

Practical Exercises

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Banking and Financial Intermediation

Capital Requirements and Liquidity Management

A commercial bank has the following balance sheet composition

Cash	C	Deposits	D
Loans	L	Other Liabilities	OL
		Equity	E

$$C + L = D + OL + E$$

At the moment the bank has not enough cash to honor all deposit withdrawals if they occur right now ($D > C$). Equity is considered to be Tier 1 and Tier 2 capital, cash has a risk weight of zero while Loans have a risk weight of 1. Assume a fraction α of depositors wants to withdraw all their deposits right now. In order to honor these redemptions, the bank will use cash and fire-sale some of its Loans if necessary. The bank will only be able to receive a fraction β for each loan in their portfolio. Compute the balance-sheet before the deposit withdrawal, and the capital ratio before and after. What should happen for the capital ratio to remain unchanged?

Solution

Capital Ratio before shock

$$CR = \frac{E}{L}$$

Balance Sheet after shock

Cash	$\max\{C - \alpha D, 0\}$	Deposits	$(1 - \alpha)D$
Loans	$\min\{L - \frac{1}{\beta}(\alpha D - C), L\}$	Other Liabilities	OL
		Equity	$E - \max\{(\frac{1-\beta}{\beta})(\alpha D - C), 0\}$

New capital ratio

$$CR = \frac{E - \max\{(\frac{1-\beta}{\beta})(\alpha D - C), 0\}}{\min\{L - \beta(C - \alpha D), L\}}$$

Capital Requirements and Liquidity Management II

Now assume that instead of suffering from deposit redemption, there is an amount CL in offbalance sheet credit line commitments. Suppose that an fraction α of those credit lines are used. If the bank uses stored liquidity management, describe how the balance sheet and the capital ratio evolves. Assume credit lines have a risk weight of 2.

Solution

Capital Ratio before shock

$$CR = \frac{E}{L}$$

Balance Sheet after shock

Cash	$\max\{C - \alpha CL, 0\}$	Deps	D
Credit Lines	αCL	Other L	OL
Loans	$\min\{L - \frac{1}{\beta}(\alpha CL - C), L\}$	Eq	$E - \max\{(\frac{1-\beta}{\beta})(\alpha CL - C), 0\}$

New capital ratio

$$CR = \frac{E - \max\{(\frac{1-\beta}{\beta})(\alpha CL - C), 0\}}{\min\{L - \frac{1}{\beta}(\alpha CL - C), L\} + 2\alpha CL}$$

Purchased Liquidity Management

Assume now that the bank needs the cash and cannot afford to fire sale loans, instead it will go the interbank market and ask for the necessary funds. Describe how the balance sheet and capital ratios evolve with the liquidity shock to the liabilities and assets.

Solution - Liability Shock

Capital Ratio before shock

$$CR = \frac{E}{L}$$

Balance Sheet after shock

Cash	C	Deps	$(1 - \alpha)D$
Loans	L	Other L	$OL + \alpha D$
		Eq	E

New capital ratio

$$CR = \frac{E}{L}$$

Solution - Asset Shock

Capital Ratio before shock

$$CR = \frac{E}{L}$$

Balance Sheet after shock

Cash	C	Deps	D
Credit Lines	αCL	Other L	$OL + \alpha CL$
Loans	L	Eq	E

New capital ratio

$$CR = \frac{E}{L + 2\alpha CL}$$

Investment Banking

An investment bank agrees to underwrite an issue of n shares of stock for Murray Construction Corp. on a firm commitment basis (underwriter's agreement to assume all inventory risk). The investment bank pays p_0 per share to Murray Construction Corp. for the n shares of stock. It then sells those shares to the public for p_u per share. How much money does Murray Construction Corp. receive? What is the profit to the investment bank? If the investment bank can sell the shares for only p_l such that ($p_l < p$), how much money does Murray Construction Corp. receive? What is the profit to the investment bank?

Solution

If p_u

MCC $p \times n$ and profit $(p_u - p) \times n$

If p_l

MCC $p \times n$ and loss $(p_l - p) \times n$

Investment Banking II

Suppose, instead, that the investment bank agrees to underwrite the n shares on a best - efforts basis. The investment bank is able to sell $n_l < n$ shares for p per share, and it charges Murray Construction Corp. c per share sold. How much money does Murray Construction Corp. receive? What is the profit to the investment bank? If the investment bank can sell the shares for only ($p_l < p$), how much money does Murray Construction Corp. receive? What is the profit to the investment bank?

Solution

If p

MCC $(p - c) \times n_l$ and bank $c \times n_l$

If p_l

MCC $(p_l - c) \times n$ and bank $c \times n_l$