

Measuring Consumer Confidence Using Aggregate Expenditure Data

(work in progress)

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The views expressed do not necessarily reflect the position of the Korea Labor Institute.

Motivation

- Consumers' confidence useful to understand the dynamics of the economy
 - Batchelor and Dua (1998), Howrey (2001), Lahiri et al. (2015)
- Survey-based consumer confidence indices are widely available across countries:
 - The Index of Consumer Sentiment (ICS) for the US, the Consumer Confidence Index (CCI) for the OECD countries, and the Consumer Survey Index (CSI) for South Korea
 - Computes the relative scores on present and future financial, business and macroeconomic conditions
- Understanding the nature of consumers' confidence can shed light on business cycle analysis

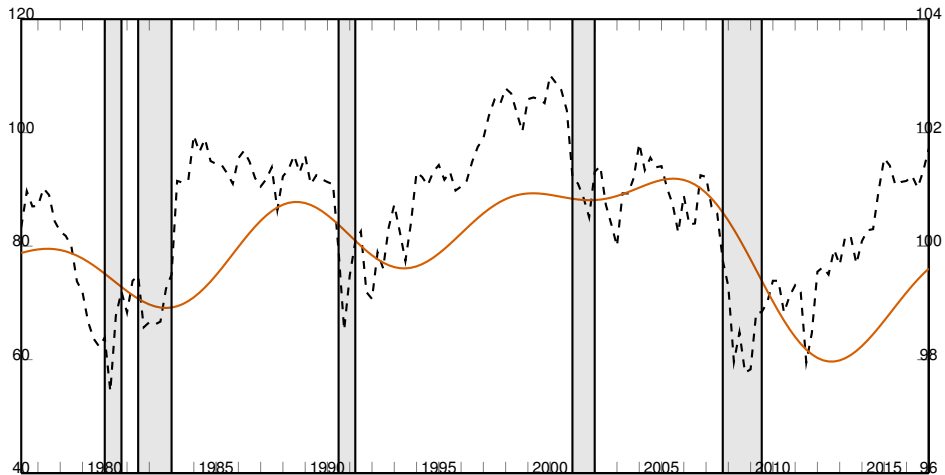


Figure: Consumer confidence and consumption-to-output ratio

The black dashed (red solid) line denotes the Michigan Survey of Consumer Confidence (consumption-to-productivity ratio). The Michigan Survey corresponds to the left y-axis and consumption-to-output ratio the right y-axis.

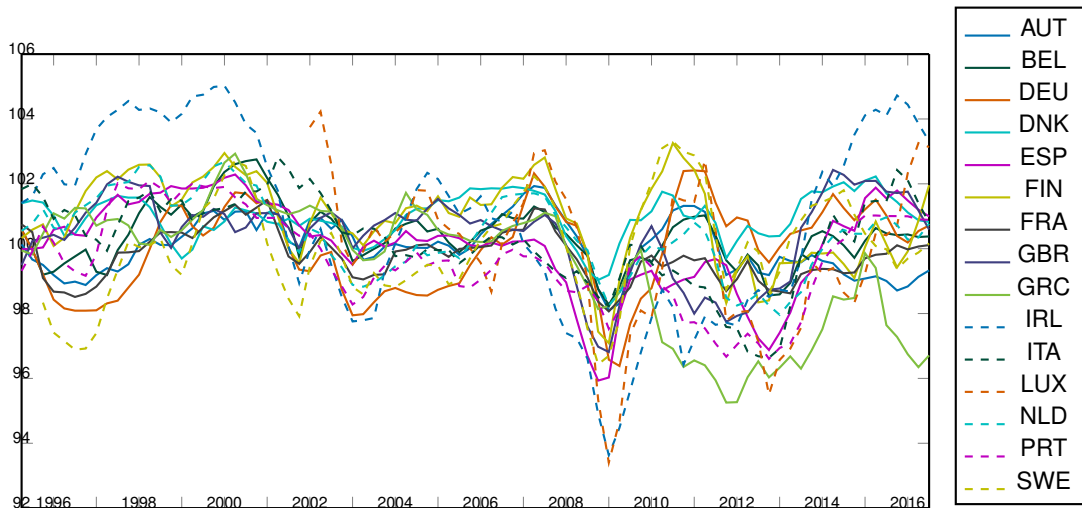


Figure: Consumer Confidence Index, 1995:II–2016:III

Notes: The lines denote the (quarterly) Consumer Confidence Index (CCI) available from the OECD. Since it is published in monthly frequency, we change it to quarterly by computing the quarterly arithmetic average at every quarter.

This paper

- **Goal:** Provide a structural interpretation of consumer confidence based on imperfect information and permanent income consumption model
- Estimate our model-based consumer confidence and compare it with the survey-based counterpart:
 1. Take a simple partial-equilibrium (PE) consumption model
 2. Define consumer confidence from the model
 3. Estimate parameters of the model using consumption and productivity series by maximum likelihood
 4. Estimate unobserved states and shocks of the model economy by the Kalman smoother
 5. Match the model-based consumer confidence with the survey-based counterpart

Preview of our results

- For the US, our model based consumer confidence is highly correlated with the survey-based counterpart
- For 15 European countries, results are mixed:
 - For some countries (ESP, GBR, GRC, IRL, ITA, NLD, PRT), correlations are very high
 - On the country, for some others (DEU, DNK, FIN, LUX), we observe a low or no correlation
- For South Korea, the correlation is fairly high ≈ 0.50 (not in the paper)

Index of Consumer Sentiment (ICS)

- It is the simple arithmetic average of the seasonally adjusted balances of answers to the questions on the financial situation of households, the general economic situation, unemployment expectations and savings over the next 12 months:
 - Q1 “... you (and your family) are better off or worse off financially than a year ago?”
 - Q2 “... 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?”
 - Q3 “(business conditions) ... during the next twelve months we’ll have good times financially, or bad times?”
 - Q4 “(in the country as a whole) we’ll have continuous good times during the next five years?”
 - Q5 “... Do you think now is a good or bad time for people to buy major household items?”

Consumer Confidence Index (CCI)

- It is the relative scores for each of the five index questions on past and future financial, business, and macroeconomics conditions:
 - Q2 “How the financial position of your household to change over the next 12 months? ”
 - Q4 “How the general economic situation in this country to develop over the next 12 months?”
 - Q7 “How the number of people unemployed in this country to change over the next 12 months?”
 - Q11 “Over the next 12 months, how likely is it that you save any money?”

Productivity process

- Productivity is sum of two components x and z :

$$a_t = x_t + z_t$$

- Permanent component:

$$\Delta x_t = \rho \Delta x_{t-1} + \epsilon_t$$

- Transitory component:

$$z_t = \rho z_{t-1} + \eta_t$$

Information

- Current productivity a_t
 - But agents cannot observe x_t and z_t separately
- A noisy signal about the permanent component x_t :

$$s_t = x_t + v_t, \quad v_t \sim N(0, \sigma_v^2)$$

A Simple Consumption Model (Blanchard, L'Huillier, Lorenzoni 2013)

- Consumption is set to long run productivity expectations:

$$c_t = \lim_{j \rightarrow \infty} \mathbb{E}_t[a_{t+j}]$$

- Abstract from capital or investment:

$$c_t = y_t$$

- Linear production technology:

$$n_t = y_t - a_t$$

► Derivation from the simple New Keynesian model

Consumption derivation

- With limiting conditions:

$$c_t = \mathbb{E}_t [c_{t+1}]$$
$$\lim_{j \rightarrow \infty} \mathbb{E}_t [c_{t+j}] = \lim_{j \rightarrow \infty} \mathbb{E}_t [a_{t+j}]$$

- By iterating the consumption Euler equation:

$$c_t = \lim_{j \rightarrow \infty} \mathbb{E}_t [a_{t+j}]$$

- Story:
 - Consumption only component of demand
 - Output fully determined by the demand side
 - The labor input adjust to produce output given y_t

Measuring confidence

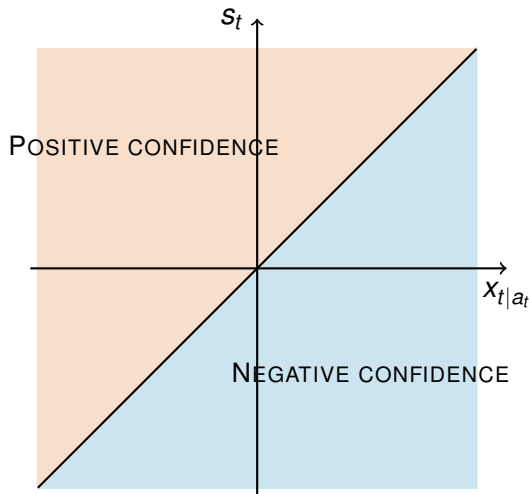
Definition

Consumer confidence at time t is given by

$$\text{Consumer confidence}_t = (\hat{s}_t - \hat{x}_{t|a_t})$$

where $\hat{s}_t$ and $\hat{x}_{t|a_t}$ are the smooth-estimated noisy signal and a belief updated with productivity observation at time t :

$$\hat{x}_{t|a_t} = \mathbb{E}[x_t | a_t, s_{t-1}, a_{t-1}, \dots, s_1, a_1]$$



Estimation and recovering the state variables

- Estimating the model:
 - The econometrician does not observe noisy signals
 - Instead, he observes the consumption series
 - Construct the filter based on the following state vector:

$$\mathbf{x}_t^E = \left(x_t, x_{t-1}, z_t, x_{t|t}, x_{t-1|t}, z_{t|t} \right)$$

- Identifying the shocks and recovering the realized news
 - Smooth-estimates the unobserved states and shocks
 - With the sequential filter, easy to estimate $x_{t|a_t}$

Table: Parameter Estimates, US 1976:II–2017:I

Parameter	Description	Value	s.e.
ρ	Persistence productivity	0.9580	0.0076
σ_u	Std dev. productivity	0.0060	0.0003
σ_ϵ	Std dev. permanent shock (implied)	0.0003	-
σ_η	Std dev. transitory shock (implied)	0.0059	-
σ_v	Std dev. noise shock	0.0133	0.0039

Notes: As σ_ϵ and σ_η are indirectly recovered, no standard errors are given.

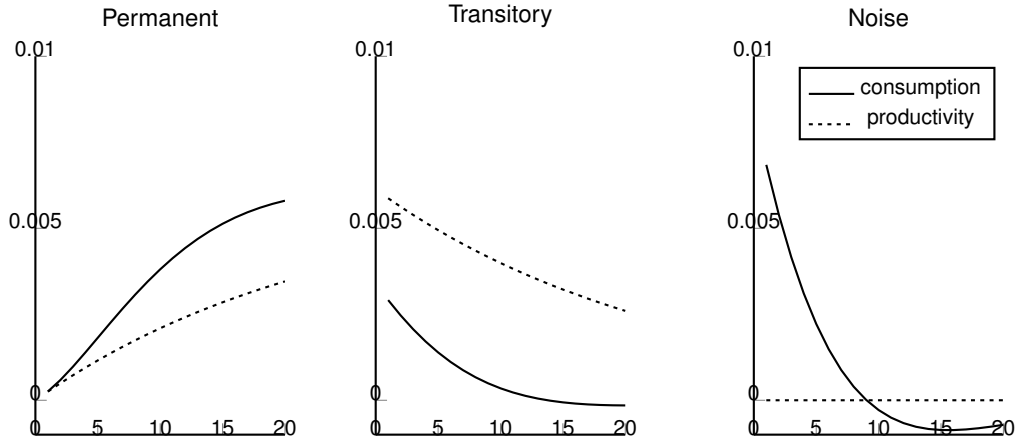


Figure: Impulse Responses

Notes: Productivity does not respond to a noise shock.

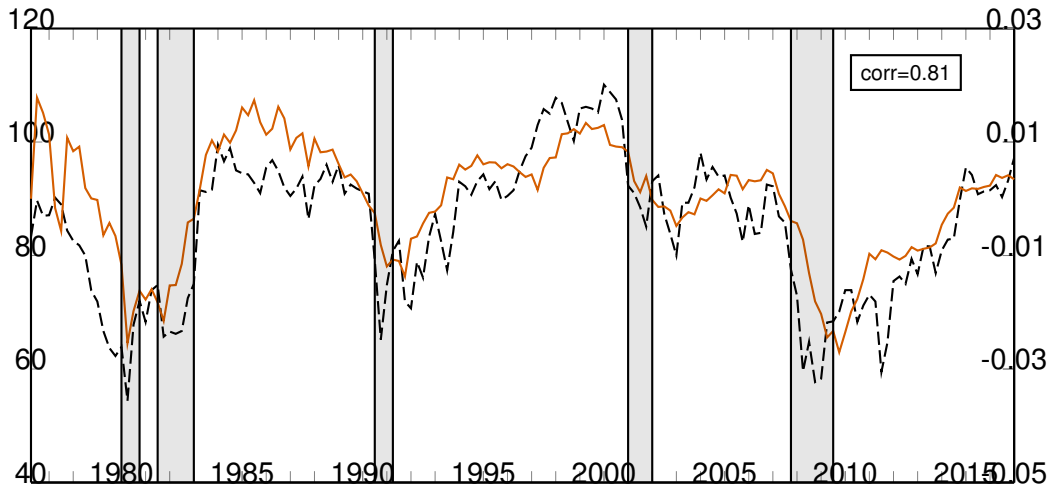
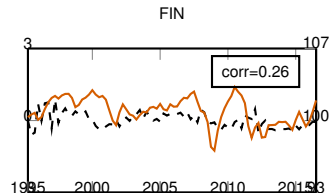
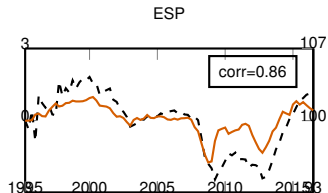
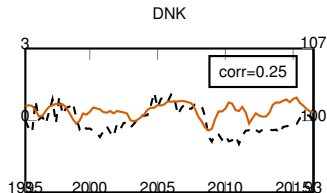
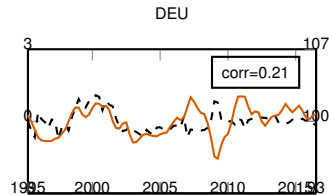
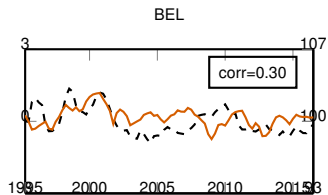
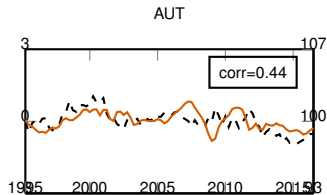
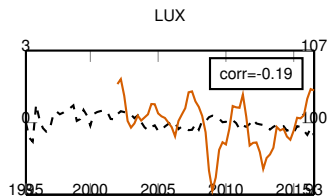
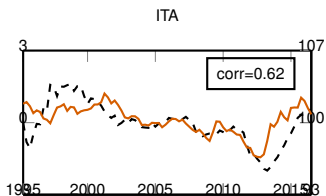
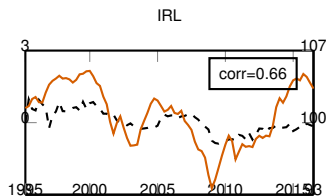
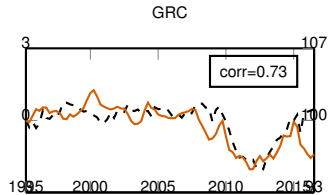
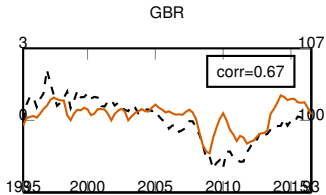
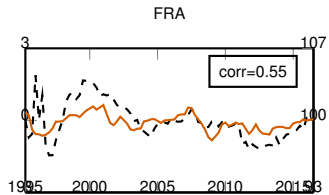


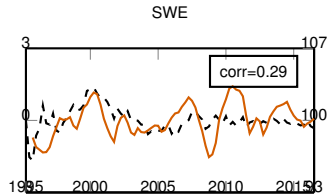
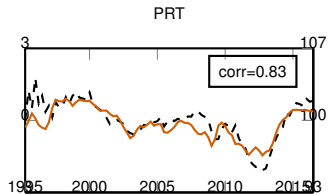
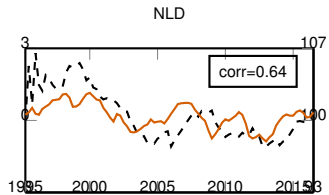
Figure: Estimated confidence and the Index of Consumer Sentiment: 1976:II–2017:I

Notes: The dashed (solid) line denotes the Michigan Survey of Consumer Confidence and the estimated consumer confidence. *corr* denotes the correlation coefficient between the Survey of Consumer Confidence and the estimated confidence.

Correlation Between The Two Measures (CCI)







Comments

- A somewhat surprisingly high correlation between the two indices (0.54 on average)
- At the same time, a great deal of heterogeneity across countries
- Two ways to look at our results:
 1. Study what structural features could potentially explain the observed heterogeneity
 2. Observed heterogeneity suggests a necessity to find an alternative index capturing consumers' confidence