Risk Taking and Interest Rates: Evidence from Decades in the Global Syndicated Loan Markets

Seung Jung Lee
Federal Reserve Board

Lucy Liu
International Monetary Fund

Viktors Stebunovs
Federal Reserve Board

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The views expressed in this paper are the responsibility of the authors and not of the Federal Reserve System or the International Monetary Fund.

Introduction

- We study risk taking in the markets for cross-border corporate loans before and after the Global Financial Crisis
- We focus on changes in riskiness of loans made by lenders to non-U.S. borrowers in response to changes in U.S. interest rates and other factors
- To the extent that the Fed's actions affect U.S. interest rates, we examine risk taking channels of monetary policy that operate either through cost of funds or through returns on safe, longer-term assets
- Before the crisis, lenders originated riskier loans in response to a decline in short-term U.S. interest rates, and, after it, in response to a decline in longer-term U.S. interest rates
- Indicated limitations for some non-U.S. central banks' actions in affecting credit risk cycles in their jurisdictions

Place in the literature

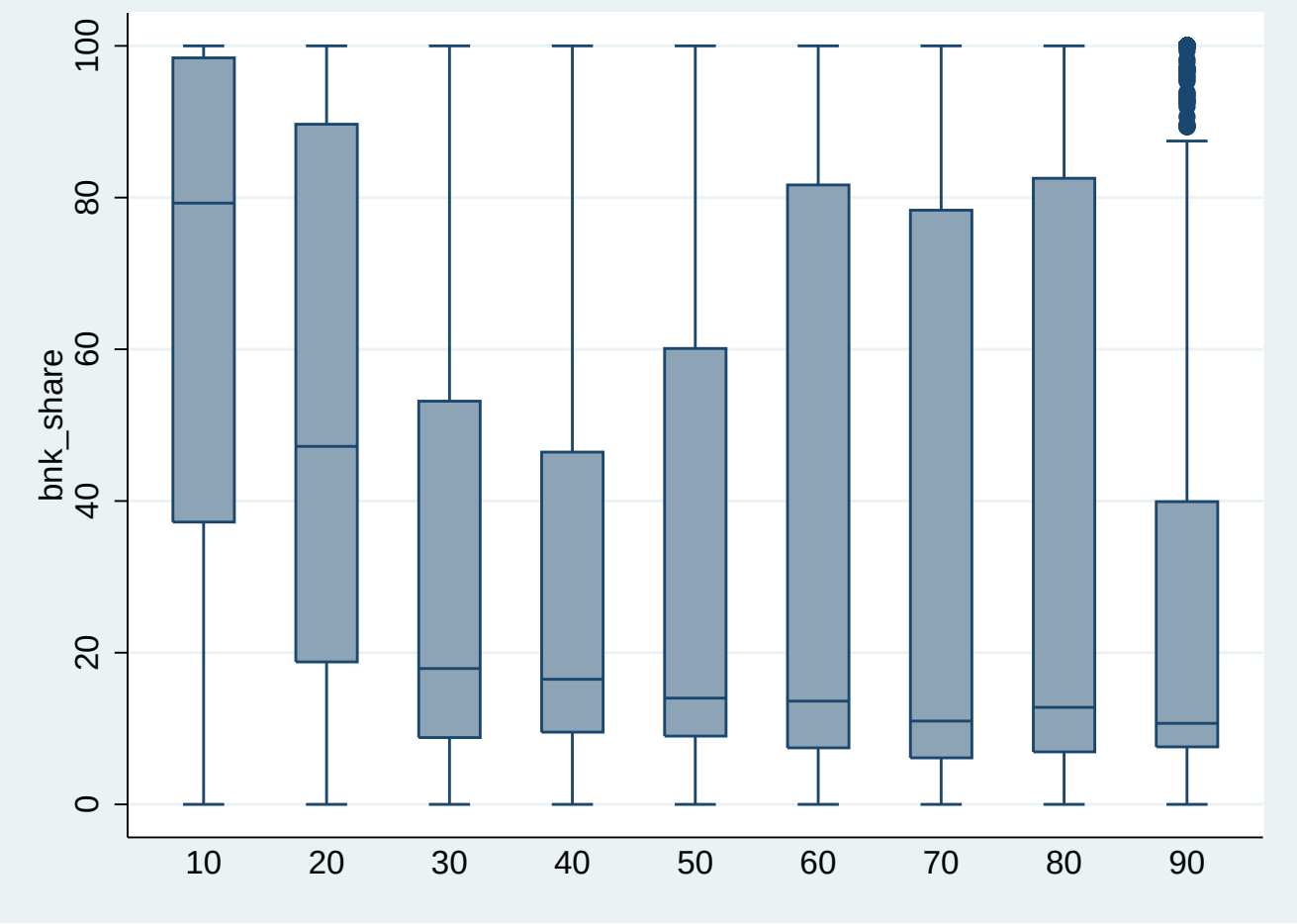
- Literature on capital flows and on risk-taking channels of monetary policy
- Limited work on credit risk of capital flows and its determinants
- Risk-taking channels of monetary policy: Focus on the short-term cost-of-funds channel (through banks)
- And less so on the returns-on-safe-assets channel (through banks and nonbanks)
    - Aramonte, Lee, and Stebunovs (2015): Risk taking in the U.S. syndicated term loan market in the post-crisis period
- We motivate two risk-taking channels through portfolio theory
- And study credit risk of loans made in the global syndicated term loan market over the last two decades

Syndicated Term Loan Market

- Focus on U.S. dollar-denominated loans with interest rates indexed to the U.S. dollar LIBOR
- Large volumes = significant market ($2 trillion in issuance compared to $1.6 trillion in bond issuance in 2013)
- Banks originate and distribute a large majority of loans to nonbanks = risk taking representative of the financial system
- Good data on prices (spreads) of loans = a good proxy for ex-ante credit risk
- Because of the global nature of the market
  - Analyze spillover effects of U.S. interest rates on risk taking by non-U.S. lenders when lending to non-U.S. borrowers
  - Address potential endogeneity of ex-ante credit risk and interest rates—a separation of interest rate-credit risk cycles

Risk Taking Representative of the Financial System

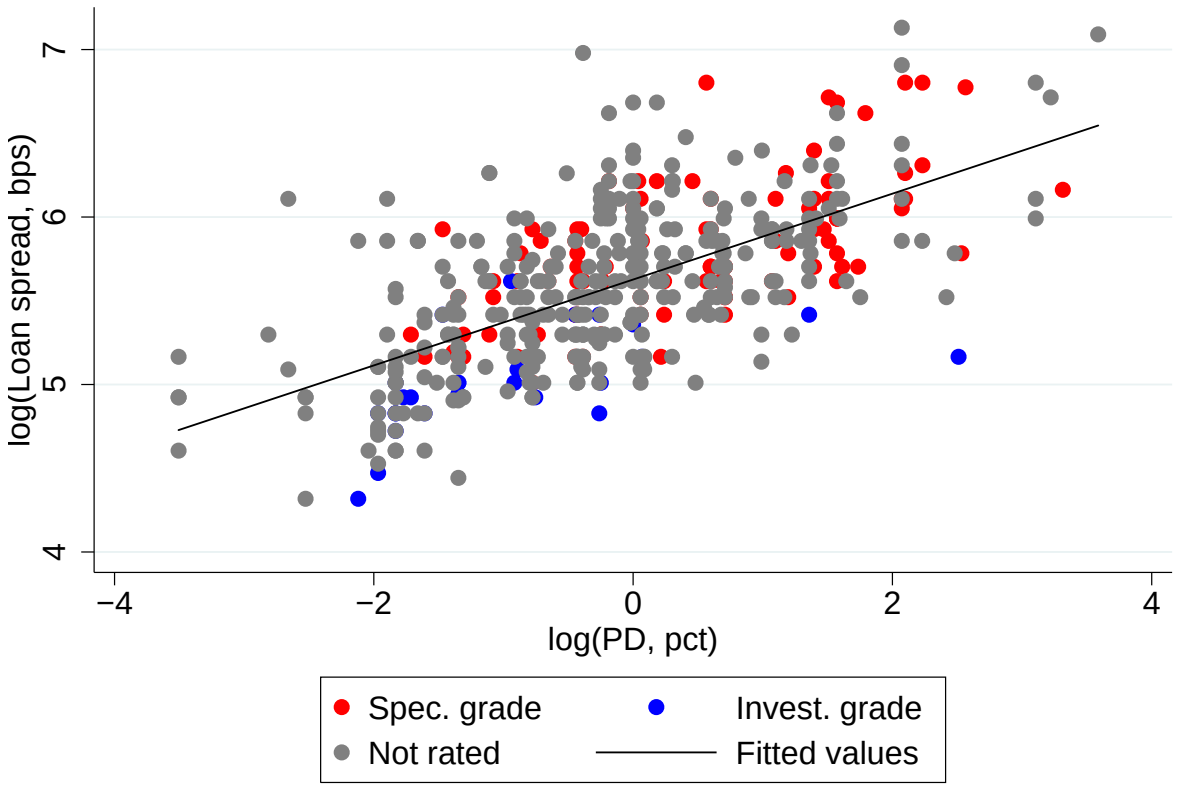
- Bank shares in term loans: The median share drops from 80 percent at origination to 10 percent in 3 months



Days since origination (10-day intervals)

Source: Quarterly Shared National Credit (SNC), 2010–2013

Loan Spreads as Proxies for Ex-ante Credit Risk



- We merge DealScan data with quarterly SNC over 2010–2013

$$\log(SPR_{i,t}) = \alpha + \beta \log(PD_i) + \boldsymbol{F_{i,t}}\theta + \varepsilon_{i,t}$$

- $SPR_{i,t}$ is a spread (price) of loan i made in quarter t; PD_i is loan i's default probability; $\boldsymbol{F_{i,t}}$ other variables/fixed effects

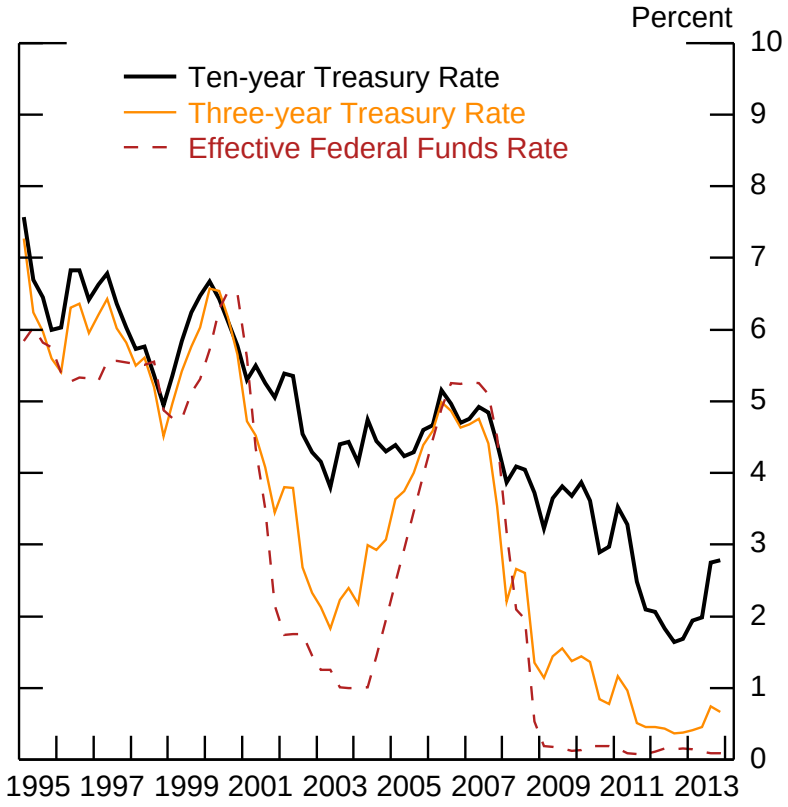
Loan Spreads as Proxies for Ex-ante Credit Risk

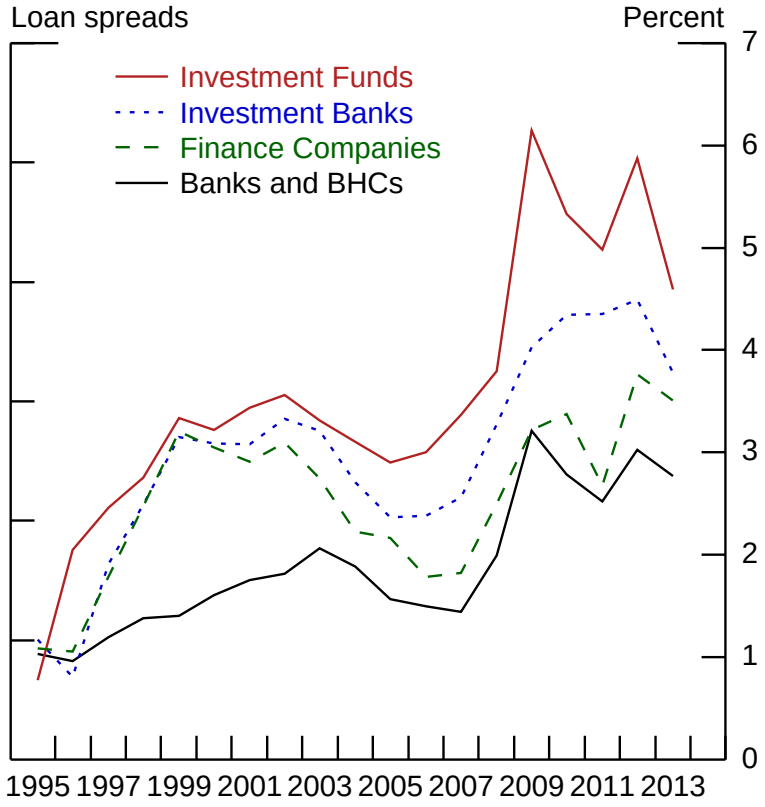
	(I)	(II)	(III)	(IV)
log(PD, pct)	0.231***	0.229***	0.225***	0.204***
	(10.77)	(10.37)	(11.94)	(11.91)
VRP, pct, sq.		0.012**	0.011**	0.007**
		(2.14)	(2.49)	(2.65)
Fixed effects	no	no	agent/year	agent/year borr'r/year
Error clustering	by quarter	by quarter	by quarter	by quarter
Observations	709	709	709	709
R-sq. adjusted	0.40	0.42	0.48	0.54

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

- Variation in spreads primarily reflects credit risk, not compensation for risk aversion (VRP—VIX-based variance risk premium)
- Adding loan characteristics explain a lot more (adj. R-sq. > 0.65)
- Spreads may be a better credit risk proxy than PDs (sufficient statistics)

U.S. Interest Rates and Syndicated Term Loan Spreads





- Short-term rates low over 2002-2004 and after 2008; longer-term rates low after 2008
- Nonbanks tend to originate loans with higher spreads
- Spreads appear to be negatively correlated with U.S. interest rates

Portfolio Model of Risk Taking

- Portfolio theory framework for different types of lenders
- Risk-averse lender's utility maximization problem

$$\max_{l, r_C} \underbrace{(1-q)R_L l + R_T(1-l) - R_C}_{\text{Net expected return}} - \underbrace{\frac{1}{2}Aq(1-q)R_L^2 l^2}_{\text{Return variance}}$$

$$\text{s.t.} \quad \underbrace{R_C \geqslant R^*(1-l) + \frac{R^*}{1-q} l}_{\text{Funding-related constraint}}$$

- Borrow \$1 at R_C and invest l in risky assets with PD q and return $(1-q)R_L$ and $(1-l)$ in safe asset with return R_T
- The constraint: $R_C \geqslant$ payoffs from safe short-term interest R^*
- Cost-of-funds channel: $\partial \hat{l} / \partial R^* < 0$
- Safe-returns channel: $\partial \hat{l} / \partial R_T < 0$
- Robust to adding demand for syndicated loans

Specification for Credit Risk of Loan Originations

$$log(SPR_{i,t}) = \alpha_i + \beta_F R_t^F + \beta_T R_t^T + \gamma_{CDR} CDR_t + \gamma_{HYSPR} HYSPR_t + \gamma_{VRP} VRP_t + \boldsymbol{X_t \gamma_X} + \varepsilon_t$$

- $SPR_{i,t}$ is the weighted-average spread for loans made by lender i at time t
- R^F is the fed funds rate and R^T is the 10-year treasury rate
- CDR is speculative grade default rate, $HYSPR$ is high-yield bond spread, and VRP is VIX-derived variance risk premium
- $\boldsymbol{X_t}$ includes European sovereign spread, news-based uncertainty index, and others
- Estimate for pre 2007:Q3 and post 2009:Q2 periods separately and jointly
- And over various combinations of lenders and borrowers by their location

Results for Credit Risk of Loan Originations: Subsamples

- Results for non-U.S. lending to non-U.S. borrowers

	Pre-2007:Q3	Pre-2007:Q3	Pre-2007:Q3	Post-2009:Q2
R^F	-0.042***		-0.041***	
R^T		-0.057**	-0.007	-0.171*
CDR	0.029**	0.031**	0.030**	0.024**
$HYSPR$	-0.016	-0.022	-0.017	0.044
VRP	0.001	-0.000	0.001	0.002
Error clustering	by quarter	by quarter	by quarter	by quarter
Observations	10747	10747	10747	3420
Lenders	1265	1265	1265	563
R-sq. overall	0.49	0.49	0.49	0.53

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, other regressors not shown

- Post-2009:Q2: The results are implicitly conditional on low fed funds rates

Results for Credit Risk of Loan Originations: Full sample

- Results for non-U.S. lenders lending to non-U.S. borrowers

	Full sample
R^F	-0.041***
$Post2008 \times R^F$	0.438
R^T	-0.030
$Post2008 \times R^T$	-0.127***
CDR	0.023***
$HYSPR$	0.014
VRP	0.002**
Error clustering	by quarter
Observations	15639
Lenders	1466
R-sq. overall	0.56

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, other regressors not shown

- In the pre crisis period, the Fed tightly controlled the fed funds rate; after it, evidence that the Fed's policies reduced U.S. Treasury rates

Marginal Effects: Economically significant

- Marginal effects using median *SPR* for sample of non-U.S. lenders lending to non-U.S. borrowers

$$\Delta(SPR_{i,t}) = SPR_{i,t}\beta\Delta R_t, SPR = 134bps$$

Increase in loan spreads due to one ppt decrease in U.S. interest rates

	(1)	(2)	(3)	
	Pre-2007q3	Post-2009q2	1995-2013	Post-2008
Fed. funds rate	6 bps	——	6 bps	insig.
10-year Treas. rate	insig.	23 bps	insig.	17 bps

- Can go further: One ppt decrease in U.S. 10-year Treasury rates may result in over one ppt increase loan PDs—a notable increase in ex-ante credit risk

Other empirical results

- Results hold for
  - Other combination of lenders and borrowers by their location
  - Continuously active lenders (originating loans in every quarter in our sample)
  - Bank and nonbank lenders
- Results appear to be stronger for speculative-grade loan originations
- Work in progress: Results may hold for loans denominated in other currencies and other interest rates (the euro)

Conclusions

- Use syndicated term loan data to explore risk taking by the broader financial system at loan originations
- Loan spreads mostly reflect ex-ante credit risk
- There is always some form of risk taking and search for yield
- Cost-of-funds channel: Operational during 1995–2007
- Safe-returns channel: Operational only after 2008, more economically significant
- International spillovers: Limitations for some non-U.S. central banks' actions in affecting credit risk cycles in their jurisdictions
- Caveats: Lenders may hedge exposures & stronger safe-returns channel may be partly due to expansive monetary policy of other countries