Discussion of "Sticky Leverage" by Joao Gomes, Urban Jermann and Lukas Schmid

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Summary

- Provide a tractable DSGE model with dynamic capital structure choice and finite maturity nominal debt

Main Results

- When inflation is exogenous:
  - Unanticipated changes in inflation have real effects, even without sticky prices or wages
  - When debt is long-lived, there is debt overhang $\Rightarrow$ reduce investment
  - Leverage is a slow-moving state variable $\Rightarrow$ persistence and propagation
- A standard Taylor rule helps stabilize the economy
  - In response to a negative productivity or wealth shock, CB raises inflation $\Rightarrow$ mitigate debt overhang

Related Literature I

- Large literature on one period nominal debt
  - Deflation raises the real burden of debt and worsens economic activity (Fisher (1933))
  - Debt overhang reduces investment (Myers (1977))
- Miao and Wang (2010): RBC model (propogation)
- Bhamra, Fisher and Kuehn (2011)
  - Infinite maturity nominal debt
  - No investment
  - Interest rate peg vs inflation targeting
- The main difference is that GJS incorporate finite maturity and investment

Related Literature II

- Continuous time: Leland and Toft (1996, JF), Leland (1998, JF), Hackbarth, Miao, and Morellec (2006, JFE)
- Discrete time: Philippon (2009, QJE)
- Probabilitistic structure
  - Chatterjee and Eyigungor (2012, AER): sovereign debt
  - Miao and Wang (2010): real DSGE model

Finite Maturity Debt Contracts: Leland (1998)

- Initially, the firm issues debt with principal P and a constant coupon C forever.
- At each t, a fraction e^{-mt} of this debt remains outstanding, with principal $e^{-mt}P$ and coupon $e^{-mt}C$
- Continuously retire outstanding debt principal at the rate me^{-mt}
- The average maturity is $\int_0^\infty tme^{-mt}dt = 1/m$
- Retired debt is replaced by the issuance of new debt with identical coupon, principal, and seniority.
- Any finite-maturity debt policy is completely characterized by (C, P, m)

Valuation: Leland (1998), HMM (2006)

- Cash flow (x_t) follow a GBM.
- Let $D^0(x,t)$ denote the time t value of debt issued at time zero

$$
\begin{aligned}
rD^0(x,t) &= e^{-mt}(mP+C) + D^0_t(x,t) \\
&\quad + \mu x D^0_x(x,t) + \frac{\sigma^2 x^2}{2} D^0_{xx}(x,t)
\end{aligned}
$$

- Let $D(x) = e^{mt} D^0(x,t)$ denote the total value of outstanding debt at any time t

$$
(r+m)D(x) = C + mP + \mu x D_x(x) + \frac{\sigma^2 x^2}{2} D_{xx}(x)
$$

- We can see that $D(x;P)$ does not depend on time

Finite Maturity Debt Contracts: Discrete Time

- A finite maturity debt contract (c, b_t, λ) where b_t is total principal at date t
- One unit debt pays coupon c
- A fraction λ is retired and then issue new debt $b_{t+1} - (1-\lambda) b_t$

$t=0$	$t=1$	$t=2$	$t=3$
b_1	$(c+\lambda) b_1$	$(1-\lambda)(c+\lambda) b_1$	$(1-\lambda)^2 (c+\lambda) b_1$
	$b_2 - (1-\lambda) b_1$	$(c+\lambda)[b_2 - (1-\lambda) b_1]$	$(1-\lambda)(c+\lambda)[b_2 - (1-\lambda) b_1]$
		$b_3 - (1-\lambda) b_2$	$(c+\lambda)[b_3 - (1-\lambda) b_2]$
			$b_4 - (1-\lambda) b_3$
b_1	b_2	b_3	b_4

- Cash flow for any debt b_t is given by

t	$t+1$	$t+2$	$t+3$	$\ldots$
b_{t+1}	$(c+\lambda) b_{t+1}$	$(1-\lambda)(c+\lambda) b_{t+1}$	$(1-\lambda)^2 (c+\lambda) b_{t+1}$	$\ldots$

Valuation: Discrete Time

- Unit debt price p_t
- Recursive valuation

$$\begin{aligned} p_t b_{t+1} &= EM_{t,t+1}\left[(c+\lambda) b_{t+1} + (1-\lambda) p_{t+1} b_{t+1}\right] \\ &\quad + EM_{t,t+1}\left(\text{recovery value}\right) \end{aligned}$$

Specific comments

- Taylor rule

$$\ln\left(r_t/\bar{r}\right) = \rho_r \ln\left(r_{t-1}/\bar{r}\right) + \left(1-\rho_r\right)\left[\rho_\mu \ln\left(\mu_t/\bar{\mu}\right) + \rho_y \ln\left(Y_t/\bar{Y}\right)\right] -$$

- Compare to DNK models: $\zeta_t \uparrow \Longrightarrow r \uparrow$, $Y \downarrow$, (inflation)$\mu \downarrow$, $rr \uparrow$
- A monetary policy shock $\zeta_t \uparrow \Longrightarrow \mu \downarrow$ (?), Default$\uparrow$, Debt$\uparrow$, $I \downarrow$, $Y \downarrow$, $C \uparrow$, $N \downarrow$, $r_f \downarrow$
- A negative TFP shock $\Longrightarrow Y \downarrow$, $\mu \uparrow$ (?), Default $\downarrow$, $I \uparrow$, $C \downarrow$ (?), $N \downarrow$, $r_f \uparrow$
- A negative wealth shock $(\delta \downarrow) \Longrightarrow Y \uparrow$, $C \downarrow$, $I \uparrow, N \uparrow$, $\mu \uparrow, r \uparrow$
- What is the intuition? Log-linear analysis
- Finacial shocks?

Specific comments

- Numerical method?
- Calibrate c?
- Which parameters are chosen to match what targets?
- What empirical facts to explain?

Conclusion

- Provide a tractable DSGE model with finite maturity nominal debts
- Related Literature should be more fairly discussed
- More intuition is needed for results related to impulse responses
- Exposition can be improved (proofs, typos, details...)