Sentiment Booms Go Wrong

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Two long Traditions in Macroeconomics

Two main ideas in macroeconomics have been widely explored by the literature,

1. **Changes in expectation** uncorrelated with current fundamentals as an important driver of economic fluctuations
   - Incentives to anticipate future economic conditions
     - $\Rightarrow$ Pigou, 1927; Keynes, 1936; Beaudry and Portier, 2006

2. **Excessive optimism** eventually leads to a recession
   - **Unrealized expectations** on future fundamentals
     - $\Rightarrow$ Pigou, 1927; Beaudry and Portier, 2004
   - **Over-accumulation** during booms
     - $\Rightarrow$ von Mises, 1940; Beaudry, Galizia, and Portier, 2018
   - **Euphoria** leads to excessive credit and higher financial fragility
     - $\Rightarrow$ Minsky, 1977; Bordalo, Gennaioli, Shleifer, 2018

This paper

1. We empirically estimate **sentiment shocks** and evaluate their effects on aggregate U.S. variables
    - We define sentiments as unpredictable **changes in expectations** uncorrelated with fundamentals
    - Sentiments shocks trigger **boom-and-bust dynamics** on most macroeconomic variables
    - Sentiments explain more than **40% of output**

2. We write a **general equilibrium model** that rationalizes our empirical findings
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Contributions

1. Novel **identification strategy** using Instrumental Variable Local Projection (IV-LP)
   - Previous literature estimates DSGE models or employ SVAR
     - ⇒ Milani, 2011; Leduc and Sill, 2013; Levchenko and Pandalai-Nayar, 2018; Feve and Guay, 2018
2. Uncover **new dynamics** in response to sentiment shocks
   - **Informative** for the literature on sentiments
     - ⇒ Angeletos and La'O, 2013
   - Consistent with models with **endogenous cyclical dynamics**
     - ⇒ Benhabib and Wang, 2013; Beaudry, Galizia, and Portier, 2019
3. Cycles are also a **high frequency phenomenon**
   - We provide evidence of higher-frequency economic fluctuations
     - ⇒ Angeletos, Collard, and Dellas, 2018
4. Theory that display **conditional boom-and-bust** dynamics
   - Cyclical dynamics are generally designed to be unconditional
     - ⇒ Beaudry and Portier, 2004

Roadmap

1. **Empirical Strategy**
2. Results
3. Test
4. Model
5. Conclusions

Overview of the Econometric Procedure

Following a recent literature which employs instruments to identify macroeconomic shocks, we develop a **2-step procedure**,

1. Build an **instrument** Z_t correlated with changes in expectations and orthogonal to fundamentals
   $\Rightarrow$ Mertens and Ravn, 2013; Gertler and Karadi, 2015

2. Estimate **dynamic responses** of macroeconomic variables using IV-LP
   $\Rightarrow$ Jordà, 2005; Kilian and Kim, 2011; Stock and Watson, 2018

Data Treatment on Expectations

We use quarterly **Survey of Professional Forecasters** (**SPF**) from 1982 to 2018 on endogenous macroeconomic variables X_t^s

Define,

- $E_t^i(X_{t+k}^s)$ as the expectation on X_{t+k}^s given the information set at time t released by professional forecaster i
- $E_t(X_{t+k}^s)$ as the mean (median) across i of $E_t^i(X_{t+k}^s)$
- $E_t(\hat{x}_{t+k}^s) = E_t(X_{t+k}^s)/E_t(X_t^s) - 1$ as the expectation of the growth rate of X^s from t to $t+k$ given information set t
- $R_{t,k}^s = E_t(\hat{x}_{t+k}^s) - E_{t-1}(\hat{x}_{t+k}^s)$ as the revision on expectations from $t-1$ to t of the growth rate of X^s from t to $t+k$
- R_t^k is the first principal component $R_{t,k}^s$

Instrument Z_t

R_t is correlated with past and current fundamentals

We estimate instrument Z_t as the unpredictable component of R_t orthogonal to fundamentals,

$$R_t^k = c + \sum_{j=0}^{J} \beta_j \Delta TFP_{t-j} + \sum_{q=1}^{Q} \gamma^q S_t^q + \sum_{l=1}^{L} \sum_{g=1}^{G} \mu_g^l PC_{t-g}^l + Z_t^k$$

where,

- ΔTFP is the first difference of utilization-adjusted TFP
- S^q is a structural shock provided by the literature
- PC^l is the lth principal component from a dataset with more than a hundred U.S. aggregates
- $J = 8, \dots, 20$, $Q = 4$, $L = 2, \dots, 4$, and $G = 2, \dots, 6$

IV-LP Estimator

Dynamic response of endogenous variable Y_{t+h} to R_t is

$$Y_{t+h} = \Theta_h^Y R_t^k + u_{h,t+h}^Y \tag{1}$$

Because R_t is endogenous OLS estimation of 1 is not valid. Eq. 1 can be estimated by IV if Z_t satisfies the following conditions

1. $E(\varepsilon_{1,t} Z_t^k) = \alpha \neq 0$ (relevance)
2. $E(\varepsilon_{2:N,t} Z_t^k) = 0$ (contemporaneous exogeneity)
3. $E(\varepsilon_{1:N,t+j} Z_t^k) = 0$ for $j \neq 0$ (lead-lag exogeneity)

Given the validity of previous conditions, an unbiased estimator for Θ_h^Y is defined as

$$\Theta_h^Y = \frac{E(Y_{t+h} Z_t^k)}{E(R_t^k Z_t^k)} \tag{2}$$

Miscellaneous Technical Details

- Forecast horizon k from SPF data is either 2 or 3
- Forecasted variables X^s are real GDP, nominal GDP, real consumption, real investment, and industrial production
- We estimate $Y_{t+h} = \Theta_h^Y R_t^k + \gamma W_t + u_{h,t+h}^Y$
  - where R_t is instrumented with Z_t
  - W_{t-1} is a series of controls at $t-1$
- If Y_t is non-stationary,
  - Detrend Y_t with low-frequency filters
  - Take the first difference of Y_t and $\Gamma_h^Y = \sum_{i=0}^{h} \Theta_h^Y$ is the response of Y_{t+h}
- Bootstrap method is from Kilian and Kim (2011)

Bootstrap Technique

Results

Model

Conclusions

Bootstrapping Technique

1. Consider tuple $\Lambda^Y_{h,t} = \{Y_{t+h} \quad R_t \quad W_t \quad u^Y_{h-1,t+h}\}$
2. Create $\Lambda^Y_{h,t,1}$ of the same length of T of $\Lambda^Y_{h,t}$ where $\Lambda^Y_{h,t,1}$ is formed by randomly extracted blocks of length l from $\Lambda^Y_{h,t}$
3. Estimate $\Theta^Y_{h,1}$ from $\Lambda^Y_{h,t,1}$ using IV-LP estimator
4. Redo first 3 steps $B = 2000$ times and get $\Theta^Y_{h,b}$ where $b = 1, \ldots, B$
5. Select confidence bands of $\Theta^Y_{h,b}$ across b for all h

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