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

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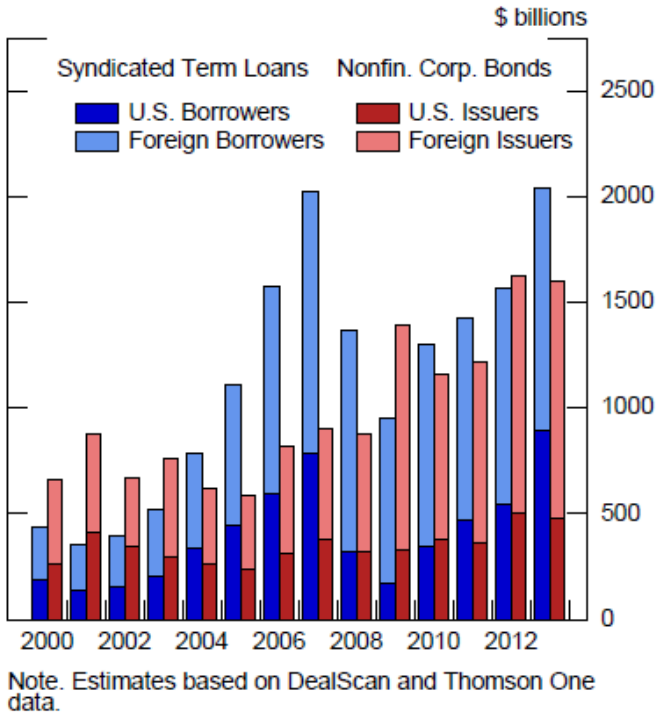
Introduction

- How interest rates in the United States and other factors affect risk taking in the market for cross-border corporate loans? Is there evidence on the global lending and risk-taking channels?
- Before the Global Financial Crisis, banks made ex-ante riskier loans to non-U.S. borrowers in response to a decline in U.S. short-term interest rates, and, after it, both banks and nonbanks made such loans in response to a decline in U.S. longer-term interest rates.
- Economic uncertainty, risk appetite, and the U.S. dollar exchange rate play a limited role in explaining ex-ante credit risk.
- To the extent that actions of the Federal Reserve affect U.S. interest rates, evidence of cross-border spillover effects of U.S. monetary policy.
- Highlight the potential policy challenges faced by central banks in affecting credit risk cycles in their own jurisdictions.

Literature and Contribution

- Cross-border bank lending as a potential channel through which monetary conditions in one country affect capital flows and credit growth in the global financial system.
  - Focus on the direction and magnitude of cross-border flows; little has been done to study the riskiness of these flows.
  - Quantitative measures of risky assets may not be sufficient to detect financial vulnerability as risk taking in the financial sector involves quality rather than the quantity of assets—see Kalemli-Ozcan, Sorensen, and Yesiltas (2012).
- Risk taking channel of monetary policy—numerous theoretical and empirical contributions.
  - Focus on banks' risk taking in home markets in response to short-term interest rates.
- Here: Using market-based measures of credit risk, examine how changes in short- and long-term U.S. interest rates and other factors affect risk taking by banks and nonbanks in the global syndicated term loan market.

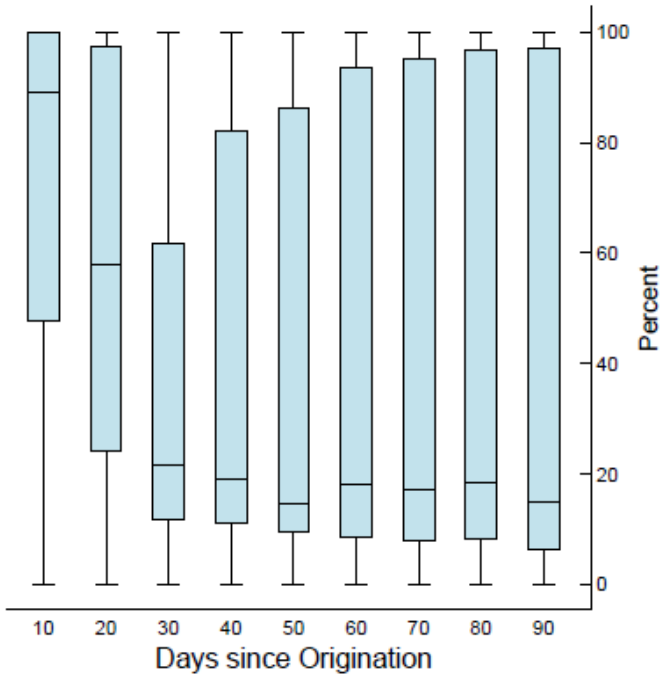
Issuance of bonds and originations of loans



Note. Estimates based on DealScan and Thomson One data.

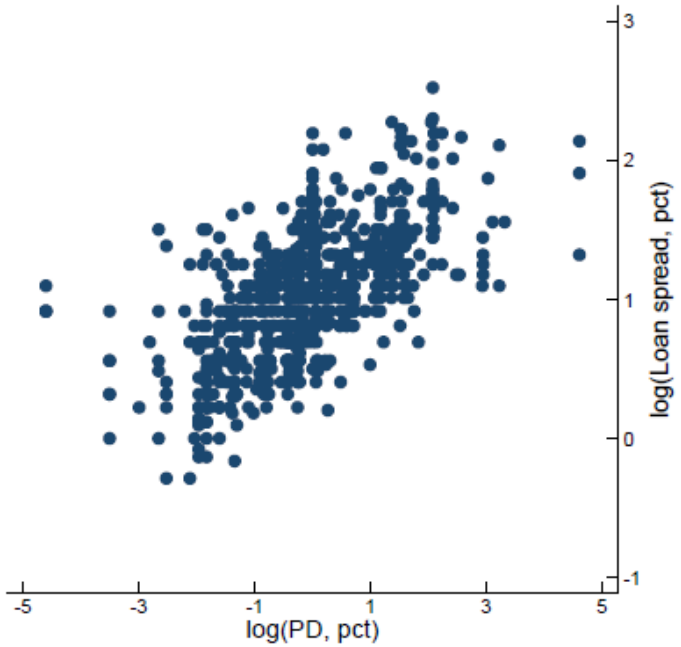
- A syndicated term loan is made for a duration of 5-7 years by a group of lenders to a nonfinancial borrower at an interest rate that is indexed to a short-term benchmark interest rate.
- Focus on syndicated term loans that are denominated in U.S. dollars, indexed to the U.S. dollar LIBOR, and originated in the global market.
- Originations of syndicated term loans ($2 trillion in 2013) are comparable in size to issuance of nonfinancial corporate bonds ($1.6 trillion).
- It is a market for risky assets: IG-rated borrowers account for just a small fraction of term loan originations.
- Risk taking representative of the global financial system's: Lenders and borrowers from around the world—both from AFEs and EMEs.

Ownership of syndicated term loans at origination and over time



- Based on syndicated term loans made in the United States in the past several years.
  - Similar data for the global market are believed not to exist.
- A sequence of box plots for bank ownership shares at different time intervals since loan originations.
- Risk taking representative of the broader financial system's: Banks originate and quickly sell off stakes in loans to shadow banks (funds, structured products, and others).
- In this market, attributing risk taking solely to banks may be highly misleading.

Loan spreads and probabilities of borrower default



Note. Based on merged SNC and Dealscan data.

- Based on syndicated term loans made in the United States in the past several years that are captured by U.S. supervisory data.
- A loan spread over the index interest rate: Good proxy for a loan's ex-ante credit risk and other risk characteristics.
  - Loan spreads that are fixed at origination for the duration of loans are highly positively correlated with through-the-cycle probabilities of borrower default over a one year horizon.

Loan spreads and probabilities of borrower default

$$log(spread_{j,l,b,t}) = \alpha_l + \delta_{PD} log(PD_{j,b,t}) + Q_{j,t}\delta_Q + \beta_T R_t^T + X_t\gamma + \theta_{l,y} + \theta_{b,i,y} + \varepsilon_{j,l,b,t}$$

	(1) PD	(2) Loan char.	(3) Macro/Bank FE	(4) Bank FE/Borr. FE
log(PD, pct)	0.231***	0.206***	0.190***	0.189***
Other loan characteristics		*Signif.*	*Signif.*	*Signif.*
U.S. int. rates, other macro			*Insignif.*	*Insignif.*
Reporting bank-year fixed effects	*No*	*No*	*Yes*	*Yes*
Borrower industry-year fixed effects	*No*	*No*	*No*	*Yes*
Num. of observations	709	709	709	709
R-sq. adj.	0.40	0.50	0.56	0.57
RMSE	0.37	0.34	0.32	0.31

t statistics in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$.
Note. Based on DealScan loans matched with the Shared National Program data. Dependent variable is log(loan spread, pct) of loan j reported by agent bank l in quarter t.

- Note: j, l, b, t stand for loan, lender, borrower, and time; Q for loan characteristics; R^T and X for U.S. long-term interest rates and other macro factors.
- Macro variables—including risk appetite—explain little when we control for probabilities of default (PDs).
- Loan spreads are more comprehensive proxies of risk that PDs.

Syndicate regressions

- What factors affect risk taking in the market for cross-border corporate loans?
- DealScan data that captures loan information at origination.
- Sample on an "ultimate" lender/borrower basis at a quarterly frequency excludes U.S. borrowers and in many instances U.S. lenders to help with identification.

$$log(spread_{j,l,b,t}) = \alpha_l + \alpha_b + \underbrace{\beta_F R_t^F + \beta_T R_t^T + X_t\gamma}_{h.f.\ push\ factors} + \underbrace{\theta_{l,c,y} + \theta_{l,i,y}}_{l.f.\ push\ factors} + \underbrace{\theta_{b,c,y} + \theta_{b,i,y}}_{l.f.\ pull\ factors} + \phi_{j,t} + \varepsilon_{j,l,b,t}$$

- Note: j, l, b, t stand for loan, lender, borrower, and time as before and c, i, and y for region, industry, and year.
- Focus on macro push factors: R^F is the U.S. federal funds rate, R^T the 10-year U.S. Treasury rate, and X are macro factors which include the U.S. dollar exchange rate.
- Include lower-frequency (annual) fixed effects to capture lenders' types and regions.
- Pull factors are captured by lower-frequency (annual) fixed effects for borrowers' industries and regions.

Syndicate regressions: Loans made by all lenders to non-U.S. borrowers

	(1) Pre-crisis	(2) Post-crisis	(3) Full
Fed. funds rate, pct	−0.062**		−0.075***
10-year Treas. rate, pct	0.037	−0.150***	−0.010
Variance risk premium, pct sq.	0.002	−0.005	0.000
European sovereign spread, pct	0.014	−0.108***	0.003
Expected inflation, pct	−0.036	0.241***	0.043*
Low-grade bond spread, pct	0.099**	0.127***	0.041***
News-based uncertainty index	−0.003***	−0.000	−0.001***
U.S. dollar exch. rate (broad)	0.004	0.044***	0.009**
Post-2008 × 10-year Treas. rate, pct			−0.011
Post-2008			0.498**
Num. of observ.	61507	18687	89655
Num. of clusters	50	18	76
R-sq. within	0.34	0.31	0.42
RMSE	0.31	0.18	0.32

t statistics in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$.
Note. Based on U.S. dollar term loans made by all lenders to non-U.S. borrowers. Dependent variable is log(loan spread, pct) of loan j in quarter t made to borrower b from country b, c in industry b, i by lender l of type l, i from country l, c. Included controls: Syndicate composition, lender type-year FEs, lender country-year FEs, borrower industry-year FEs, borrower country-year FEs, and dummy for crisis quarters.

- To the extent that the Federal Reserve controls U.S. interest rates, international risk taking spillovers from U.S. monetary policy.
- Riskier loans made to non-U.S. borrowers in response to decline in the funds rate before the crisis and in the 10-year U.S. Treasure rate after it. Other factors appear to play a more limited role.
- Post crisis "marginal effects": Credit rating specific, small for IG-rated borrowers, material for others.
- The same results for loans made by:
  - U.S. lenders to non-U.S. borrowers—outward transmission of U.S. monetary policy.
  - Non-U.S. lenders to EME borrowers—strongest case for identification, indirect outward transmission of U.S. monetary policy.

Portfolio regressions

- Lenders tend to make risk taking decisions in terms of credit risk of loan portfolios not just individual loans.
- Focus on loan portfolios made by each lender to borrowers in AFEs and in EMEs.

$$log(pspread_{bc,l,t}) = \alpha_{bc} + \alpha_l + \underbrace{\beta_F R_t^F + \beta_T R_t^T + \gamma X_t}_{h.f.\ push\ factors} + \underbrace{\theta_{l,c,y} + \theta_{l,i,y}}_{l.f.\ push\ factors} + \underbrace{\theta_{bc,y}}_{l.f.\ pull\ factors} + \varepsilon_{l,b,t}$$

- Note: bc stands for borrower region, other indexes as before.
- Pspread is the average loan spread for a portfolio of loans that a lender made to borrowers in a certain region at a certain time.
- By design, more limited options for pull factors.

Portfolio regressions: Loans made by all lenders to non-U.S. borrowers

	(1) Pre-crisis	(2) Post-crisis	(3) Full
Fed. funds rate, pct	−0.028*		−0.036***
10-year Treas. rate, pct	0.040*	−0.219**	0.036
Variance risk premium, pct sq.	0.002	0.002	0.002*
European sovereign spread, pct	−0.015	−0.049	−0.037**
Expected inflation, pct	0.005	0.088	0.021
Low-grade bond spread, pct	0.019	0.032	0.037***
News-based uncertainty index	−0.002**	−0.002**	−0.002***
U.S. dollar exch. rate (broad)	0.002	0.016	−0.004
Post-2008 × 10-year Treas. rate, pct			−0.214***
Post-2008			1.327***
Num. of observ.	14675	4791	21591
Num. of lenders	1690	675	1974
Num. of clusters	50	18	76
R-sq. within	0.15	0.12	0.32
RMSE	0.49	0.38	0.48

t statistics in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$.
Note. Based on U.S. dollar term loans originated in the global market to non-U.S. borrowers. Dependent variable is log(average spread of loan portfolio, pct) of lender l from country l, c of type l, i made to borrowers from country b, c in quarter t. Included controls: Lender type-year FEs, lender country-year FEs, borrower country-year FEs, and dummy for crisis quarters.

- Similar findings as for the syndicate regressions.
- Riskier loans made to non-U.S. borrowers in response to decline in the federal funds rate before the crisis and in the 10-year U.S. Treasure rate after it.
- News-based uncertainty appears to play a more consistent role across the periods.
- Caveats apply to all our regressions:
  - Lenders may hedge their syndicated loan risk exposures in other markets.
    - Because hedges are sold by other financial institutions, the broader financial system can be still strained to cope with additional credit risk.
  - Do not observe all assets of lenders in the sample.

Portfolio regressions: Loans made by banks and shadow banks

	(1) Pre-crisis	(2) Post-crisis	(3) Full
Bank×Fed. funds rate, pct	−0.029**		−0.036***
Nonbank×Fed. funds rate, pct	0.000		−0.016
Bank×10-year Treas. rate, pct	0.044*	−0.224**	0.040*
Nonbank×10-year Treas. rate, pct	0.008	−0.207**	0.010
Bank×10-year Treas. rate, pct×Post-2008			−0.224***
Nonbank×10-year Treas. rate, pct×Post-2008			−0.147*
Post-2008			1.362***
Others not shown	...	...	...
Num. of observ.	14098	4672	20844
Num. of groups.	1343	610	1563
Num. of clusters	50	18	76
R-sq. within	0.15	0.12	0.32
RMSE	0.49	0.38	0.48

t statistics in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$.
Note. Note. Based on U.S. dollar term loans originated in the global market to non-U.S. borrowers. Dependent variable is log(average spread of loan portfolio, pct) of lender l from country l, c of type l, i made to borrowers from country b, c in quarter t. Included controls: Lender type-year FEs, lender country-year FEs, borrower country-year FEs, and dummy for crisis quarters.

- Separate regression coefficients on U.S. interest rates for banks and nonbank financials estimated on portfolios of loans made to non-U.S. borrowers.
- Differences in the global risk taking channels before and after the Global financial crisis:
  - Before the crisis, banks' risk taking was sensitive to the federal funds rate.
  - After the crisis, banks and nonbanks' risk taking was driven by the 10-year U.S. Treasury rate.
- Robustness checks: Immediate lenders and borrowers; most active lenders; leveraged vs IG-grade loan portfolios.

Conclusions

- Findings suggest the existence of the global risk-taking channel of U.S. monetary policy.
  - Lower interest rates in the United States encourage risk taking by U.S. and non-U.S. banks and shadow banks in other countries.
- Such spillovers highlight challenges faced by central banks, particularly those in EMEs, in affecting risk taking in lending and, more broadly, credit cycles in their respective jurisdictions.
  - The Federal Reserve's monetary policy easing meant to boost "productive" risk taking in the United States, not necessarily risk taking in other countries.
  - View that spillovers may not be necessarily desirable, no matter the credit cycle in other jurisdictions.
  - Room for international policy coordination to ensure financial stability.