Banking on Uninsured Deposits

Itamar Drechsler[1] Alexi Savov[2] Philipp Schnabl[2] Olivier Wang[2]

[1]Wharton [2]NYU Stern

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2023 regional bank crisis

Since early 2022, the Fed has raised short-term rates by 5.25%

- long-term rates are up 2.5%

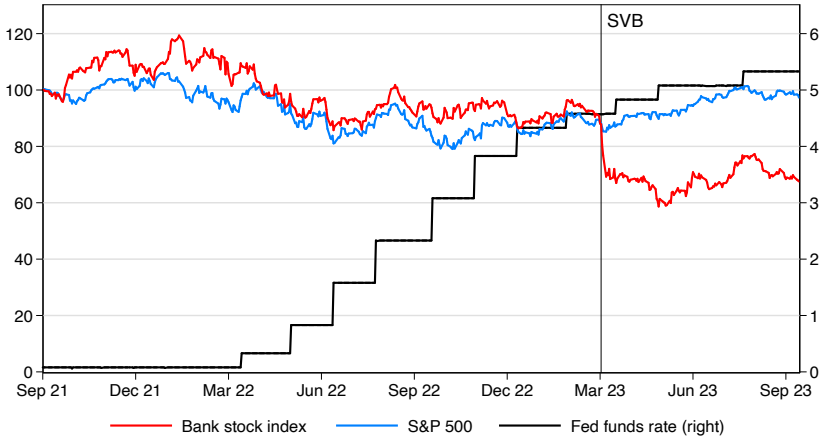
Banks held $17T of long-term loans and securities with average duration 4 years

- implied loss of 0.025 x 4 x 17 = $1.7T
- very large compared to $2.2T bank equity

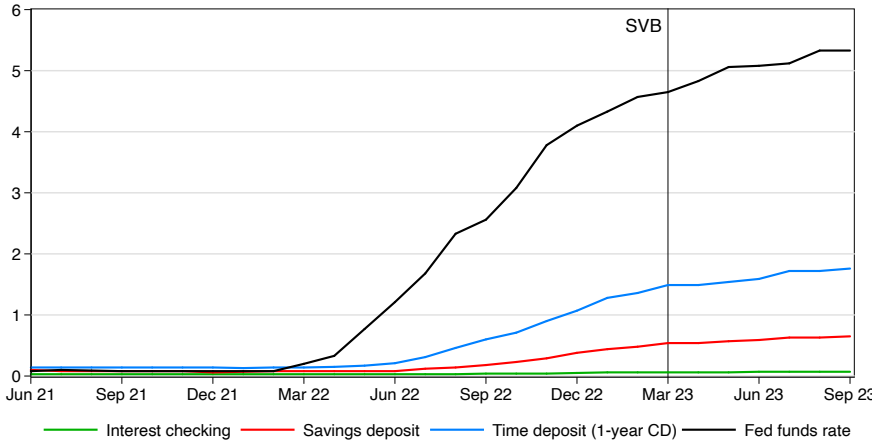
Lawrence H. Summers ✓
@LHSummers

SVB committed one of the most elementary errors in banking: borrowing money in the short term and investing in the long term. When interest rates went up, the assets lost their value and put the institution in a problematic situation.

But why not earlier? Why not all banks?



A natural hedge: low deposit betas

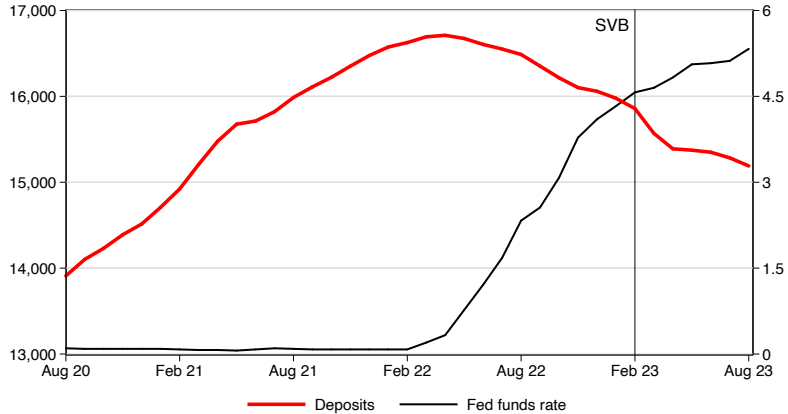


The deposit franchise hedge (Drechsler, Savov, Schnabl 2021)

1. $17 trillion of bank deposits
   - with a deposit beta of 0.4, banks are earning $0.6 \times 5.5\% = 3.3\%$ deposit spread
   - $\$17 \times 3.3\% = \$561$ billion higher income per year

2. Gain on deposit franchise enough to offset asset losses in $\sim$3 years
   - deposits went from unprofitable to highly profitable
   - explains why bank stocks held up as rates rose

Deposit outflows



- Deposit outflows of 5% ($830 billlion) from Mar 22 until Feb 2023
- Additional outflows of 4% ($660 billion) from Mar 23 until Aug 2023

This paper

Deposit franchise hedges interest rate risk...

...**but only if depositors remain with the bank**

Hedge can be undermined by two kinds of deposit outflows:

- rate-driven outflows - “deposits channel of MP” (DSS, 2017)
- **runs on the uninsured deposit franchise**

Main results

1. Uninsured deposit franchise is a runnable asset
   $\rightarrow$ self-fulfilling runs even if loans/securities are fully liquid

2. Deposit franchise value rises with rates + uninsured DF is runnable
   $\rightarrow$ bank run risk increases at higher rates

3. Risk management dilemma:
   - need long-term assets to hedge bank's value to interest rates
   - but then relative value of uninsured DF rises with interest rates, raising run risk

   $\rightarrow$ cannot perfectly hedge both interest rate and run risk with uninsured DF

4. Solutions: options, "rate-cyclical" capital

Model: deposit franchise with outflows

- Bank starts with assets A and deposit base $D_{-1} = D$.
- In period t, remaining deposits D_{t-1}
  - pay deposit rate $r_{d,t}$
  - require operating costs c per dollar
  - withdrawals $X_t = D_{t-1} - D_t$
- Date-0 bank value (EVE)

$$V = A - L$$

where L is PV of liabilities

$$L = \underbrace{\sum_{t \geq 1} q_t D_{t-1} \left(r_{d,t} + c \right)}_{\text{interest expenses and costs}} + \underbrace{X_0 + \sum_{t \geq 1} q_t X_t}_{\text{withdrawals}}$$

Simplifying assumptions

- Initial interest rate $r_{-1} = r$. One-time shock to $r_0 = r_1 = \cdots = r'$.
  $\rightarrow$ Deposit rate $r'_d = \beta r'$

- $t \geq 1$: exogenous outflows

$$X_t = \delta D_{t-1}$$

  to capture natural decay of deposit base.

Deposit franchise value

Rewrite

$$V = A + \underbrace{DF - D}_{-L}$$

where

$$DF = \textbf{deposit franchise}$$

Proposition

Without runs,

$$DF(r') = D\left[\frac{(1-\beta)r' - c}{r' + \delta}\right]$$

$$DF'(r) = D\left[\frac{c + (1-\beta)\delta}{(r+\delta)^2}\right] > 0$$

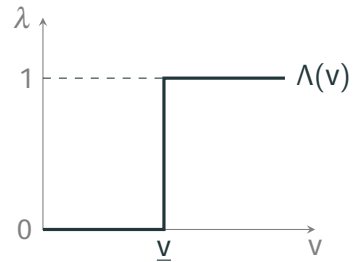
Adding uninsured deposits and runs

Exogenous share u of deposits uninsured: bank value

$$V = A - D + DF_I + \lambda DF_U$$

where λ: **endogenous** fraction of remaining uninsured depositors

$\lambda = \Lambda(v)$ increasing in $v = V/D$: earnings, stock price



Runs on the deposit franchise

Bank solvency ratio given λ: $v(\lambda, r') = v(0, r') + \lambda \cdot u \overbrace{\frac{(1-\beta^U)r' - c^U}{r'+\delta}}^{=DF_U(r')/D}$

Equilibrium given $A(r')$: λ s.t. $\boxed{\Lambda(v(\lambda, r')) = \lambda}$

Proposition

If $v(0, r') < \underline{v}$: run equilibrium $\lambda = 0$ exists (though A is fully liquid).

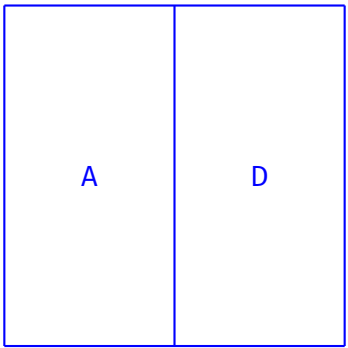
The larger is $DF_U(r')$, the higher is $v(1, r')$ at which a run equilibrium exists.

This is when:

- the share of uninsured deposits u is higher
- the uninsured deposit beta β^U is lower
- **the interest rate r' is higher**

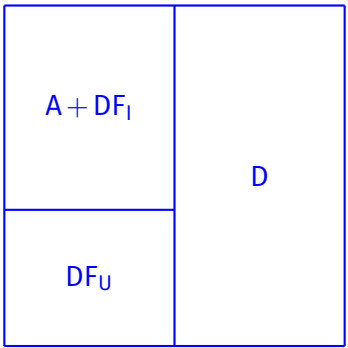
Balance sheet: unique equilibrium at r

No run

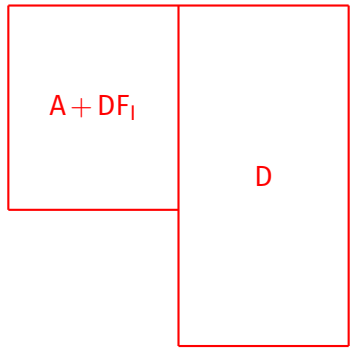


Balance sheet: two equilibria at $r' > r$

No run



Run



Optimal duration(s)

Proposition

Hedging interest rate risk for all r' in no-run equilibrium requires:

$$T_A = (1-u)\frac{(1-\beta^l)\delta + c^l}{(r+\delta)^2} + u \times \frac{(1-\beta^U)\delta + c^U}{(r+\delta)^2}$$

Hedging liquidity/run risk for all r' requires:

$$T_A = (1-u)\frac{(1-\beta^l)\delta + c^l}{(r+\delta)^2} + u \times 0$$

Risk management dilemma

$$v(1, r') = v(0, r') + DF_U(r')$$

Hedging interest rate risk: stabilize $v(1, r')$

Hedging run/liquidity risk: maintain $v(0, r') \geq \underline{v}$

Proposition

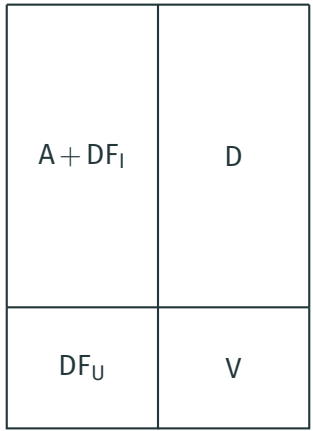
Suppose the bank perfectly hedges interest rate risk in the good equilibrium. Then the run equilibrium exists for

$$r' > \bar{r} = \frac{c^U + \delta \frac{v^* - \underline{v}}{u}}{1 - \beta^U - \frac{v^* - \underline{v}}{u}}$$

No run equilibrium as $\beta^U \to 1$: dilemma caused by **low beta uninsured**

$\to$ retail uninsured and corporate checking, **not** competitive wholesale funding

Why can’t the bank only hedge liquidity risk?



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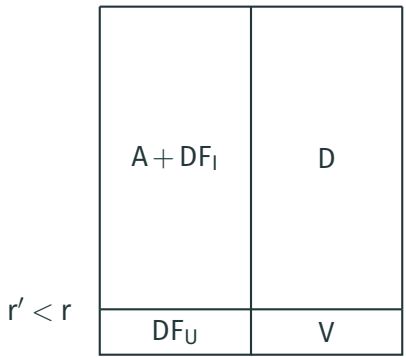


V exposed to interest rate risk when rates **fall**

Solution: Options

To hedge against runs when rates $\uparrow$ and interest rate risk when rates $\downarrow$ need

$$v(0, r') \geq \underline{v} \qquad \textbf{and} \qquad v(1, r') \geq v^* \text{ (initial level)}$$

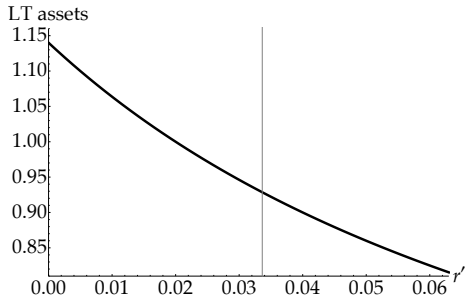
Proposition

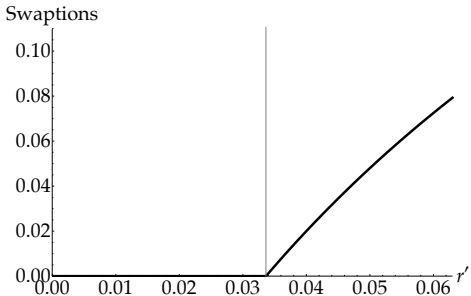
Banks must hold puttable LT bonds: combination of LT assets + call options on r':

$$A^*(r') = \underbrace{(1+v^*)D - DF_I(r') - DF_U(\lambda = 1, r')}_{\text{LT assets}} + \underbrace{\max\{0, DF_U(\lambda = 1, r') - (v^* - \underline{v})D\}}_{\text{payer swaptions}}$$

- Banks already hold swaptions to hedge MBS negative convexity...
  need more to hedge run risk: keep uninsured DF from exceeding bank's equity
- Requires more capital up-front: to use efficiently, invest in options (not cash)

Solution: Options





Conclusion

1. Low beta uninsured deposits (uninsured retail, corporate checking) create a runnable deposit franchise asset (DF_U)
2. Since DF_U rises with interest rates, so does run/liquidity risk
3. Risk management dilemma: banks need assets with
   - long duration to hedge interest rate risk
   - short duration to avoid run risk (as DF_U becomes large relative to V)
4. Solution: options or “rate-cyclical” capital
   - raises capital as rates increase to keep DF_U/V in check