

A Model of Shadow Banking: Crises, Central Banks and Regulation

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Disclaimer

The views expressed in this presentation are those of the authors only and do not involve the responsibility of the Bank of Italy and that of Credit Suisse.

The paper in a nutshell

- ▶ Approach:
 - ▶ Shadow banking as a credit intermediation mechanism.
 - ▶ Open issue: *properties* (e.g. efficiency, stability) of shadow banking.
- ▶ This paper:
 - ▶ Propose a stylized representation of the modern financial ecosystem (focus on two key developments).
 - ▶ Build a simple two-period model to understand how *properties* are affected by the financial ecosystem around the shadow banking system.

Outline of the talk

- ▶ The Financial Ecosystem, key developments:
 1. Institutional Cash Pools: demand for parking space.
 2. Entities with liabilities in fixed nominal amount: demand for returns.
- ▶ Shadow banking intermediation mechanism.
- ▶ The Model.
 1. Baseline: cash pools and shadow bankers.
 2. Adding entities with liabilities in fixed nominal amount.
- ▶ Policy implications.

Relationship with the literature

- ▶ “Liquification view” of shadow banking (Gorton and Metrick 2012).
- ▶ Financial intermediaries as producers of liquidity (Gorton and Pennacchi 1990).
- ▶ General approach to demand and supply of liquidity of Holmström-Tirole (2011).
- ▶ Several theory paper on shadow banking (e.g. Gennaioli et al. 2013).
- ▶ Discussion on modern financial ecosystem (e.g. Pozsar 2014).

Institutional Cash Pools

- ▶ Examples:
 - ▶ Liquidity tranche of real money accounts (e.g. FX reserve managers).
 - ▶ Cash balances of multinational corporations.
 - ▶ Central liquidity desk of large asset managers.
- ▶ Large in size (total \sim \$7trillion, end-2014).
- ▶ Secular rise, real economy drivers: global imbalances (global savers face poorly sophisticated domestic financial markets), capital vs labor share and tax optimization (large profits and cash balances of big corporations).

Institutional Cash Pools

Cash pools demand *parking space* (storage):

1. **Public** parking space: T-bills, repos backed by Treasuries.
2. **Private** parking space: mainly repos backed by private-label securities which serve as (shadow) collateral.

(Recall: cash pools have no access to central bank accounts and dislike bank deposits, which represent non-diversified, uninsured credit risk.)

Entities with liabilities in fixed nominal amount

- ▶ Examples: Pensions funds and insurance companies.
- ▶ Asset-liability mismatch, struggle to meet promises made in the past and reach for yield.
- ▶ Real economy drivers, e.g. aging.
- ▶ Rely on shadow banking to bridge ALMs: increased allocation to alternative investments delivered by hedge funds, institutional-class (total and absolute return) bond funds.

Shadow banking intermediation mechanism

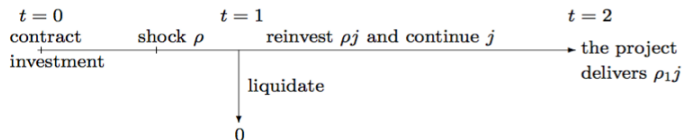
In this paper, “shadow bankers”:

- ▶ Heterogenous universe which includes (some activities of) global banks, dealers, hedge and levered bond funds, ...
- ▶ (in different ways and forms) Grant credit to the economy and use these credit claims to manufacture securities which serve as (shadow) collateral to attract funding.
- ▶ The flow of credit to the economy and the quality of shadow collateral depend on incentives of shadow bankers. Incentives are driven by the financial ecosystem.

Baseline: shadow bankers

2-period model, built on Holmström-Tirole (2011).

- ▶ Have equity A , raise funds $i - A$ from cash pools and invest i in partially illiquid projects (limited pledgeability: $\rho_0 i < \rho_1 i$).
- ▶ Aggregate liquidity shock (crisis) with prob $1 - \alpha$ at interim stage: ρ_j must be reinvested to continue projects at scale j .



- ▶ Limited pledgeability creates a borrowing and a liquidity constraint ($\rho > \rho_0$).

Baseline: shadow banking technology

- ▶ The technology gives bankers some “extra-pledgeability” (liquification).
- ▶ Shadow bankers decide how to allocate extra-pledgeability between the crisis (l_c) and no-crisis states (l_{nc}):
 - ▶ *Simple* shadow banking: $l_{nc} = l_{nc} = l$. Pledgeability of shadow collateral is constant across states of the world.
 - ▶ *Complex* shadow banking: $l_{nc} = \gamma l$, $\gamma > 1$ and $l_c = 0$. Shadow collateral becomes illiquid in a crisis.
- ▶ Implications for the leverage-insurance trade-off:
 - ▶ When $\rho_0 + l = \rho$, simple shadow banking gives full insurance.
 - ▶ Complex shadow banking: Boost leverage, no insurance (full deleveraging in a crisis).
- ▶ Real world interpretations.

Baseline: modeling cash pools

- ▶ Cash pools are market investors, large endowment Y , look for storage, demand an expected return R (endogenous).
- ▶ Parking space comes from:
 - ▶ The government: sovereign bonds, come in fixed supply X , sold at equilibrium price q at $t = 0$, return 1 at $t = 1$.
 - ▶ Shadow bankers: the pledgeable part of investment projects.

Baseline: shadow banker's problem

$$\max_{i,j,l_{nc},l_c} u_b \equiv \alpha\rho_1 i + (1 - \alpha)(\rho_1 - \rho)j - Ri \quad (\text{Utility})$$

subject to

$$R(i - A) \leq \alpha(\rho_0 + l_{nc})i + (1 - \alpha)(\rho_0 + l_c - \rho)j \quad (\text{BC})$$

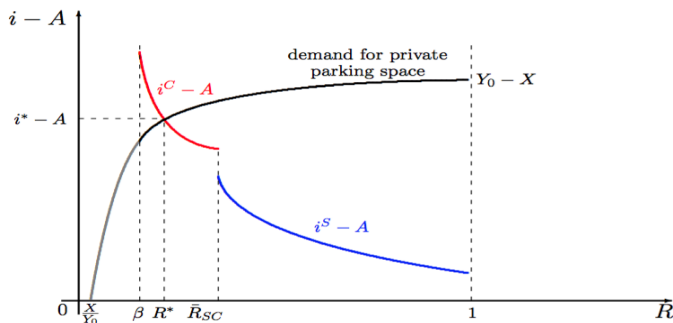
$$j = i \text{ if } l_c = l \quad \text{and} \quad j = 0 \text{ if } l_c = 0 \quad (\text{LC})$$

- ▶ Find the optimal choice for each R .
- ▶ Then look for the competitive equilibrium by imposing the equilibrium condition in the market for parking space (where $q = 1/R$):

$$i - A = Y - X/R \quad (1)$$

Baseline: main results

- ▶ Complex shadow banking is the competitive equilibrium outcome when $R^* < \bar{R}_{SC}$. Hint.
- ▶ R^* is decreasing in Y (demand for parking space) and increasing in X (supply of public parking space).



Adding entities with liabilities in fixed nominal amount, e.g. pension funds

- ▶ Pension funds have endowment A_p and fixed liabilities \bar{c}^P .
- ▶ Portfolio allocation: sovereign bonds, simple and complex shadow banking. Assets at $t = 2$ are c^P .
- ▶ Recall: complex shadow banking yields zero in a crisis.

Results and intuitions

- ▶ When no scarcity of public parking space, sovereign bonds are attractive for pensions and complex shadow banking is not an equilibrium outcome.
- ▶ When scarcity of public parking space:
 - ▶ High ρ_1 : simple shadow banking is the equilibrium outcome.
Hint: its return suffices to meet the fixed liabilities also in a crisis.
 - ▶ Low ρ_1 : complex shadow banking is the equilibrium outcome.
Hint: no portfolio allocation is able to generate adequate returns to meet liabilities in a crisis. Pensions simply maximize returns in the nocrisis states.

Summing up

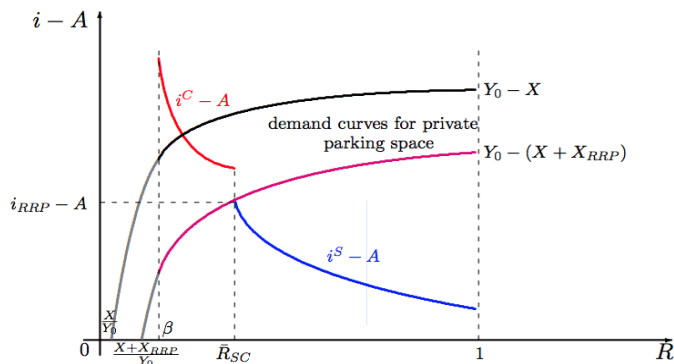
- ▶ When the demand for parking space is high (as compared to the supply of public parking space), the cost of funding for shadow bankers is low.
- ▶ Under these conditions, complex shadow banking (i.e. financial instability) is the competitive equilibrium outcome.
- ▶ Side effect: low yields on sovereign bonds push entities with liabilities in fixed nominal amount to reach for yield and allocate funds to complex shadow banking.
- ▶ And notably so when the fundamental return of real investment projects is low (e.g. secular stagnation).

Broader implications

- ▶ Relative supply of public parking space affects the intermediation mechanism that emerges at the equilibrium.
- ▶ Promises made in the past affect the mandate (risk-return profile) which real money investors give to shadow bankers today.
- ▶ Financial stability implications of different kinds of *imbalances*.

Reverse Repo Program

Central banks can expand the supply of public parking space.
Powerful policy tool, also to affect incentives.



Liquidity regulation

- ▶ Liquidity regulation in the model is a minimum amount of sovereign bonds shadow bankers must hold.
- ▶ It is effective, as sovereign bonds are used in a crisis to improve continuation scale.
- ▶ Destroys incentives for simple shadow banking.
- ▶ It also creates additional demand for “safe” assets which represent parking space to cash pools.
- ▶ Scope for time-varying liquidity regulation.

THANKS FOR YOUR ATTENTION!

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