Discussion: Agency Conflicts, Investment and Asset Pricing by Albuquerque and Wang

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Research question

- How does the level of investor protection affect

  1. aggregate investment

  2. aggregate dividends

  3. asset prices

- Part of broader research literature: how do corporate finance issues affect asset prices?

- Main contribution: paper provides a theoretical framework which nests exchange and production economy

- Dividends and investment determined endogenously
- Asset prices determined in terms of dividends – exchange economy approach
- Asset prices determined in terms of investment and capital stock – production economy approach

▶ Weaker investment protection leads to over-investment

Model summary

- Break from representative agent approach – use 2 agents – both have power utility – same relative risk aversion γ

- Agent 1: Controlling shareholder – chooses dividends and steals from representative firm output
  - Investment is firm output less dividends and theft

$$I(t) = \overbrace{Y(t)}^{\text{output}} - \overbrace{D(t)}^{\text{dividends}} - \overbrace{s(t)\,Y(t)}^{\text{theft}}$$

- Agent 2: Minority shareholder: standard investor – choose consumption and portfolio policy

- Get equilibrium asset prices via market clearing

Controlling shareholder's problem

- Controlling shareholder's objective function

$$J_1(K_0) = \sup_{D,s} E \int_0^{\infty} e^{-\rho t} u(C_1(t))\, dt,$$

$$C_1(t) = \overbrace{\alpha D(t)}^{\text{dividends}} + \overbrace{s(t)\, Y(t)}^{\text{stolen output}} - \overbrace{\Phi(s(t), Y(t))}^{\text{cost of stealing}}$$

- Firm output is a constant multiple of the capital stock

$$Y(t) = hK(t),$$

- Shocks to growth rate of capital stock *scaled by investment-capital ratio*

$$\frac{dK(t)}{K(t)} = \left(\frac{I(t)}{K(t)} - \delta\right) dt + \epsilon \frac{I(t)}{K(t)} dZ(t).$$

- Bellman pde

$$\sup_{D,s} \left\{ u(C_1) - \rho J_1 + \left(\frac{I}{K} - \delta\right) K J_{1,K} + \frac{1}{2}\left(\frac{I}{K}\right)^2 K^2 J_{1,KK} \right\} = 0$$

Results: Stealing, dividends and investment

- Proportion of output stolen is higher when investor protection is weaker

$$s = \frac{1-\alpha}{\eta} \equiv \phi$$

- Dividend-capital ratio is lower when investor protection is weaker

$$d = (1-\phi)\, h - i$$

- Investment-capital ratio is higher when investor protection is weaker

$$i = \text{ In terms of } \alpha, \eta, \gamma, h, \delta, \epsilon$$

Minority shareholder's problem

- Minority investor owns fraction $1-\alpha$ of representative firm's shares (can trade them!) at price $P(t)$

- Objective function
$$\sup_{C_2,\omega} E \int_0^{\infty} e^{-\rho t} u\left(C_2(t)\right) dt,$$

- Standard dynamic budget constraint
$$\frac{dW_2(t)}{W_2(t)} = \left(r(t) + \omega(t)\lambda(t) - \frac{C_2(t)}{W_2(t)}\right) dt + \omega(t)\sigma_P(t)\, dZ(t),$$
  - $\omega(t)$ – proportion of her wealth the minority investor puts in the stock market
  - $\lambda(t)$ – risk premium
  - $\sigma_P(t)$ – stock market return volatility

- via market clearing these policies determine
  - Price-dividend ratio, $\frac{P(t)}{D(t)}$, and
  - Price-capital ratio, $\frac{P(t)}{K(t)}$, i.e. Tobin's q

Summary: understanding the model

- Model nests two standard approaches to asset pricing

1. Exchange economy

- Relates stock price, $P(t)$, and riskfree rate, $r(t)$, to dividends, $D(t)$

$$\frac{P(t)}{D(t)} = \frac{1}{\widehat{\mu}_P - \mu_D}$$

2. Production economy

- Relates stock price, $P(t)$, and riskfree rate, $r(t)$, to investment, $I(t)$ and capital stock, $K(t)$

$$\frac{P(t)}{K(t)} = q$$

Equilibrium results

- Discount rate is higher when investor protection is weaker

$$\widehat{\mu}_P = r + \gamma \sigma_D^2$$

  - Riskless rate is higher when investor protection is weaker
  - Dividend growth volatility is higher when investor protection is weaker

$$\sigma_D = i\epsilon$$

- Price-dividend ratio is lower when investor protection is weaker, if $\gamma > 1$

$$\text{Gordon growth model: } \frac{P(t)}{D(t)} = \frac{1}{\widehat{\mu}_P - \mu_D}$$

  - Increase in $\widehat{\mu}_P$ dominates increase in $\mu_D = i - \delta$

$$\widehat{\mu}_P - \mu_D = \rho + (\gamma - 1)\left(\mu_D - \frac{1}{2}\gamma\sigma_D^2\right)$$

- $\mu_D - \frac{1}{2}\gamma\sigma_D^2$ is higher when investor protection is low

- Tobin's q(market-to-book) is lower when investor protection is weaker

$$q = \frac{P(t)}{K(t)} = \left(1 + \frac{1-\alpha^2}{2\eta\alpha d}h\right)^{-1} \frac{1}{1-\gamma\epsilon^2 i},$$

and

$$\frac{dq}{d\eta} = \frac{1}{y}\left[\frac{1-\alpha}{\eta^2}h - \frac{di}{d\eta}\left(1 + \frac{1-\alpha^2}{2\eta\alpha d}h\right)^{-1}\left(\frac{1-\alpha^2}{2\eta\alpha d}h + \gamma\right)\right] > 0,$$

because

$$\frac{di}{d\eta} < 0.$$

Comments

1. Extend to Epstein-Zin preferences – separate relative risk aversion γ from elasticity of intertemporal substitution EIS – Price-dividend ratio result is reversed

   - Price-dividend ratio is higher when investor protection is weaker, if $EIS > 1$
   - Recent empirical estimates: $EIS > 1$, Attanasio and Vissing-Jorgensen (2003)
     - Increase in $\widehat{\mu}_P$ does not dominate increase in $\mu_D = i - \delta$

$$\widehat{\mu}_P - \mu_D = \rho + \left(\frac{1}{EIS} - 1\right)\left(\mu_D - \frac{1}{2}\gamma\sigma_D^2\right)$$

2. With Epstein-Zin preferences, Tobin's q is still lower when investor protection is weaker

$$\frac{dq}{d\eta} = \frac{1}{y}\left[\frac{1-\alpha}{\eta^2}h - \frac{di}{d\eta}\left(1+\frac{1-\alpha^2}{2\eta\alpha d}h\right)^{-1}\left(\frac{1-\alpha^2}{2\eta\alpha d}h + \frac{1}{EIS}\right)\right] > 0,$$

because

$$\frac{di}{d\eta} < 0.$$

Suggestion: Explain why effect of investor protection on the price-dividend ratio depends on whether EIS is $<$ or $>$ 1, but this does not matter for Tobin's q

3. Price-dividend ratio is a constant:

- Equity premium puzzle

$$\lambda = \gamma \sigma_D^2$$

- Excess volatility puzzle

$$\sigma_P = \sigma_D$$

4. Paper has many results – what is the main result?

Summary

- Nice model – looks at effects of agency on asset prices

- Attractive feature – nests exchange and production economy

- Model does not match asset price data – provides a way of thinking about how asset prices are affected by corporate finance considerations via fundamentals such as dividends and investment

References