Bank Funding Risk, Reference Rates, and Credit Supply

Harry Cooperman,[1] Darrell Duffie,[2] Stephan Luck,[1] Zachry Wang[2], Yilin Yang[2]

July 2022, NBER SI Corporate Finance/Risk

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[1]Federal Reserve Bank of New York
[2]Graduate School of Business, Stanford University

Introduction

- Historically, the majority of C&I loans in the U.S. is indexed to LIBOR.
  - $\approx$ 80% floating rate
  - $\approx$ 70% indexed to LIBOR
- LIBOR is now being replaced with SOFR.

  London Interbank Offered Rate (LIBOR)
  - LIBOR includes changes in bank credit spreads.

  $\rightarrow$ *Increases during times of distress.*

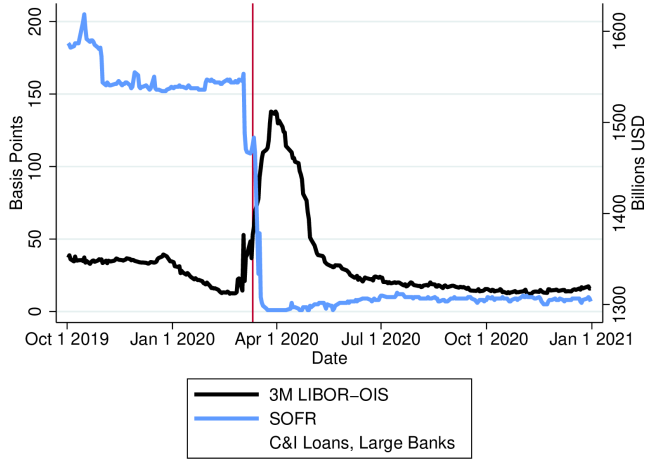
  Secured Overnight Financing Rate (SOFR)
  - SOFR is a risk-free rate.

  $\rightarrow$ *Falls during times of distress.*
- LIBOR mitigates impact of potential funding shocks.

  $\rightarrow$ Bank interest income rises when funding costs increase.

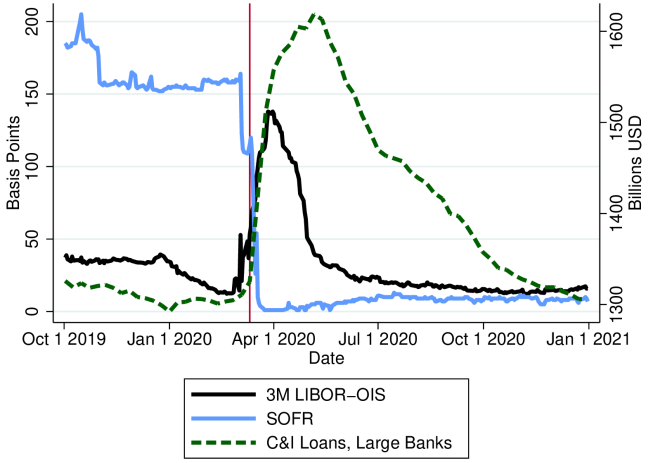
  $\rightarrow$ Reduces incentives to draw revolving credit.
- **How will the transition from LIBOR to SOFR affect credit supply?**

C&I lending and reference rates during COVID recession



Data sources: FRED, Bloomberg.

C&I lending and reference rates during COVID recession



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Research objective

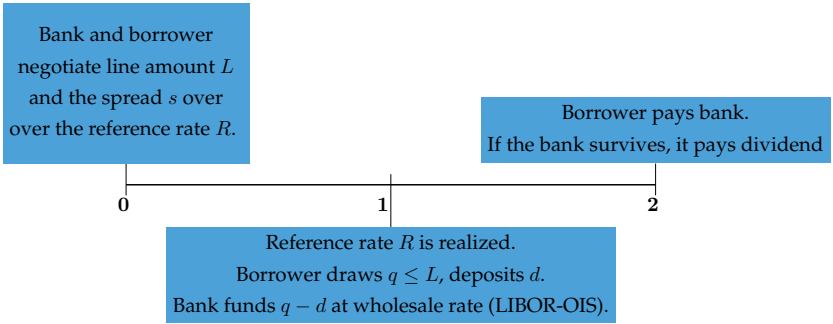
1. **Theoretically**
   - Under which conditions do reference rates matter for credit supply?

2. **Empirically**
   - Does revolving credit plausibly represent a funding risk for banks?

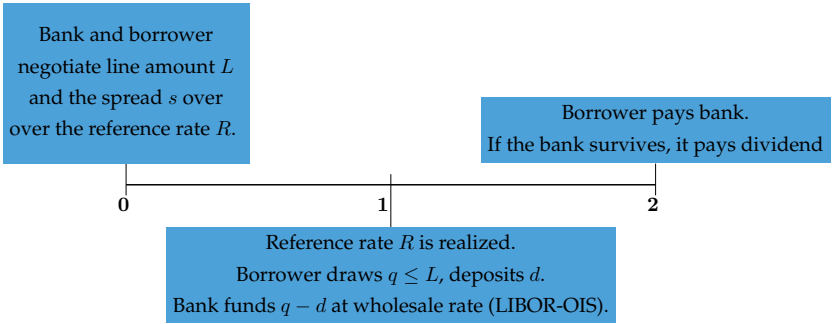
3. **Calibration**
   - What is the impact of the LIBOR-SOFR transition on credit supply?

1. A Model of Credit Line Provision
2. Empirical Facts about Bank Funding Risk from Credit Line Drawdowns
3. Quantifying the Effect of the LIBOR-SOFR Transition on Credit Supply

Simplified model of a credit line



Simplified model of a credit line



Bank:

· Risk-neutral

· Offers menu of line limits and spreads

· Bertrand competition

· Exogenous default risk

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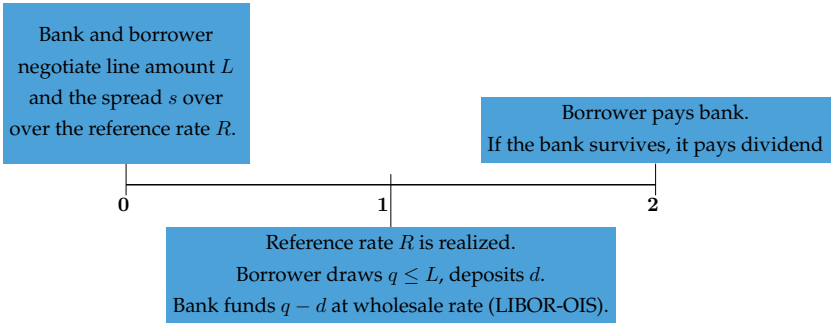


Bank:

· Risk-neutral

· Offers menu of line limits and spreads

· Bertrand competition

· Exogenous default risk

Borrower:

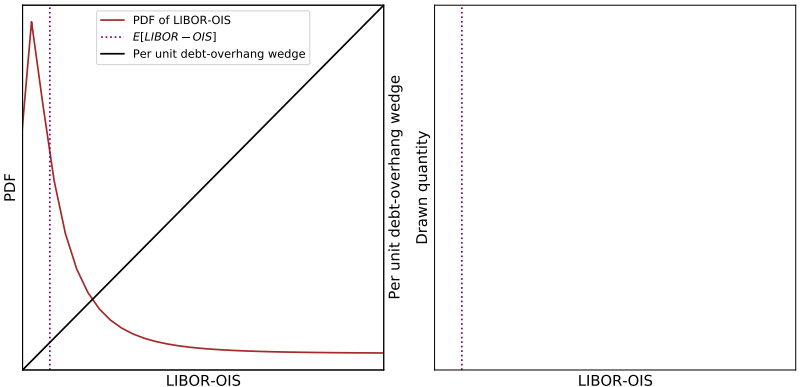
· Risk-neutral

· Chooses line limit and drawn amount

· Liquidity shocks correlate with bank funding spread

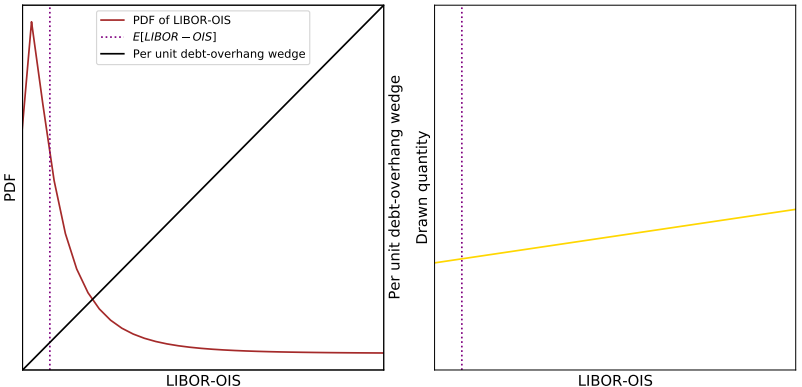
· No default risk

Credit provision and reference rates



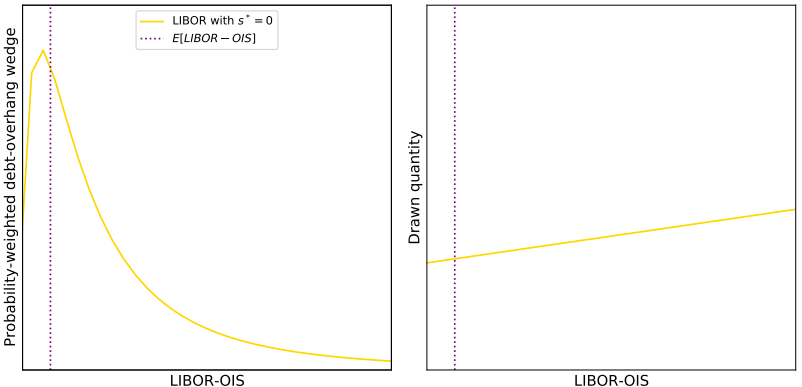
- **Key friction:** bank funding spread above the risk-free rate

Credit provision and reference rates



- Under risk-sensitive reference rate: spread $s = 0$, credit limit L is indeterminate

Credit provision and reference rates



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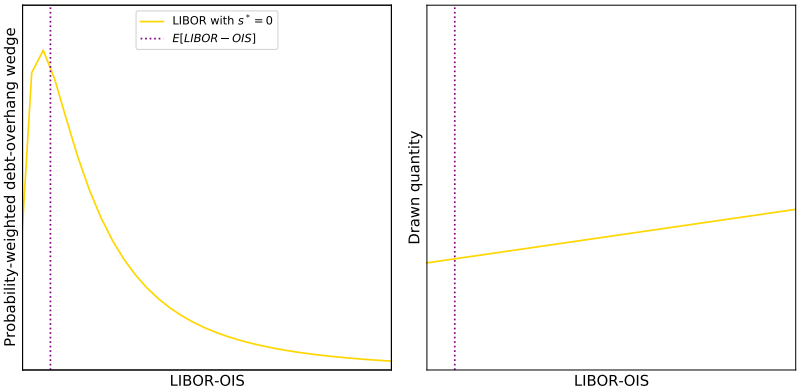
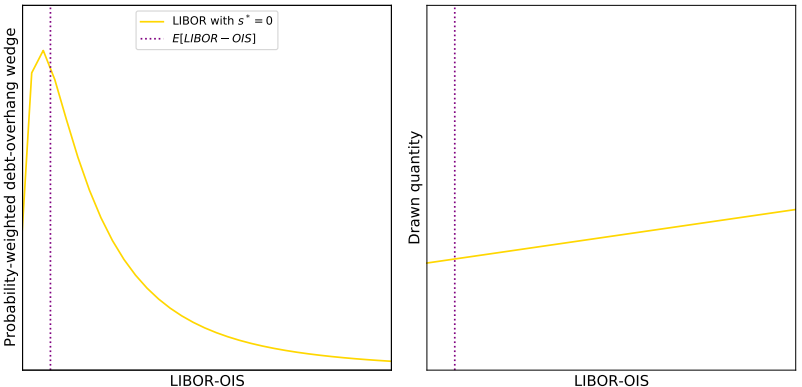
Credit provision and reference rates



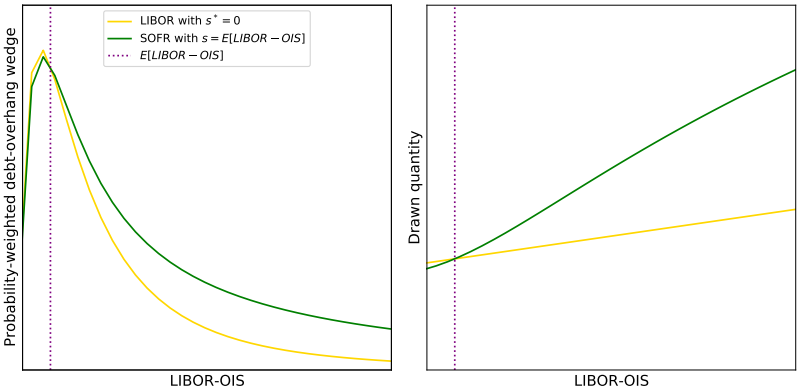
- **Thought experiment:** reference rate cannot vary across states

Credit provision and reference rates



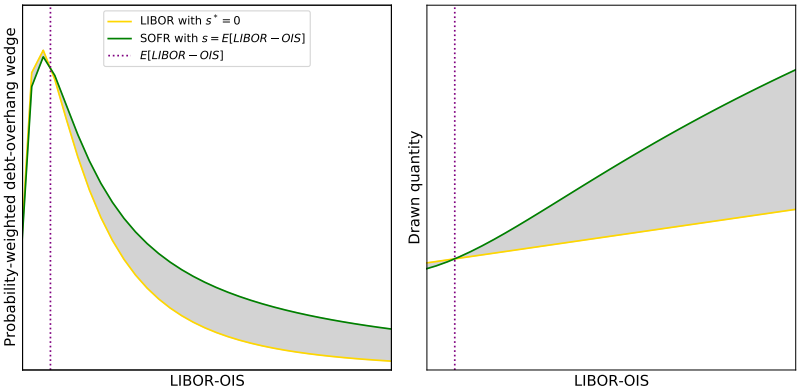
- **Thought experiment:** Assume $s = E[LIBOR - OIS]$

Credit provision and reference rates



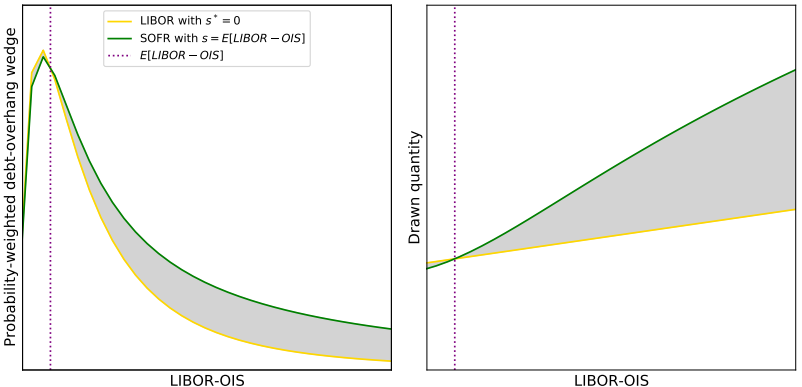
→ Borrower will draw more when bank funding costs are high

Credit provision and reference rates



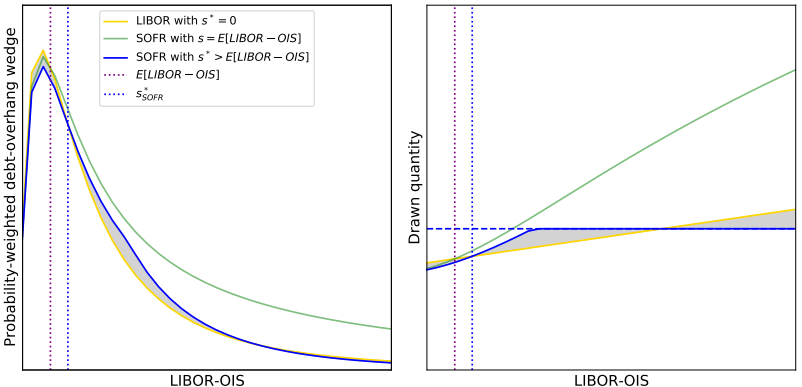
→ Expected debt-overhang wedge increase

Credit provision and reference rates



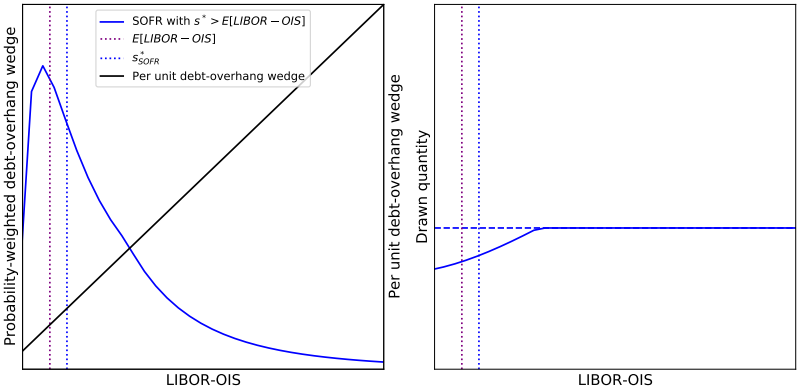
→ Bank will adjust menu: increase spread s for a given limit L

Credit provision and reference rates



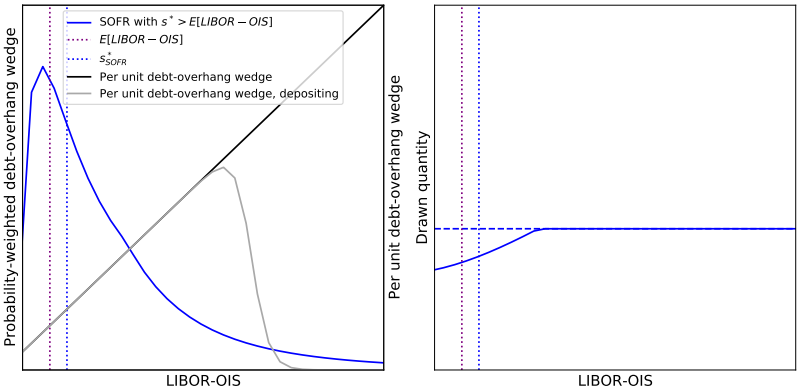
$\rightarrow$ Credit limit emerges, higher cost of credit $s^* > E[LIBOR - OIS]$

Credit provision and reference rates: the role of depositing



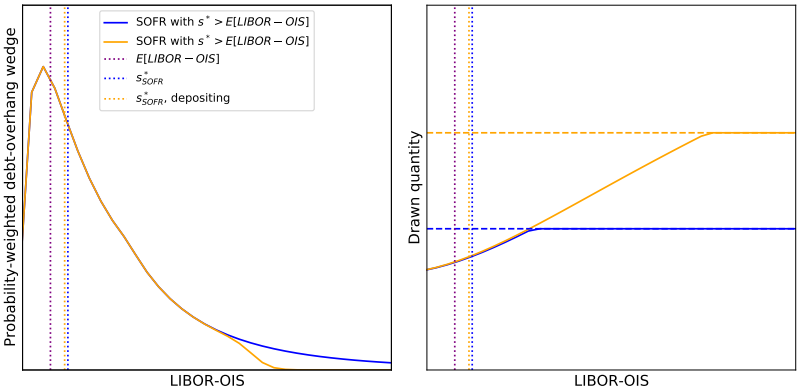
- Thus far, we assumed that all draws need to be funded at LIBOR-OIS

Credit provision and reference rates: the role of depositing



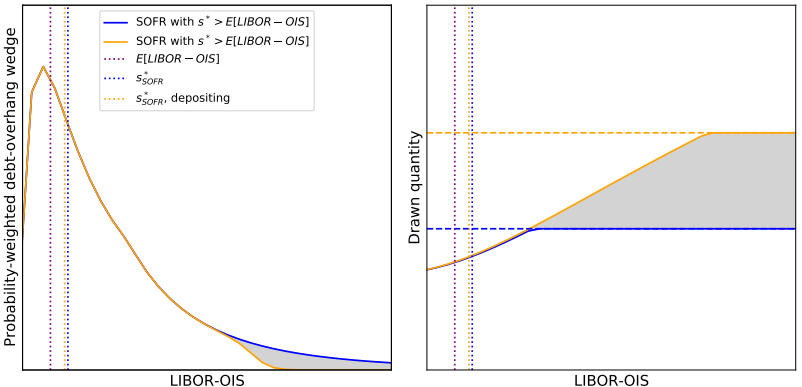
- **Thought experiment:** draws in bad states are precautionary (on deposit)

Credit provision and reference rates: the role of depositing



→ Reduction in debt-overhang wedge

Credit provision and reference rates: the role of depositing



→ Bank willing to provide more credit

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Data

- FR2052a:
  - Detailed BHC-level information for assets and liabilities.
  - Frequency: Monthly (banks $>$ \$100B in assets) and daily (GSIBs).
- Y14-Q Schedule H1:
  - Detailed loan-level information for C&I larger than \$1 million.
  - All BHCs with more than \$100B in assets.
- FR2420:
  - Wholesale funding and corporate deposit rates.
- Other publicly available data:
  - Bloomberg, FR-Y9C, RateWatch, FHLB Des Moines historical rates file, Compustat, Capital IQ, etc.

Substantial bank funding risk from pre-committed credit

Loan Type	Util ($B)	Comm ($B)	% Utilized	No. Banks
Credit Line	543.76	1876.39	28.98	20
Term Loan	310.37	375.26	82.71	20

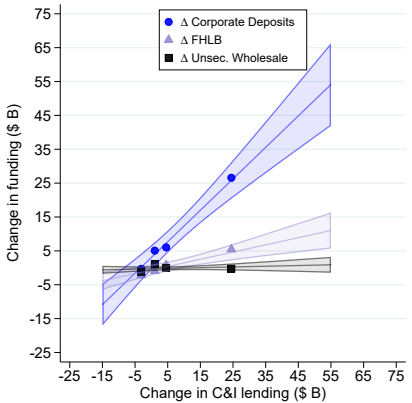
Source: FR Y-14Q Schedule H1 B as of 2019q4.

- Largest 20 BHCs alone have $1.3 trillion unfunded commitmens
- During stress periods, when bank credit spreads are high, corporations draw down on credit lines.
  - Around 7% increase of total CI lending during GFC
  - Around 20% increase during COVID recession
- Acharya, Engle, and Steffen (2022).

Drawdowns during COVID were precautionary.

Bank-level evidence:

- $1 increase in drawdowns → 89 cents increase in corporate deposits.
- Remaining amount raised via FHLB advances.
- No use of unsecured wholesale funding.

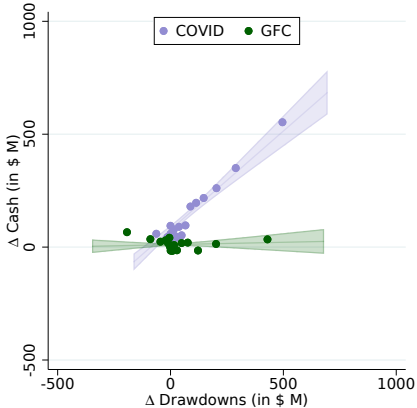


Binned scatterplot. 4 bins in each series across 24 banks which implies 6 banks per bin. Data Source: FR2052a.

Unlike during COVID, drawdowns during GFC were bank-funded.

Borrower-level evidence:

- COVID:
  - $1 increase in drawdown → 84 cents increase in deposits.
- GFC:
  - $1 increase in drawdown → 0 cents increase in deposits.
  - In line with Ivashina and Scharfstein (2010) and Acharya and Mora (2014).



Data Source: FR Y14Q, Compustat, Capital IQ.

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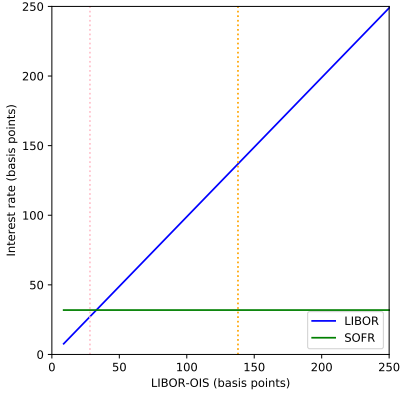
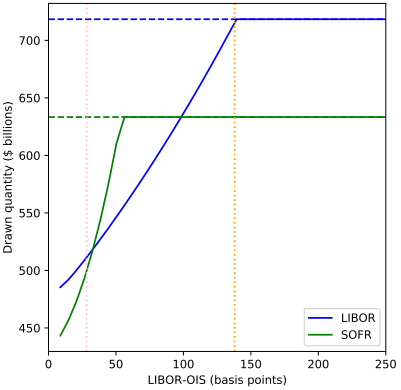
The effect of the LIBOR-SOFR transition on credit line prices and quantities.





Parameterization

Key Findings

1. **Theoretically:**
   - Debt-overhang wedge implies a risk-free borrower pays a premium on revolving credit indexed to SOFR (compared to LIBOR) but not on term loans.
   - Mitigated to the extent drawdowns are pre-cautionary as opposed to bank-funded

2. **Empirically:**
   (i) Bank funding risk from pre-committed credit is substantial.
   (ii) Drawdowns during COVID were precautionary; drawdowns required bank funding during GFC.

3. **Quantifying the effect of the LIBOR-SOFR transition**:
   - Moderate increase in expected funding cost.
     - Approx. 5-15 bps higher spread in normal times.
     - Approx. 50-100 bps lower spread during distress.

   $\rightarrow$ But less funding available during distress.

Parameterization

- $C = 0.06$, $\alpha = 0.25$, $r = 0$, $f = 0.0003$.
- $S = \theta W$, $\theta = 1$, $\psi = K(W)$.
- $b(q, S) = \psi \log(q - \underline{q}) + (1 - \Phi(W))q$.
- $\Phi = \frac{D}{1+e^{-m(x-w_0)}}$, with $D = 1$, $m = 0.223$, and $w_0 = 130$ basis points.
- $K(w) = \delta(w + s(L))(\lambda e^{\eta w} - \underline{q})$, with $\lambda = 465.71$, $\eta = 0.003089$, and $\underline{q} = 430$ (where q is measured in billions of dollars and w is measured in basis points).
- $\log S$ is Gaussian with mean -6.416 and standard deviation 0.892.
- Vertical gray dotted lines are shown at the sample average of LIBOR-OIS (28 basis points) and at the 140 bps level of LIBOR-OIS reached in the COVID shock of March, 2020.