Counterparty Risk and Repo Runs

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Abstract

I develop a model in which borrowers finance the purchase of risky assets by borrowing against the assets as collateral. Due to limited liability, borrowers with impaired balance sheets have incentives to take excessive leverage, exposing their lenders to the risk of counterparty default. I show that lenders' efforts to deter excessive leverage-taking generate a novel run mechanism through which a small shock on borrowers' balance sheets can generate large decreases in collateralized funding and asset prices.

Motivation

- Fragility in collateralized debt markets: repo, ABCP, margin loan, mortgage lending,....
- Why do lenders tighten collateral constraints during a financial crisis?
  - Existing papers: lenders' concerns about collateral value.
  - This paper: lenders' concerns about borrowers' default.

Borrowers with Different Types

- $t = 0, 1$. A continuum of borrowers with two types.
- At $t = 0$, each borrower has l unit of cash.
  - A high-type borrower receives $x_H > 0$ units of cash at date $t = 1$.
  - A low-type borrower receives $x_L < 0$ units of cash at date $t = 1$.
  - Each borrower is privately informed of its x.

Asset Purchase and Collateralized Borrowing

- At $t = 0$, borrowers can buy a financial asset in a competitive market.
  - Fixed supply: A.
  - Risky payoff: v_H with probability q and v_L with probability $1 - q$ at date 1.
  - Endogenous asset price: P.
- Each borrower can finance its asset purchase through borrowing against a purchased asset as collateral.
  - Lenders are deep-pocketed and infinitely risk-averse.
  - Lenders value the collateral asset at $u < v_L$.
  - Endogenous collateralized funding: $D \leq v_L$.

Borrowers' Asset Demand

- High-type borrowers: $a_H(P, D) = \frac{l}{P - D}$
- Low-type borrowers choose between two investment strategies:
  - Hold a_H units of assets and become insolvent in bad times.
  - Hold $a_L(P, D) = \frac{l + x_L}{P - v_L} < a_H$ units of assets to stay solvent in bad times.
- Lenders set $D \leq D^*(P)$ to make sure that low-type borrowers will not take excessive leverage and default in bad times.

Collateral Constraint and Market Clearing

- Collateral constraint: $D = \min\{v_L, D^*(P)\}$.
  - $P \downarrow \rightarrow$ asset purchase becomes less risky $\rightarrow D \uparrow$
  - $P \downarrow \rightarrow$ low-type borrowers have higher incentive to take excessive leverage $\rightarrow D \downarrow$
  - Lower collateral asset price can lead to a tighter collateral constraint.
- Market clearing: $\theta a_H(P, D) + (1 - \theta)a_L(P, D) = A$.
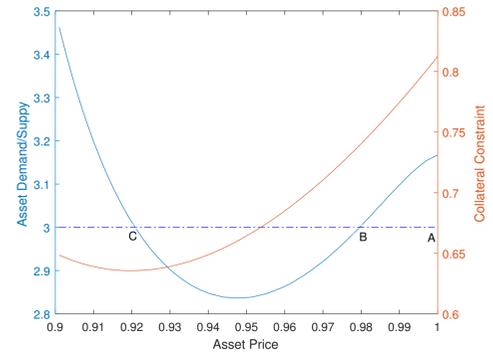
Multiple Equilibria

Figure 1: Left y-axis: aggregate asset demand as a function of asset price P. Right y-axis: collateralized funding D as a function of asset price P.

Multiple Equilibria

- Multiple equilibria supported at different asset prices
  - Expecting that the asset price is close to (below) fundamental, lenders worry little (a lot) about low-type borrowers taking excessive leverage.
  - As a result, lenders set a loose (tight) collateral constraint, resulting in large (small) asset demand that rationalizes the initial guess of asset price.
- A small decrease in borrowers' net-worth can lead to a large tightening of collateral constraint and a large fall in asset price.

Policy Interventions

- A liquidity backstop can shift the economy out of a bad equilibrium.
  - The central bank must lend freely at an amount between crisis and pre-crisis level.
- Capital injection vs asset purchase.
  - Capital injection is more effective due to the endogenous response of collateral constraint.
  - Capital injection can improve funding liquidity by letting high-type borrowers signaling themselves out.

Dynamic Implication

- $t = 0, 1, 2$.
- At date 0, borrowers purchase risky assets financed by collateralized borrowing.
- At date 1, borrowers need to roll over their short-term collateralized debts and rebalance their asset positions.
  - An aggregate shock realizes and determines borrowers' balance sheet strength.
- At date 2, all claims mature and the game ends.

Forced Deleveraging

- Any equilibrium of the model features a cut-off structure.
- When the aggregate state is above a threshold at date 1,
  - The collateral constraint does not bind.
  - The asset price rises to the fundamental value.
- When the aggregate state is below the threshold,
  - the collateral constraint becomes tighter at date 1.
  - Forced deleveraging at fire sale prices.
- Financial regulations designed to limit borrowers' leverage taking may backfire.