

# Project

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Marco Brianti

Vito Cormun

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Boston College

# Objective of the Project

Estimating responses of key macroeconomic variables to a sentiment shock.

## Preview of the results:

- ➊ Most of the variables display a boom-bust response with peaks respectively at 2 and 10 quarters.
- ➋ Effects on inflation are robustly nonsignificant or negative.

# Econometric Procedure - Overview

We use a 2-step procedure

- ① Estimate series of sentiment shocks using forecast revisions
- ② Estimate IRFs via local projection à la Jorda (2005)

## Step 1 - Overview

We estimate sentiment shocks as SPF forecast revisions of real GDP growth rate which are orthogonal to

- ① contemporaneous structural shocks
- ② lagged principal components from a large dataset
- ③ past and future TFP

## Step 1 - Estimation of $Z_t$

### Data

- $X_t$  is log of Real GDP at time  $t$
- $X_{t+k|t} = E[X_{t+k}|I_t]$  provided by SPF

### Procedure

$$Z_t = (X_{t+4|t} - X_{t|t}) - (X_{t+4|t-1} - X_{t|t-1})$$

where

- $(X_{t+4|t} - X_{t|t})$  is expected growth rate of Real GDP conditional on information set up to time  $t$
- $(X_{t+4|t-1} - X_{t|t-1})$  is expected growth rate of Real GDP conditional on information set up to time  $t - 1$
- $Z_t$  is an innovation to the expectations of output growth rate

## Step 1 - Estimation of $\tilde{Z}_t$

**Problem.**  $Z_t$  is correlated with current and future fundamentals such as fiscal policy, monetary policy, current and future TFP.

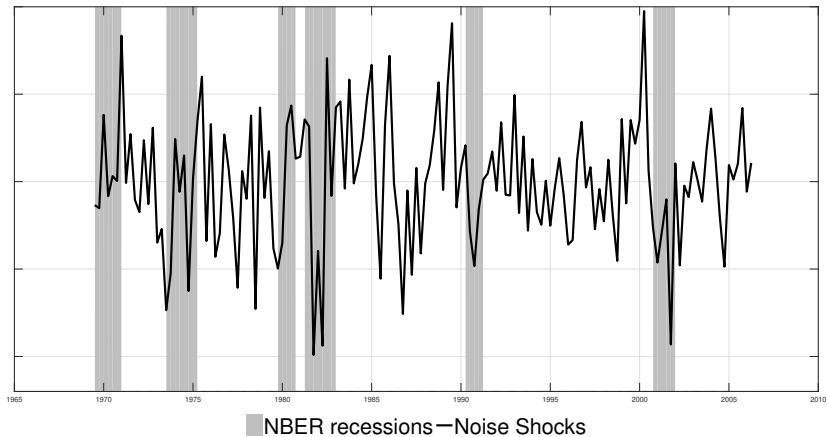
**Solution.** Estimate  $\tilde{Z}_t$  as the residual of the following regression,

$$Z_t = C + \sum_{j=-J}^H \delta_j \Delta TFP_{t+j} + \gamma SS_t + \mu PC_{t-1} + \tilde{Z}_t$$

where

- $C$  is a constant parameter
- $\Delta TFP_t$  is first difference of utility-adjusted total factor productivity at time  $t$
- $SS_t$  is a vector of structural shocks at time  $t$  possibly estimated via narrative approach
- $PC_{t-1}$  is a vector of principal component at time  $t - 1$

# Noise Shocks $\tilde{z}_t$



## Step 2 - Estimation of IRFs to $\tilde{Z}_t$

Define  $Y_t$  to be the BP-filtered log-transformation of an endogenous aggregate macroeconomic variable.

Using standard OLS techniques we estimate  $H$  regressions

$$Y_{t+h} = \Theta_h^Y \tilde{Z}_t + \epsilon_{t+h}$$

where  $h = 1, 2, \dots, H$  represent the forecast horizon.

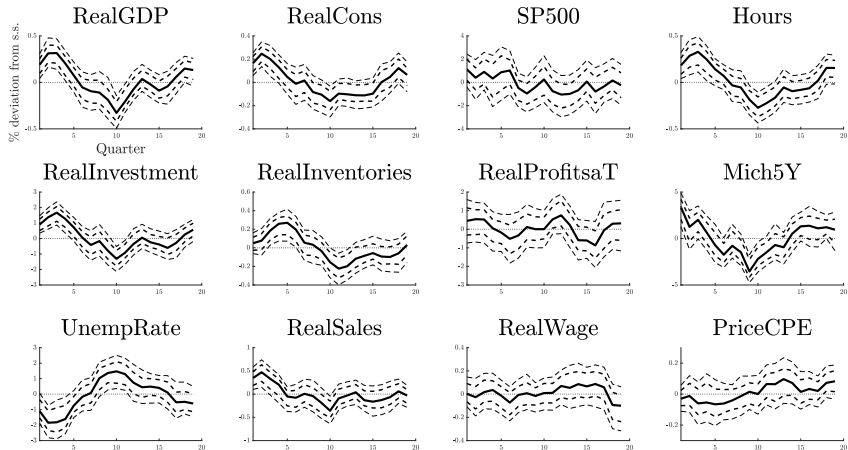
$\Theta_1^Y, \Theta_2^Y, \dots, \Theta_H^Y$  represent the path of the impulse response function of  $Y_t$  to a unit deviation of  $\tilde{Z}_t$ .



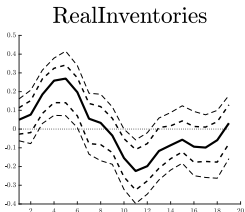
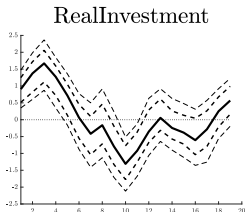
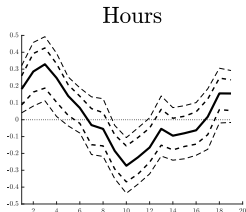
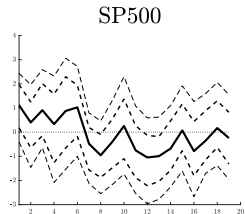
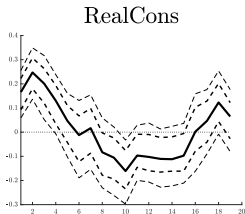
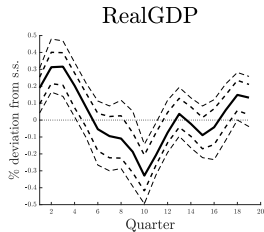
# Bootstrapping Techniques

- ❶ Consider the tuple  $\Gamma_h^Y = \{Y_{t+h}, T_t, \tilde{Z}_t, X_{t-1}\}$ .
- ❷ Divide  $\Gamma_h^Y$  over time  $t$  in smaller blocks and randomly reorder these blocks in order to form a new tuple  $\Gamma_{h,Boot1}^Y$  of the same size of the previous one.
- ❸ Estimate  $\Theta_{h,Boot1}$  from  $\Gamma_{h,Boot1}^Y$  using standard OLS techniques.
- ❹ Redo (1)-(3) 2000 times and select confidence intervals.

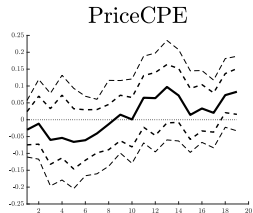
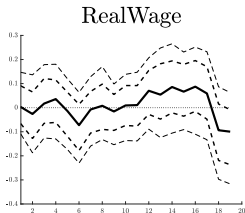
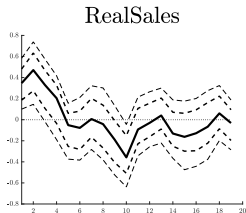
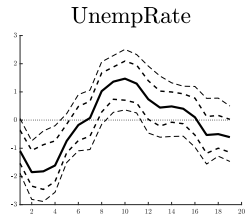
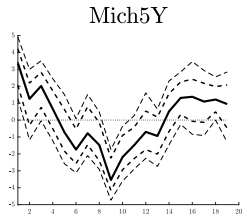
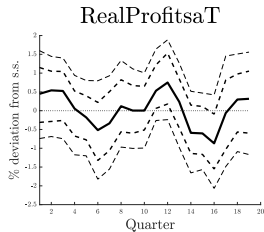
# Local Projection - Confidence Interval 68% and 90%



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# Local Projection - Confidence Interval 68% and 90%



# Theoretical Interpretations

- ① First Avenue
- ② Second Avenue