Not so Great Expectations – M. Sockin

Discussion – WFA 2015

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What is this paper about?

Dynamic AP Model with Imperfect Information

- Solution of truly dynamic model of private information
- Rich feedback of prices onto real investment

Moving towards dynamic prediction of NREE models?

- Conditional reaction of firm decisions to asset prices
  - Prices are more informative during recoveries
  - Distort firm investments at the bottom of recessions

Theoretical contribution

- Elegant model that has closed form with true dynamics
- Clear predictions of price information revelation
What are the main results?

Information revelation
- Time variation in information content embedded in prices
  - True dynamic in information extraction from prices
  - Signal-to-noise ratio varies over the “business cycle”
- Two-way play of information revelation with real quantities
  - Managers base their investment decision from household trading/prices
  - Household infer about the state of the economy from investment (robust?)

Macroeconomic implications
- “Slow recovery”
  - prices are most informative in intermediary stage of business cycle
- When does the “q-theory works”
Outline

Description of the model
- Demand side (households): Variation in information content of prices
- Supply side (firms): Impact and interplay with real investment

Discussion
- Empirical implications
- What do we learn from this exercise
Model

Supply side:
- AK model with IST shocks
  \[
  \frac{dK_t}{K_t} = (I_t\theta_t - \delta)dt + \sigma_k dZ^k_t
  \]
- Firm managers have imperfect information about \( \theta \)

Demand side:
- Households have some private information
  - Noisy signal on \( \theta \)
  - Bet on their signal on financial markets
- Demand shocks on households ("Liquidity"/noise trade shocks)

Equilibrium:
- Firms learn from prices: shape their investment policy
- Households learn from firm behavior
- Lack of complete separation between control variables and signal extraction – firms investment do affects the signal extraction problem
Households trading:

- Trade on private information
- Trade on noise/demand/liquidity shocks ($\xi$)
- Prices imperfectly reveals state of the economy because of demand shocks

Strength of price signal:

- Informational content of prices in the risk-free rate

\[
 r = \frac{a}{a - I} \rho - \delta - \frac{\sigma_k^2}{1 - \pi} + I \frac{\Sigma}{\Sigma + \sigma_s^2} \left( \theta - \hat{\theta}^c \right) - \frac{\pi \sigma_k^2}{1 - \pi} \xi
\]

- Households trade more aggressively (and reveal more information) with
- $\Sigma$ is the variance of public information about the signal
- Signal-to-noise ratio: $\frac{\Sigma}{\Sigma + \sigma_s^2}$
Real impact of information revelation - Firms

Investment policy:
- Firms investment policy follows q-theory

\[
\text{investment rate } \approx \rho(q^{\hat{\theta}^c} - 1)
\]

Feedback of investment into information
- Signal-to-noise ratio also depends on investment

\[
\frac{dK_t}{K_t} = (I_t\theta_t - \delta)dt + \sigma_k dZ_t^k
\]

- High investment means large sensitivity of capital growth to underlying \(\theta\)
- Low investment no informational content from capital growth: \(I\theta \rightarrow 0\)

When do we learn from prices
- Investment needs to be high
- Variance of public signal needs to be high
- First prediction: risk of getting “stuck” in low investment states
Discussion - Theory

Main result:

- Most information revelation happens in intermediary states
- Goldilock price revelation:
  - $\Sigma$ cannot be too low
  - Investment rate cannot be too low
- Conditionnal “q”: elasticity of investment to prices depends on strength of financial signal

Exposition:

- Most results are described in narrative way
- Get more traction by “simulating” the model
- Gain a better understanding of joint-dynamics of investment and Signal-to-noise
- For example: Why do slow recoveries happen? Do they actually happen within the model?
- Simulate path? Get better sense of how the model comes to life
Assumptions:

- Unobservable is IST shock $\theta$. Is the model robust to noise about fundamental TFP shocks?
- Essential for joint-dynamics of investment and information revelation
- With learning about productivity, impact of investment on learning would be dampened (or shut off)
Discussion - Empirical predictions

Conditional q-theory:

- Within the model: q-theory seems to be more salient in intermediary/goldilock states
- Empirical predictions: stock returns / investment predictability strongest in intermediary states

\[
R_{t\rightarrow t+1} = a + \left(-6.5 \ (I/K)_t \times (\text{low-consumption})
- 8.3 \ (I/K)_t \times (\text{mid-consumption})
+ 2.4 \ (I/K)_t \times (\text{high-consumption})\right)
\]

- Alternative explanations (see Li & Zhang): financial frictions
- Find a way to generate unique predictions
Conclusion

**Wow theory:**
- Closed form solution of hard dynamic GE model with dispersed information
- Important role of prices for real quantities (and vice-versa)
- Builds a common framework of analysis to ask such questions
  - Make sure finance and macro people talk to each other

**Future work:**
- Move away from narrative tale of the theory to something more formal: simulation
- Think harder about empirical implications and actually do it