Dynamic Banking with Non-Maturing Deposits

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What the paper does

Motivation

- Study banks' deposit issuance behavior when deposits' effective maturity depends on bank's credit worthiness;
- Study how bank leverage and default risk react to interest rate and to asset-side shocks
- Study how a regulator (with or without commitment) would alter deposit issuance behavior to improve aggregate outcomes

Key idea / ingredients

- With frictions, bank deposits behave like term debt, thus subject to dilution risk
- Bank's commitment problem interacts in complex ways with state-dependent deposit withdrawal intensity

Commitment problem in (simple) banking model

Banking model

- Asset cash-flows y_t follow (μ, σ) GBM dynamics
- Deposits b_t get "liquidity benefits" ℓ, priced at q_t
- Deposit withdrawal intensity λ (constant for now)
- No commitment: $db_t = (G_t - \lambda b_t)\, dt$

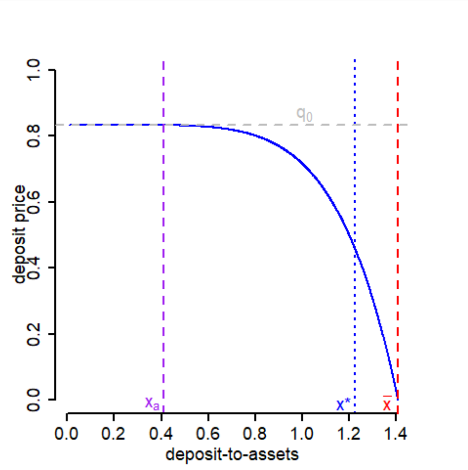
Problem

$$E(y, b) = \sup_{G,\tau} \mathbb{E}\left[\int_0^\tau e^{-rt}\,(y_t + G_t q_t - \lambda b_t)\, dt\right]; \qquad q(y, b) = \mathbb{E}\left[\int_0^\tau e^{-(r+\lambda)t}(\ell + \lambda) dt\right]$$

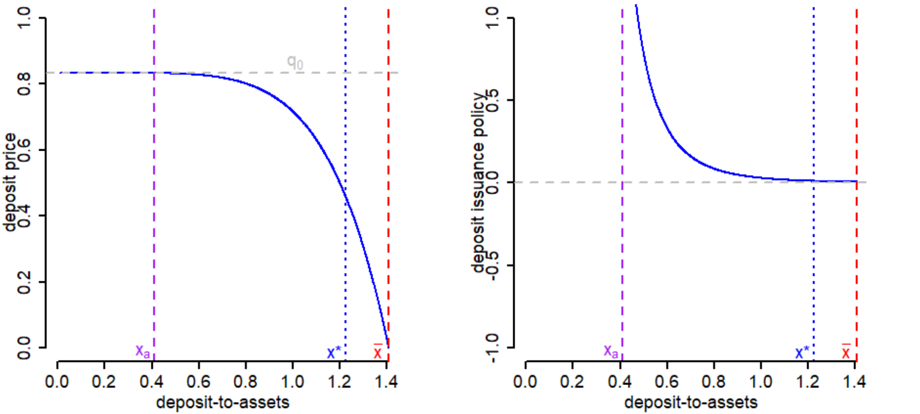
Coasian outcome with state variable $x_t := b_t / y_t$

- Issuance rate $G_t = g(x_t) y_t = \left(\frac{\ell}{-q'(x_t)}\right) y_t$
- Default cutoff $\bar{x}$
- Attraction point x_a

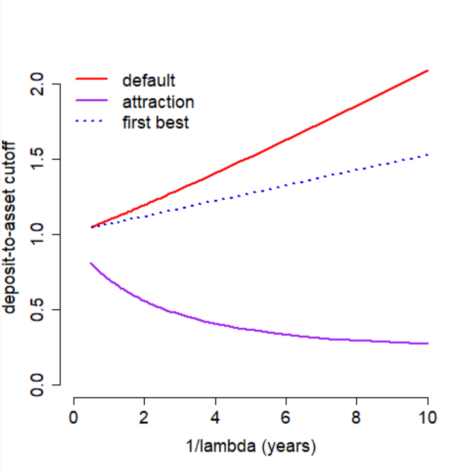
Deposit pricing and deposit issuance rate



Deposit pricing and deposit issuance rate



Sensitivity to deposit withdrawal intensity λ



First best in (simple) banking model

Problem of regulator without commitment

$$W(y,b) := \sup_{\Gamma} \mathbb{E}^{y,b}\left[\int_0^{\tau} e^{-rt}\left[y_t + \ell b_t\right] dt\right],$$

$$\text{s.t. } db_t = d\Gamma_t - \lambda b_t dt; \qquad \tau := \inf\{t \geq 0 : E(y_t, b_t) \leq 0\}$$

$$E(y,b) := \sup_{\tau} \mathbb{E}^{y,b}\left[\int_0^{\tau} e^{-rt}\left[y_t - \lambda b_t\right] dt + \int_0^{\tau} e^{-rt} Q(y_t, b_t) d\Gamma_t\right]$$

$$Q(y,b) := \mathbb{E}^{y,b}\left[\int_0^{\tau} e^{-(r+\lambda)t}\left(\ell + \lambda\right) dt\right]$$

First best issuance policy

- issue lump amount of deposit $d\Gamma_0 = x^* y_0$ at $t = 0$;
- issue/buy back deposits at $t > 0$ so that $x_t = x^*$ constant;
- bank shareholders indifferent between defaulting or continuing;
- deposits are risk free, with price $\bar{q} = \frac{\ell+\lambda}{r+\lambda}$
- $x^* = \frac{1}{\lambda - (\lambda+\mu)\bar{q}}$ (well defined if ℓ is not “too high”)
- Regulator with commitment achieves same outcome(!)

Banking model with endogenous withdrawal intensity

Banking model

- Asset cash-flows y_t follow (μ, σ) GBM dynamics
- Deposits b_t get "liquidity benefits" $\ell(q_t)$, with $\ell'(q) > 0$, priced at q_t
- Deposit withdrawal intensity $\lambda(q_t)$, with $\lambda'(q) < 0$
- No commitment: $db_t = (G_t - \lambda(q_t) b_t)\, dt$

Problem

$$E(y, b) = \sup_{G, \tau} \mathbb{E}\left[\int_0^\tau e^{-rt}\,(y_t + G_t q_t - \lambda(q_t) b_t)\, dt\right]; \quad q(y, b) = \mathbb{E}\left[\int_0^\tau e^{-\int_0^t (r + \lambda(q_s)) ds} (\ell + \lambda(q_t)) dt\right]$$

If "smooth" MPE exists...

- Coasian outcome remains
- Issuance rate $G_t = g(x_t) y_t$
- $g(x) = \frac{\ell(q)}{-q'} + (1 - q)\, x \lambda'(q) \to$ issuance rate tilted downwards!

Theory

Debt/deposit issuances without commitment

- Coasian result relatively standard in corporate finance literature
- Discrete time: still some commitment – maybe move to continuous time to entirely remove commitment?

Robustness of results?

- Mostly numerical results
- Some of the results (for example the difference between the Ramsey and Markov perfect regulators) potentially dependent upon specific asset process assumed
- Lack of sharp theoretical results to make reader fully comfortable
  - theoretical analysis mostly focusing on “local deviations”
  - existence of the MPE?
  - uniqueness of the MPE?

Empirics: is this the right model of a bank?

Deposit issuances

- In the model, controlled by the bank
- In practice, very difficult for banks to control precisely their (retail) deposit funding
- Time-series variation in (retail) demand deposit mostly orthogonal to banks' credit spreads (except in the very rare event of a "run")

Proceeds from deposit issuances

- In the model, used to pay dividends to shareholders
- In practice, banks acquire additional assets and originate additional loans