Comment on "Credit risk and the macroeconomy: Evidence from an estimated DSGE model" by Simon Gilchrist, Alberto Ortiz, Egon Zakrajšek

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Main question

- How important are credit market shocks to account for business cycles?
- Develop a DSGE model with financial market frictions and estimate it using a new index of corporate credit spread.

Previous result by GYZ (2009)

- Construct a new index of corporate credit spread for the 1990-2008 period.
- Their credit spread index outperforms standard default-risk indicators in terms of the predictive power for economic activity.
- Their FAVAR results suggest that shocks to the corporate credit market accounts for more than 30% of the forecast error variance in economic activity at 2-4 year horizon.

What is done in this paper

- Extend the corporate credit spread index of GYZ to a longer period: 1973-2008.
- Show that its predictive power for economic activity outperforms some commonly used financial indicators.
- Conduct Baysian ML estimation of a DSGE model with financial market frictions using their data on the corporate credit spread.

Comments

- Very interesting data and very important project.
  - Financial market data has a lot of information which could be used to advance our understanding on macroeconomic fluctuations.

Comments

- Is this a good model to explain the corporate credit spread?
  - Generally, asset prices are difficult to explain.
  - In particular, fluctuations in risk premium are difficult to account for.
  - Maybe this model, with habit persistence and adjustment cost of capital, can account for the corporate credit spread, but ...

Comments

- Even if the original model is capable of explaining the risk premium, its linear approximation is not.
- An exogenous "risk-premium shock" may have to be added to generate risk premium in a linearized model.
  - Indeed, such shocks are assumed in this paper as:

$$E_t r_{t+1}^k - (r_t - E_t \pi_{t+1}) = \cdots + \epsilon_t^{\mathrm{fd}} \tag{24}$$

- Adding such exogenous shocks may cause a bias in estimation.

Example

- Consider a version of Jermann (1998):

$$\max \mathrm{E}_0 \sum_{t=0}^{\infty} \beta^t \frac{1}{1-\sigma}\left(c_t - bc_{t-1}\right)^{1-\sigma}$$

subject to

$$c_t + i_t = y_t = \exp(z_t) k_{t-1}^{\alpha}$$

$$k_t = (1 - \delta k_{t-1}) + i_t - H\left(\frac{i_t}{k_{t-1}}\right) k_{t-1}$$

$$z_t = \rho_z z_{t-1} + \epsilon_t$$

where

$$H(x) \equiv \frac{\xi}{2\delta}(x-\delta)^2$$

Example

- Benchmark parameter values:

$$\alpha = 0.36, \quad \beta = 0.99, \quad \delta = 0.025, \quad \sigma = 5, \quad b = 0.8,$$
$$\xi = 5, \quad \rho_z = 0.9, \quad \mathrm{std}(\epsilon) = 0.007.$$

- Equity premium generated by the model (annualized rates):

$$\mathrm{E}[r_{f,t}] = 0.0267$$
$$\mathrm{E}[r_{k,t}] = 0.0727$$
$$\mathrm{E}[\mathrm{rp}_t] = 0.0460$$

Experiment

- The model is simulated for 1200 periods.
- Conduct Baysian ML estimation of a linearized version of the model using the following data generated by the original model:
  1. output;
  2. output and equity premium.
- A sizable bias when the equity premium is used in the estimation.

Estimation 1

- Use data $\{y_t\}$ to estimate the linearized version of the model.
- Take $\alpha = 0.36$, $\beta = 0.99$, and $\delta = 0.025$ as given.
- Estimate σ, b, ξ, ρ_z, and std(ϵ) with priors:

$$\sigma \sim G(5, 0.1), \quad b \sim B(0.8, 0.03), \quad \xi \sim G(5, 0.1),$$
$$\rho_z \sim B(0.9, 0.03), \quad \mathrm{std}(\epsilon) \sim IG(0.007, \inf)$$

Estimation 1

- Estimation result given data on $\{y_t\}$:

	σ	b	ξ	ρ_z	std(ϵ)
prior mean	5.00	0.800	5.00	0.900	0.007
post. mean	4.99	0.800	5.00	0.877	0.007

Estimation 2

- Use simulated data $\{y_t, \mathrm{rp}_t\}$.

- Augment the linearized model with a risk-premium shock, a_t:

$$\mathrm{rp}_t = \cdots + a_t$$

$$a_t = (1-\rho_a)\bar{a} + \rho_a z_{t-1} + \nu_t$$

- Estimate σ, b, ξ, ρ_z, and std(ϵ), $\bar{a}$, ρ_a, std(ν) with priors:

$$\sigma \sim G(5, 0.1), \quad b \sim B(0.8, 0.03), \quad \xi \sim G(5, 0.1),$$

$$\rho_z \sim B(0.9, 0.03), \quad \mathrm{std}(\epsilon) \sim IG(0.007, \mathrm{inf}),$$

$$\bar{a} \sim N(0, 0.03), \quad \rho_a \sim N(0, 0.03), \quad \mathrm{std}(\nu) \sim IG(0.001, \mathrm{inf})$$

Estimation 2

- Estimation result given data on $\{y_t, \mathrm{rp}_t\}$:

	σ	b	ξ	ρ_z	std(ϵ)
prior mean	5.00	0.800	5.00	0.900	0.007
post. mean	4.81	0.94	4.40	0.975	0.0074

	$\bar{a}$	ρ_a	std(ν)
prior mean	0.00	0.00	0.001
post. mean	0.007	0.19	0.064

Conclusion

- The authors have constructed a very interesting index of corporate credit spread, which could be used to better understand macroeconomic fluctuations.

- One concern about the authors' approach is that using a linearized model augmented with risk premium shocks to account for asset prices may yield a biased result.