI	0.394	0.901	0.389	0.888	0.370	0.845	0.379	0.867
PC1	0.374	0.855	0.350	0.799	0.350	0.801	0.366	0.837
PC2	0.467	1.068	0.462	1.055	0.454	1.039	0.471	1.078
SA	0.399	0.912	0.386	0.883	0.388	0.886	0.387	0.885
CW	0.386	0.882	0.370	0.845	0.371	0.849	0.370	0.847
FW	0.392	0.897	0.378	0.864	0.382	0.874	0.380	0.868
SA_MCS	0.375	0.857	0.367	0.839	0.380	0.868	0.375	0.857
CW_MCS	0.330	0.754	0.332	0.758	0.339	0.776	0.325	0.743
FW_MCS	0.334	0.765	0.338	0.774	0.344	0.787	0.331	0.758

Italy

	MIDAS						Bridge	
	Month 1		Month 2		Month 3			
CCI	0.797	1.061	0.804	1.071	0.798	1.063	0.802	1.069
PC1	0.727	0.968	0.729	0.971	0.715	0.952	0.724	0.965
PC2	1.037	1.381	0.932	1.242	0.976	1.300	0.939	1.251
SA	0.749	0.997	0.750	1.000	0.751	1.001	0.753	1.003
CW	0.731	0.974	0.734	0.977	0.728	0.970	0.731	0.973
FW	0.741	0.987	0.745	0.992	0.743	0.990	0.745	0.992
SA_MCS	0.737	0.982	0.763	1.017	0.732	0.975	0.756	1.007
CW_MCS	0.644	0.858	0.682	0.908	0.657	0.875	0.652	0.869
FW_MCS	0.643	0.857	0.686	0.914	0.660	0.879	0.656	0.874

Note: Initial forecasting period is 2007.1-2010.1. Entries show the RMSFE (left column) and the relative RMFSE (right column) for the MIDAS and bridge equations. The relative RMSFE is the ratio of the RMSFE of a particular forecast to the RMSFE of the CCI reported by the EU Commission. SA =simple average of forecasts, PC = Principal components, CW, FW =Weights based on correlation or on the forecast errors, respectively, MCS =Model confidence set.

References

Acemoglu D, Scott A (1994): Consumer confidence and rational expectations: Are agents beliefs consistent with the theory? *Economic Journal* 104, 1-19.

Al Eyd A, Barrell R, Davis EP (2009): Consumer confidence indices and short term forecasting of consumption, *Manchester School* 77, 96-111.

Bram J, Ludvigson S (1998): Does consumer confidence forecast household expenditure? A sentiment index horse race, Federal Reserve Bank of New York, *Economic Policy Review*, 59-78.

Campbell J, Mankiw NG (1991): The response of consumption to income. A cross-country investigation, *European Economic Review* 35, 723-767.

Carroll CD, Fuhrer JC, Wilcox DW (1994): Does consumer sentiment forecast household spending? If so, why? *American Economic Review* 84, 1397-1408.

Croushore D (2005): Do consumer-confidence indexes help forecast consumer spending in real time? *The North American Journal of Economics and Finance* 16, 435-450.

Dominitz J, Manski CF (2004): How should we measure consumer confidence, *Journal of Economic Perspectives* 18, 51-66.

Dreger C, Schumacher C (2005): The out-of sample performance of leading indicators for the German business cycle, *Journal of Business Cycle Measurement and Analysis* 2, 71-88.

Dreger C, Reimers H-E (2009): The role of asset prices for private consumption. Evidence from paneconometric models, *DIW Discussion Paper* 872.

Easaw JZ, Garratt D, Heravi SM (2005): Does consumer sentiment accurately forecast UK household consumption? Are there any comparisons to be made with the US?, *Journal of Macroeconomics* 27, 517-532.

Eppright DR, Arguea NM, Huth WL (1998): Aggregate consumer expectation indexes as indicators of future consumer expenditures, *Journal of Economic Psychology* 19, 215-235.

European Commission (2007): The joint harmonised EU programme of business and consumer surveys, User Guide.

Flavin M. (1981): The adjustment of consumption to changing expectations about future income, *Journal of political economy* 89, 974-1009.

Gayer C, Genet J (2006). Using factor models to construct composite indicators from BCS Data – A comparison with European Commission confidence indicators, *European Economy, Economic Papers* 240, European Commission, Brussels.

Ghysels G, Sinko A, Valkanov R (2007): MIDAS regressions: Further results and new directions, *Econometric Reviews* 26, 53-90.

Hansen R, Lunde A, Nason JM (2005): Model confidence sets for forecasting models, Working Paper 2005-07, Federal Reserve Bank of Atlanta.

Hall RE (1978): Stochastic implications of the life cycle-permanent income hypothesis: Theory and evidence, *Journal of Political Economy* 86, 971-987.

Howrey EP (2001): The predictive power of the index of consumer sentiment, *Brooking Papers on Economic Activity* 1, 175-216.

Jonsson A, Lindén S (2009): The quest for the best consumer confidence indicator, European Economy, Economic Papers 372, European Commission, Brussels.

Ludvigson S (2004): Consumer confidence and consumer spending, Journal of Economic Perspectives 18, 29-50.

Nahuis NJ, Jansen WJ (2004): Which survey indicators are useful for monitoring consumption? Evidence from European countries, Journal of Forecasting 23, 89-98.

Annex: Questionnaire for consumer survey

Q1: How has the financial situation of your household changed over the last 12 months?

Q2: How do you expect the financial position of your household to change over the next 12 months?

Q3: How do you think the general economic situation in the country has changed over the past 12 months?

Q4: How do you expect the general economic situation in this country to develop over the next 12 months?

Q5: How do you think that consumer prices have developed over the last 12 months?

Q6: By comparison with the past 12 months, how do you expect that consumer prices will develop in the next 12 months?

Q7: How do you expect the number of people unemployed in this country to change over the next 12 months?

Q8: In view of the general economic situation, do you think that now it is the right moment for people to make major purchases such as furniture, electrical/electronic devices, etc.?

Q9: Compared to the past 12 months, do you expect to spend more or less money on major purchases (furniture, electrical/electronic devices, etc.) over the next 12 months?

Q10: In view of the general economic situation, how are the conditions to save?

Q11: Over the next 12 months, how likely is it that you save any money?

Q12: Given the current financial situation of your household, how much do you save?

See European Commission (2007). The actual consumer confidence indicator is based on the questions Q2, Q4, Q7 and Q11.