FINM2002 Derivatives
FINM6041 Applied Derivatives
Workshop 3

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1. Overview

- UK banks face scandal over toxic interest rate swap products
- The failure of Silicon Valley Bank
- A numerical example of interest rate swap for investments
- Currency swaps (optional reading)

1. Toxic Interest Rate Swap Products

- UK banks face scandal over toxic insurance products
    - During GFC in 2008, big UK banks (Royal Bank of Scotland, RBS) actively promoting interest rate swap contracts to small businesses
    - As part of their loans from the bank
    - "Interest rate is very likely to go up"
    - "An insurance against future increase in interest rate"
    - "(potential risk? nah)"
    - Huge interest rate cut in late 2008 to historical low
    - Big loss to the small businesses
    - Financial Services Authority investigation
    - Ongoing lawsuits against banks
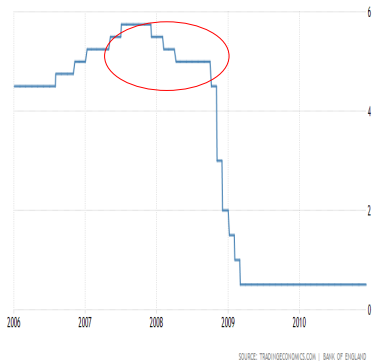
UK interest rate
Source: Bank of England

2. The Failure of Silicon Valley Bank

- Silicon Valley Bank (SVB)
  - 16th largest bank in the U.S., bankrupted in March 2023
  - Largest bank failure since 2008
  - Multiple reasons and a classic bank run

- Let's focus on its big loss in fixed income securities
  - SVB did not make risky investments, but it suffers big loss due to interest rate risk
  - Back in COVID period, interest rate was low, while level of deposits was high $\rightarrow$ SVB invested more than 60% of its asset into government bonds and high quality fixed income securities - fixed rate income assets
  - U.S Fed aggressively increased the interest rate from almost zero to 5% over the past year, to counter inflation

2. The Failure of Silicon Valley Bank

$$P_0 = \sum_{t=1}^{T} \frac{CF_t}{(1+y)^t}$$

- More than 20% loss in face value of the SBV assets
  - Would be OK if hold until maturity
  - Depositors worried and started bank run
  - Have to fire-sale, causing further loss $\rightarrow$ more bank runs
  - Bankrupted in 48 hours
- Un-hedged interest rate risk exposure
  - By the end of 2022
  - $120,000 million fixed-rate assets
  - Only $550 million notional was covered by interest rate swap for hedging purpose

- Companies A and B are offer the following rates of return on a $10 million investment project

	Fixed	Floating
Company A	5%	BBSW
Company B	8.2%	BBSW+1%

- Company A requires a fixed-rate investment

- Company B requires a floating rate investment

- Design a swap that the swap bank will charge 0.2%, and company B will receive 75% of the gain

3. Interest Rate Swaps for Investments

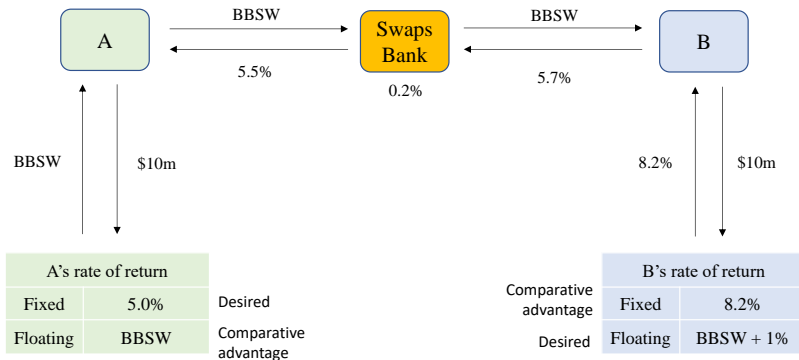|	Fixed	Floating
Company A	5%	BBSW
Company B	8.2%	BBSW+1%
Difference	3.2%	1%

- Identify (relative) comparative advantage
    - Company B has comparative advantage in fixed-rate investment
    - Company A has comparative advantage in floating-rate investment

- Maximum gain after 0.2% commission is $3.2\% - 1\% - 0.2\% = 2\%$
    - Company B receives 75% of the gain, $2\% \times 0.75 = 1.5\%$
    - Company A receives 25% of the gain, $2\% \times 0.25 = 0.5\%$

3. Interest Rate Swaps for Investments

Interest Rate Swaps (Investment)

> Total gains from swaps = 2%

> A is better off by 0.5% at fixed

> B is better off by 1.5% at floating

A's rate of return		
Fixed	5.0%	Desired
Floating	BBSW	Comparative advantage

	B's rate of return	
Comparative advantage	Fixed	8.2%
Desired	Floating	BBSW + 1%

3. Interest Rate Swaps for Investments

- The rate of return after entered into interest rate swaps:
    - Company A is better off by 0.5% (i.e., 5.5% - 5%)
    - Company B is better off by 1.5% (i.e., BBSW+2.5% - BBSW -1%)
    - Therefore, the total gain is 2%

	Fixed	Floating
Company A	5%	BBSW
Company B	8.2%	BBSW+1%
Difference	3.2%	1%

	Invested	Received	Paid out	Net return
Company A	BBSW	+5.5%	−BBSW	5.5%
Company B	8.2%	+BBSW	−5.7%	BBSW+2.5%