Macroeconomic Risks and Asset Pricing: Evidence from a DSGE Model

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What is this paper about?

Bringing (monetary/NK) DSGE into finance

- Explanatory powers of macro shocks for asset prices
- Bringing macroeconomics language closer to finance: economies of scale!

Moving towards production ready asset pricing models?

- Why do we write medium-scale DSGE models?
- Policy analysis, counterfactual analysis.
- Recent financial crisis, new macrofinance models
  - He & Krishnamurthy; Brunnermeier & Sannikov
  - importance of getting prices right for (monetary) policy analysis

What are the main results?

Estimate the DSGE on real quantities

- Estimate 18 parameters using a few aggregate quantities $\{dy, dc, di, dw, \pi, r, h\}$
- Model matches all moments accurately except for consumption and wage growth $\{dw, dc\}$

Recover the SDF and estimate its pricing properties

- Recover the SDF from the model
  - model 1: SDF model directly from the estimated pricing kernel
  - model 2: SDF model as a affine model of the model's latent shocks
- Run a horserace of both model-based SDF agains the Fama-French 3 factors

  Test the model on a large set of test assets (FF25, industry, bond returns)
- Model 2 performs almost as well as FF3 and model 1 is within 5% significance of both models.

Outline

Description

- Model: what is new with respect to DSGE models and/or finance models
- Which mechanism is key to our explanation of asset prices

Discussion

- What mechanism really drive prices
- What are the latent shocks

Model

Key ingredients:

- RBC model with intermediate goods and labor and services

$$Y_{i,t} = (z_t H_{i,t})^{1-\alpha} K_{i,t}^{\alpha} - \varphi \Psi_t^{\frac{\alpha}{1-\alpha}} z_t$$

  - z_t neutral shocks (classical RBC productivity shock)
  - Ψ_t investment specific shock (shock that shift supply of capital down)
- Calvo pricing on firm's side and labor wage's side
- Households have standard preferences on labor and consumption good services

Which mechanism is key driving force behind asset prices:

- IST shock affects both the supply of capital and the firm's rent level
  - Is it investment moving or operating leverage
- Monetary and government policy shock: hard to understand their role on asset prices.

Empirics

Tested models:

$$m_t^1 = m_t^{\text{model}}$$
$$m_t^2 = b_0^2 + b_z e_t^z + b_\psi e_t^\psi + b_V e_t^V$$
$$m_t^3 = b_0^3 + b_{\text{mkt}} r_t^{\text{mkt}} + b_{\text{hml}} r_t^{\text{hml}} + b_{\text{smb}} r_t^{\text{smb}}$$

Which model works better?

- Model 2 seems to fare relatively well sometimes better than FF3
- Model 1 is mostly within 5% confidence bound of both other models.

Model discussion

IST shocks:

- IST shocks are a force behind prices: Kogan & Papanikolaou
- The role of IST shocks in the model:
  - Both operating leverage
  - Adjustment cost rent displacement
- Which one matters most? Estimate model 1 sensitivity to changes in φ that controls the role of the operating leverage channel

Monetary policy shocks:

- What happens to firms' rents and consumption after monetary policy shock?
- If rates increase (unexpectedly) stock prices decrease (negative price of risk)
- Compare the estimation result with Bernanke & Kuttner
  - 25bp raise in rate, stock market decreases by 1%
- B&G push for risk premium effect:
  Is it mostly cash-flow effect due to Calvo pricing or is it a risk premium effect on consumption?

Empirical exercise

Latent factors:

- What are the latent factors?
- Time series analysis (correlation with BC, persistence etc...)
- Do they look anything like their direct measured counterparts?
  - Take Kogan & Papanikolaou measurement of IST shocks and compare Ψ_t
  - Is productivity really procyclical?

What drives risk prices?

- Differences between model 1 and 2:
  - constant linear pricing in model 2
  - non-linear state dependent risk prices in the model's SDF
- Sensitivity analysis
  - Role of model parameters to understand the mechanism
  - Are the overidentifying restrictions of model 1 vs. model 2 violated?
  - Which ones are most binding?

Conclusion

Interesting paper:

- Bridge from mainstream macro policy analysis to asset pricing
- Important role of macro shocks for asset prices
- Builds a common framework of analysis to ask questions to might be related
  - Make sure finance and macro people talk to each other

Future work:

- Role of IST shock for prices is not entirely clear
- Most interesting is the effect of monetary policy on prices
  - Lots of papers investigating the role of monetary policy on risk premia and stock prices
  - Calibrate and investigate these insights within a NK-DSGE model