Sources of Business Fluctuations: Financial or Technology Shocks?

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This paper

• Are financial or technology shocks the major source of economic fluctuations?

• Adds a financial accelerator mechanism and two financial shocks to a DSGE model with neutral and investment specific technological change

• Estimates the model using data from the US and Japan

• Obtains historical/variance decompositions

• Neutral technology shocks matter for output; financial shocks and technology shocks matter for investment
The model:

Central bank

- Sets the policy rate $r_t^n$ according to a Taylor Rule rule with interest rate smoothing and a monetary policy shock ($z_t^r$)

Financial intermediary

- Borrows from households at rate $r_t^n$. Lends to entrepreneurs at rate $r_t^E$
- Implied/passive. Nothing to restrict $B_t \leq D_t$?

Households

- Consume; supply labour to entrepreneurs; deposit saving with financial intermediary with return $r_t^n$
- Habit formation; sticky wages (Calvo)
- Shocks: consumption preference ($z_t^b$); labour supply ($z_t^l$); wage markup ($z_t^l$)
The model: entrepreneurs

Gilchrist et. al. (2009) augmented with variable a capital utilization rate

Period $t$:
- Buys capital from the capital producing firm using net worth and borrowing from the financial intermediary
- Rate paid on borrowing is $r^n/\pi$ plus an external finance premium that increases with leverage

Period $t+1$:
- Uses this capital in production
- Sells this product to retailers at marginal cost
- Sells the (depreciated) capital back to the capital producing firm
- Pays back the financial intermediary

Shocks: neutral tech ($z_t^\text{z}$); ext. fin. premium ($z_t^{\text{efp}}$); net worth ($z_t^{\text{nw}}$)
The model:

Retailers

- Buy entrepreneurs’ product; differentiate it at no cost; sell the retail product to the consumption-good firm at markup $\lambda_t$
- Set prices on a staggered basis (Calvo)
- Shocks: retail goods price markup ($z^p_t$)

Consumption-good firm

- Produces the consumption good
- Sells to households and investment-good firms at marginal cost
The model:

**Investment-Good Firms**

- Buy consumption good; convert into investment good using technology $I_t = (Y_t/\Psi_t)$

  \[
  \log \Psi_t = \log \psi + \log \Psi_{t-1} + z_{\psi}^t
  \]

- Sell investment good to capital-good firm at markup over marginal cost $1/\Psi_t$ so that $P_i^t/P_t = (1 + \lambda_i^t)/\Psi_t$

- Shocks: investment specific technology shock ($z_{\psi}^t$); investment goods price markup ($z_{\psi}^t$)

**Market Clearing Condition for Consumption Goods**

\[
Y_t = C_t + \frac{I_t}{\Psi_t} + gZ_t^* \exp \tilde{z}_t^g
\]

- Shocks: external demand shock ($\tilde{z}_t^g$)
The model:

**Capital-good firm**

- Invests in the capital stock by purchasing investment goods, subject to investment adjustment costs

\[ K_t = (1 - \delta(u_t))K_{t-1} + (1 - S(\cdot))I_t \]

- Sells \( K_t \) to entrepreneurs at the end of the period and buys it back in the following period.
What’s interesting about this paper?

(1) Allows for more than one unit root

- $P_t^i / P_t$ falls over time
- Real output and real investment needn’t grow at the same rate in the long run.

(2) Allows for financial shocks

(3) An impressive paper. This can not have been easy!
Relative Price of Investment
Ratio of Investment IPD to CPI (1970=100)

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Australia
US
Japan
Comments and questions

• The data used in this paper will tend to overstate the importance of neutral technology shocks and understate the importance of investment and financial shocks (See Justiniano et. al. (2010a))
  – excludes inventories from investment
  – includes purchases of consumer durables in consumption

• Impulse responses would have been helpful.

• How do these results compare to a baseline specification?

• How sensitive are these results to the priors?

• Does adding investment-specific technological shocks and financial shocks improve out of sample forecasting performance and/or ability of the model to produce business cycles with features similar to those observed in the data?