Deutsche Bundesbank's 9th Spring Conference: "Microdata Analysis and Macroeconomic Implications"

Eltville, 27-28 April 2007

Frank Smets

(European Central Bank)

Discussion of „When is Market Incompleteness Irrelevant for the Price of Aggregate Risk?"

by Dirk Krueger and Hanno Lustig

The Irrelevance of Market Completeness for the Price of Aggregate Risk

Krueger and Lustig

Discussion

Frank Smets

European Central Bank

Overview

- Impressive paper with a striking result:
  - Idiosyncratic risk with market incompleteness is irrelevant for the pricing of aggregate risk.
- My discussion:
  - Large literature that finds that idiosyncratic risk with market incompleteness can affect risk premia and partially explain the equity premium puzzle: e.g. Constantinides and Duffie (1996)
    - The important difference is the absence of **countercyclical** cross-sectional variation in this paper
  - The source of risk matters: e.g. Angeletos and Calvet (2006).
    - Endowment risk versus production risk

Overview

- The title of the paper “The irrelevance of market incompleteness for the price of aggregate risk” is therefore somewhat misleading.
- I like better the title of the presentation: “When is market incompleteness irrelevant for the price of aggregate risk?”

The main finding (1)

- The standard CCAPM model of excess returns holds in an economy with:
  - Heterogenous agents that face idiosyncratic income shocks;
  - Incomplete markets, i.e. there are no Arrow-Debreu securities that can insure against idiosyncratic risk;
  - Solvency constraints that are proportional to aggregate income;
  - i.i.d shocks to the growth rate of aggregate income

The main finding (2)

- With aggregate iid shocks to the growth rate, the interest rate is constant and there is no trading in the bond;
- Idiosyncratic risk does lead to a reduction in the interest rate for the usual reasons:
  - In order to smooth consumption in the face of those shocks, precautionary saving increases which in equilibrium reduces the interest rate;
  - Question: To what extent does this depend on the presence of borrowing constraints?

The main finding (3)

- But the Breeden-Lucas CCAPM prices excess returns:

$$E_t[(R^s_{t+1} - R_t)\beta(\lambda_{t+1})^{-\gamma}] = 0$$

- Where λ_t is the aggregate growth rate of the economy

- Should make “representative-agent-type” of macroeconomists like myself happy…

But what about the equity premium puzzle?

$$\frac{E(R^i) - R^f}{\sigma(R^i)} = -\rho_{m,R^i} \frac{\sigma(m)}{E(m)} = -\rho_{m,R^i} \gamma \sigma(\Delta \ln c)$$

- With a stock market Sharp ratio of 0.5 (8% excess return and 16% standard deviation), a standard deviation of consumption growth of 1%, and a correlation coefficient of 0.2, we need a coefficient of risk aversion of 250.

Constantinides and Duffie (1996)

- The introduction of idiosyncratic risk can partially solve the equity premium puzzle.
- Even more: for any degree of risk aversion, CD (1996) show one can generate a labour income risk process that generates the equity premium.
- Does this contradict Krueger and Lustig? What is the difference?
  - CD: Variance of idiosyncratic risk rises when the market declines (CCV)
  - KL: idiosyncratic risk is independent of aggregate risk

Cochrane (2001)

- Example without borrowing constraints:
  - For every household: $$E_t\left[\left(\frac{C^i_{t+1}}{C^i_t}\right)^{-\gamma} R^e_{t+1}\right] = 0$$
  - Aggregating across households: $$E_t\left[E_N\left[\left(\frac{C^i_{t+1}}{C^i_t}\right)^{-\gamma}\right] R^e_{t+1}\right] = 0$$
  - If cross-sectional variance of consumption growth is lognormally distributed: $$E_t\left[\left[e^{-\gamma E_N \Delta c^i_{t+1} + \frac{\gamma^2}{2}\sigma^2_N \Delta c^i_{t+1}}\right] R^e_{t+1}\right] = 0$$

Cochrane (2001)

$$E_t\left[\left[e^{-\gamma E_N \Delta c_{t+1}^i + \frac{\gamma^2}{2}\sigma_N^2 \Delta c_{t+1}^i}\right] R_{t+1}^e\right] = 0$$

- Economy displays more risk aversion than would a representative agent with aggregate consumption (Mankiw,1986)
- Risk aversion can vary over time if cross-sectional variation varies over time: this variation can generate high risk premia, if market return varies negatively with cross-sectional variance

This is an empirical question…

- It makes intuitive sense: people who loose their job in recessions are probably more hit than others;
- But does it also affect consumption?
- Micro work (e.g. Storesletten, Telmer and Yaron) finds high persistence and strong countercyclicality in labour income risk:
  - SD is 0.21 in a contraction and 0.12 in expansion

Other forms of idiosyncratic risk?

- Angeletos and Calvet (2006) introduce idiosyncratic production risks on private capital (in addition to endowment risk): $y_t^i = A_t^i f(k_t^i) + e_t^i$
  - Incomplete markets
  - No aggregate risk;
  - Short-term risk-less bond: no borrowing constraints;
  - CARA utility: allows closed-form solution
- Now, incomplete markets affect the willingness of agents to invest with implications for aggregate risk premia, capital accumulation and the business cycle

Angeletos and Calvet (2006)

- In an incomplete-market equilibrium, the macro path is deterministic and satisfies:

$$C_t + K_{t+1} = f(K_t) + (1-\delta)K_t$$

$$C_{t+1} - C_t = \Psi \ln[\beta(1+r_t)] + \Gamma_t^2[\sigma_e^2 + f(K_{t+1})^2\sigma_A^2]/(2\Gamma)$$

$$r_t + \delta = f'(K_{t+1})[1-\Gamma_t f(K_{t+1})\sigma_A^2]$$

  - Idiosyncratic production risk introduces a risk premium on private equity and discourages aggregate investment for a given interest rate;
  - The precautionary motive tends to stimulate savings

Conclusions

- Striking and elegant findings that set a standard/benchmark for this literature;
- The importance of countercyclical cross-sectional variation to generate risk premia from idiosyncratic risk is well understood and is absent from Krueger-Lustig.
- Other idiosyncratic risk may have different implications