Corporate Loan Spreads and Economic Activity

Anthony Saunders
NYU Stern

Alessandro Spina
Copenhagen Business School

Sascha Steffen
Frankfurt School

Daniel Streitz
IWH Halle; Jena; Copenhagen Business School

June 2021

Motivation

- Credit spreads widely used to forecast business cycle (e.g., Bernanke, 1990; Friedman and Kuttner, 1992, 1993; Gertler and Lown, 1999; Gilchrist and Zakrajšek, 2012; López-Salido, Stein, and Zakrajšek, 2017)

Motivation

- Credit spreads widely used to forecast business cycle (e.g., Bernanke, 1990; Friedman and Kuttner, 1992, 1993; Gertler and Lown, 1999; Gilchrist and Zakrajšek, 2012; López-Salido, Stein, and Zakrajšek, 2017)

- Motivated by the role of financial market frictions in propagating and amplifying shocks to the economy (e.g., Bernanke and Gertler, 1989; Kiyotaki and Moore, 1997)

Motivation

- Credit spreads widely used to forecast business cycle (e.g., Bernanke, 1990; Friedman and Kuttner, 1992, 1993; Gertler and Lown, 1999; Gilchrist and Zakrajšek, 2012; López-Salido, Stein, and Zakrajšek, 2017)
- Motivated by the role of financial market frictions in propagating and amplifying shocks to the economy (e.g., Bernanke and Gertler, 1989; Kiyotaki and Moore, 1997)
- Focus on corporate bond markets due to data availability but large part of the economy is dependent on bank debt

Motivation

- Credit spreads widely used to forecast business cycle (e.g., Bernanke, 1990; Friedman and Kuttner, 1992, 1993; Gertler and Lown, 1999; Gilchrist and Zakrajšek, 2012; López-Salido, Stein, and Zakrajšek, 2017)
- Motivated by the role of financial market frictions in propagating and amplifying shocks to the economy (e.g., Bernanke and Gertler, 1989; Kiyotaki and Moore, 1997)
- Focus on corporate bond markets due to data availability but large part of the economy is dependent on bank debt
- "*we have in mind that the pricing of credit risk in the bond market is [...] linked to the pricing of credit risk in the banking system. Although the former is easier for us to measure empirically, we suspect that the latter may be as or more important in terms of economic impact*" (López-Salido, Stein, and Zakrajšek, 2017)

Motivation

- Credit spreads widely used to forecast business cycle (e.g., Bernanke, 1990; Friedman and Kuttner, 1992, 1993; Gertler and Lown, 1999; Gilchrist and Zakrajšek, 2012; López-Salido, Stein, and Zakrajšek, 2017)

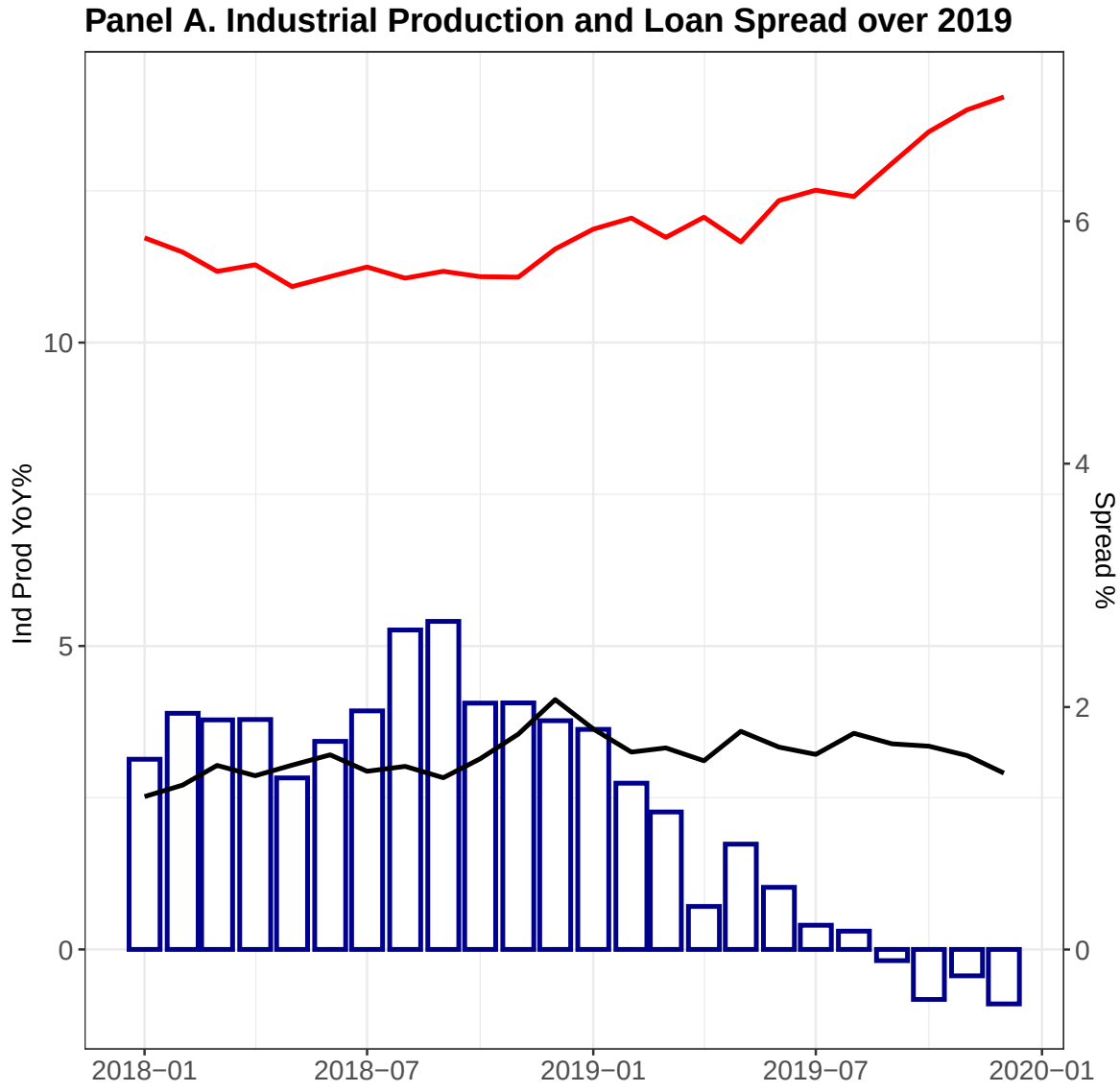
- Motivated by the role of financial market frictions in propagating and amplifying shocks to the economy (e.g., Bernanke and Gertler, 1989; Kiyotaki and Moore, 1997)

- Focus on corporate bond markets due to data availability but large part of the economy is dependent on bank debt

- "*we have in mind that the pricing of credit risk in the bond market is [...] linked to the pricing of credit risk in the banking system. Although the former is easier for us to measure empirically, we suspect that the latter may be as or more important in terms of economic impact*" (López-Salido, Stein, and Zakrajšek, 2017)

→ This paper: Novel dataset to explore the ability of corporate *loan* spreads to forecast economic developments

Motivation


Panel A. Industrial Production and Loan Spread over 2019
Ind Prod YoY%
Spread %
10
5
0
6
4
2
0
2018−01
2018−07
2019−01
2019−07
2020−01

This paper

1. We develop a new credit spread based on secondary loan market prices

This paper

1. We develop a new credit spread based on secondary loan market prices

- Useful? Yes!
  - Most firms don't have access to bond markets; countries with less developed capital markets; Goodhart's law

This paper

1. We develop a new credit spread based on secondary loan market prices

- Useful? Yes!
  - Most firms don't have access to bond markets; countries with less developed capital markets; Goodhart's law

- Key result: A 1 SD $\uparrow$ loan spread predicts a 0.41 SD $\downarrow$ industrial production. Twice the economic magnitude of the bond spread. Even when included jointly.

This paper

1. We develop a new credit spread based on secondary loan market prices

- Useful? Yes!
  - Most firms don't have access to bond markets; countries with less developed capital markets; Goodhart's law
- Key result: A 1 SD $\uparrow$ loan spread predicts a 0.41 SD $\downarrow$ industrial production. Twice the economic magnitude of the bond spread. Even when included jointly.
- Robust to:
  - Other economic aggregates; different time horizons; other benchmark measures; other countries; OOS

This paper

2. We investigate possible channels as to the loan spread's differential predictive power informed by theory

This paper

2. We investigate possible channels as to the loan spread's differential predictive power informed by theory

- We show the joint role of borrower and intermediary balance sheet constraints

This paper

2. We investigate possible channels as to the loan spread's differential predictive power informed by theory

- We show the joint role of borrower and intermediary balance sheet constraints
- 2/3 of the predictive power of the loan spread is coming from deterioration of borrower balance sheets.

This paper

2. We investigate possible channels as to the loan spread's differential predictive power informed by theory

- We show the joint role of borrower and intermediary balance sheet constraints
- 2/3 of the predictive power of the loan spread is coming from deterioration of borrower balance sheets.
- We can link this to borrower financial frictions (size, age, private, rating).
  - See e.g. Bernanke and Gertler (1989); Kiyotaki and Moore (1997); Gertler and Kiyotaki (2010)

This paper

3. We highlight possible benefits of exploring lower aggregation levels when forecasting economic outcomes.

This paper

3. We highlight possible benefits of exploring lower aggregation levels when forecasting economic outcomes.

- Bottom-up spreads are aggregated using simple means in the literature (e.g., Gilchrist and Zakrajšek, 2012; López-Salido, Stein, and Zakrajšek, 2017)

This paper

3. We highlight possible benefits of exploring lower aggregation levels when forecasting economic outcomes.

- Bottom-up spreads are aggregated using simple means in the literature (e.g., Gilchrist and Zakrajšek, 2012; López-Salido, Stein, and Zakrajšek, 2017)

- We document substantial cross-industry heterogeneity as to the predictive power of credit spreads.

This paper

3. We highlight possible benefits of exploring lower aggregation levels when forecasting economic outcomes.

- Bottom-up spreads are aggregated using simple means in the literature (e.g., Gilchrist and Zakrajšek, 2012; López-Salido, Stein, and Zakrajšek, 2017)
- We document substantial cross-industry heterogeneity as to the predictive power of credit spreads.
- We show that forecasts can be improved when incorporating alternative aggregation methods.

Data

- Daily secondary market prices (mid quotes) of loans from the Loan Syndication and Trading Association (LSTA)
  - 1999 to Q1 2020 period, U.S. non-financial firms, TL, >300,000 loan-month observations ($\sim$ 1,200 loans outstanding per month)
- LPC Dealscan matched to LSTA using LIN
  - Loan amount/spread $->$ cash flows + contract terms
- Bond information
  - Gilchrist and Zakrajšek (2012), TRACE and Mergent FISD
- Macro variables: FRED, Bureau of Economic Analysis (BEA), Bureau of Labour Statistics

▸ Loan Market - Volume ▸ Loan Market - Liquidity

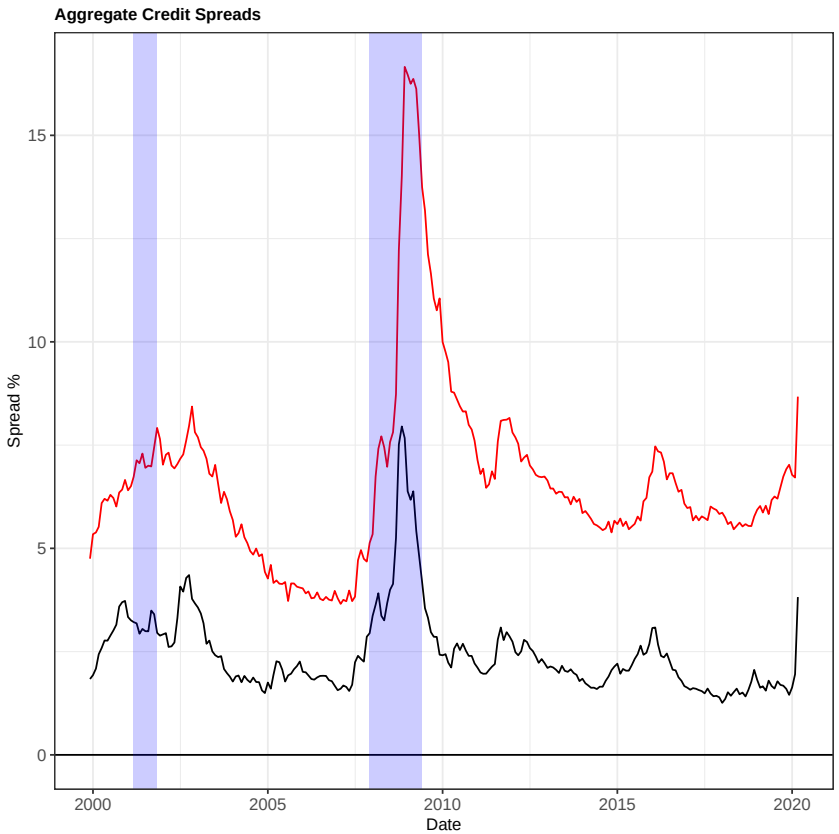
Constructing the aggregate loan spread

- "Bottom-up" spread (Gilchrist and Zakrajšek, 2012)
  - Qrt. cash flows: coupon using 3m forward LIBOR + AISD
    $\rightarrow$ yield-to-maturity $y_{it}[k]$
  - Synthetic risk-free loan w/ same cash-flow profile
    $\rightarrow$ yield-to-maturity $y^f_{it}[k]$
    - DCF using cont. comp. zero-coupon Treasury yields (Gürkaynak, Sack, and Wright, 2007)

$\rightarrow$ Loan spread (for each loan): $S_{it}[k] = y_{it}[k] - y^f_{it}[k]$

$\rightarrow$ Aggregate loan spread: $S^{Loan}_t = \frac{1}{N_t} \sum_i \sum_k S_{it}[k]$

Aggregate credit spreads (1999-2020)



- Aggregate loan and bond spreads.
- ρ=0.76 [ρ=0.65 ex '08-'09 financial crisis]
- Loan spreads are more volatile than bond spreads (σ=2.28% vs. σ=1.04%)
- Loan spreads an order of magnitude larger than bond spreads (different borrower types)

▸ Borrower Rating ▸ Borrower Size/Age

Forecasting economic developments

$$\Delta y_{t+h} = \alpha + \sum_{i=1}^{p} \beta_i \Delta y_{t-i} + \gamma_1 \Delta S_t + \lambda_2 TS_t + \lambda_3 RFF_t + \epsilon_{t+h},$$

- Δy is the log growth rate of industrial production (in this talk; various other macro variables in the paper)
- S_t is a credit spread $\{Loan, Bond\}$
- TS_t is the term spread and RFF_t real effective fed fund rate
- Estimated with OLS, p based on AIC, Newey-West/H-H s.e., coefficients are standardized

Baseline results

	Industrial Production; Forecast horizon: 3 months		
	(1)	(2)	(3)
ΔS_t^{Loan}	-0.410		-0.396
	(-5.727)		(-3.831)
ΔS_t^{Bond}		-0.198	-0.030
		(-2.257)	(-0.267)
Adjusted R^2	0.313	0.198	0.311
Incremental R^2	+0.150	+0.035	+0.148
Observations	241	241	241

BASELINE RESULTS

	Industrial Production; Forecast horizon: 3 months		
	(1)	(2)	(3)
ΔS_t^{Loan}	-0.410		-0.396
	(-5.727)		(-3.831)
ΔS_t^{Bond}		-0.198	-0.030
		(-2.257)	(-0.267)
Adjusted R^2	0.313	0.198	0.311
Incremental R^2	+0.150	+0.035	+0.148
Observations	241	241	241

- 1 std dev $\uparrow$ in S_t^{Loan} $\rightarrow$ 0.410 std dev $\downarrow$ in industrial production in subsequent three months

Baseline results

	Industrial Production; Forecast horizon: 3 months		
	(1)	(2)	(3)
ΔS_t^{Loan}	-0.410		-0.396
	(-5.727)		(-3.831)
ΔS_t^{Bond}		-0.198	-0.030
		(-2.257)	(-0.267)
Adjusted R^2	0.313	0.198	0.311
Incremental R^2	+0.150	+0.035	+0.148
Observations	241	241	241

- 1 std dev $\uparrow$ in S_t^{Loan} $\rightarrow$ 0.410 std dev $\downarrow$ in industrial production in subsequent three months

Baseline results

	Industrial Production; Forecast horizon: 3 months		
	(1)	(2)	(3)
ΔS_t^{Loan}	-0.410		-0.396
	(-5.727)		(-3.831)
ΔS_t^{Bond}		-0.198	-0.030
		(-2.257)	(-0.267)
Adjusted R^2	0.313	0.198	0.311
Incremental R^2	+0.150	+0.035	+0.148
Observations	241	241	241

- 1 std dev $\uparrow$ in S_t^{Loan} $\rightarrow$ 0.410 std dev $\downarrow$ in industrial production in subsequent three months

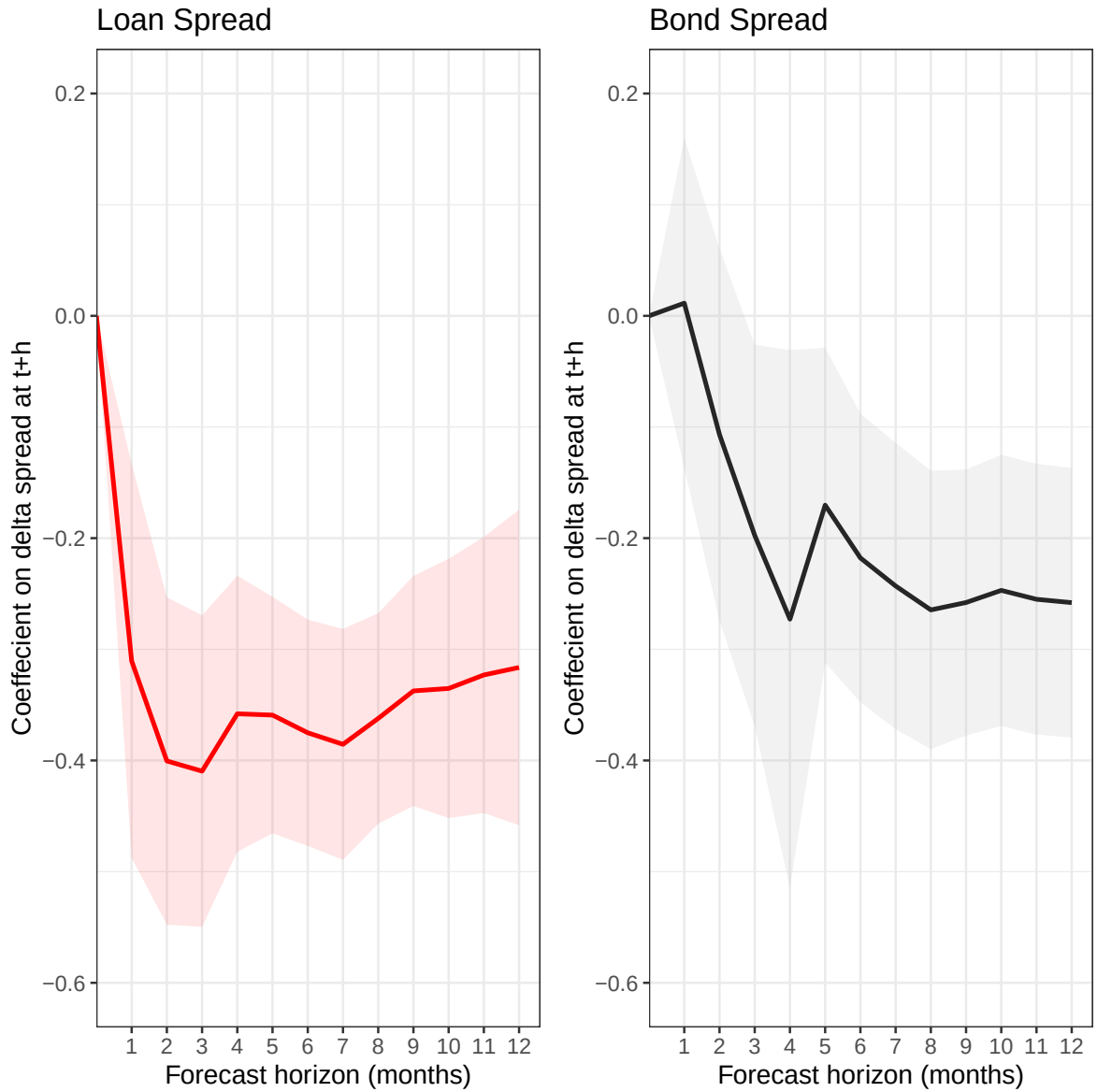
Baseline results

	Industrial Production; Forecast horizon: 3 months		
	(1)	(2)	(3)
ΔS_t^{Loan}	-0.410		-0.396
	(-5.727)		(-3.831)
ΔS_t^{Bond}		-0.198	-0.030
		(-2.257)	(-0.267)
Adjusted R^2	0.313	0.198	0.311
Incremental R^2	+0.150	+0.035	+0.148
Observations	241	241	241

- 1 std dev $\uparrow$ in S_t^{Loan} $\rightarrow$ 0.410 std dev $\downarrow$ in industrial production in subsequent three months
- R^2 $\uparrow$ 15 pp relative to benchmark

▸ Hansen Hodrick SE ▸ Out of sample

Dynamics - Local Projections



Other credit spreads and robustness

	Industrial Production; Forecast horizon: 3 months	
	Coefficient	Incremental R^2
Alt. bond spreads		
Δ Baa-Aaa spread	-0.277	+0.077
	(-3.918)	
Δ HY-Aaa spread	-0.248	+0.062
	(-4.013)	
Equity market		
S&P500 return	0.216	+0.041
	(2.921)	
Adj. for contract terms		
Residual ΔS_t^{Loan}	-0.405	+0.120
	(-5.646)	
Ex. financial crisis		
ΔS_t^{Loan}	-0.207	+0.034
	(-3.047)	
ΔS_t^{Bond}	-0.058	+0.001
	(-0.720)	

▸ Europe ▸ Industry level ▸ Alt weights

Other credit spreads and robustness

	Industrial Production; Forecast horizon: 3 months	
	Coefficient	Incremental R^2
Alt. bond spreads		
Δ Baa-Aaa spread	-0.277	+0.077
	(-3.918)	
Δ HY-Aaa spread	-0.248	+0.062
	(-4.013)	
Equity market		
S&P500 return	0.216	+0.041
	(2.921)	
Adj. for contract terms		
Residual ΔS_t^{Loan}	-0.405	+0.120
	(-5.646)	
Ex. financial crisis		
ΔS_t^{Loan}	-0.207	+0.034
	(-3.047)	
ΔS_t^{Bond}	-0.058	+0.001
	(-0.720)	

▸ Europe ▸ Industry level ▸ Alt weights

Other credit spreads and robustness

	Industrial Production; Forecast horizon: 3 months	
	Coefficient	Incremental R^2
Alt. bond spreads		
Δ Baa-Aaa spread	-0.277	+0.077
	(-3.918)	
Δ HY-Aaa spread	-0.248	+0.062
	(-4.013)	
Equity market		
S&P500 return	0.216	+0.041
	(2.921)	
Adj. for contract terms		
Residual ΔS_t^{Loan}	-0.405	+0.120
	(-5.646)	
Ex. financial crisis		
ΔS_t^{Loan}	-0.207	+0.034
	(-3.047)	
ΔS_t^{Bond}	-0.058	+0.001
	(-0.720)	

▸ Europe ▸ Industry level ▸ Alt weights

Other credit spreads and robustness

	Industrial Production; Forecast horizon: 3 months	
	Coefficient	Incremental R^2
Alt. bond spreads		
Δ Baa-Aaa spread	-0.277	+0.077
	(-3.918)	
Δ HY-Aaa spread	-0.248	+0.062
	(-4.013)	
Equity market		
S&P500 return	0.216	+0.041
	(2.921)	
Adj. for contract terms		
Residual ΔS_t^{Loan}	-0.405	+0.120
	(-5.646)	
Ex. financial crisis		
ΔS_t^{Loan}	-0.207	+0.034
	(-3.047)	
ΔS_t^{Bond}	-0.058	+0.001
	(-0.720)	

▸ Europe ▸ Industry level ▸ Alt weights

Other credit spreads and robustness

	Industrial Production; Forecast horizon: 3 months	
	Coefficient	Incremental R^2
Alt. bond spreads		
Δ Baa-Aaa spread	-0.277	+0.077
	(-3.918)	
Δ HY-Aaa spread	-0.248	+0.062
	(-4.013)	
Equity market		
S&P500 return	0.216	+0.041
	(2.921)	
Adj. for contract terms		
Residual ΔS_t^{Loan}	-0.405	+0.120
	(-5.646)	
Ex. financial crisis		
ΔS_t^{Loan}	-0.207	+0.034
	(-3.047)	
ΔS_t^{Bond}	-0.058	+0.001
	(-0.720)	

▸ Europe ▸ Industry level ▸ Alt weights

Mechanism I: Intermediary balance sheets

- Loan market borrowers may have limited funding alternatives and hence are particularly sensitive to shocks to the balance sheets of financial intermediaries
- Reduced capacity and/or willingness of intermediaries to provide credit to the economy which is reflected in credit spreads
  - A deterioration in the health of intermediaries (e.g. Holmström and Tirole, 1997)
  - Frictions in raising new capital (e.g. He and Krishnamurthy, 2013; Gertler and Kiyotaki, 2010)
  - Fluctuations in collateral value (e.g. Kiyotaki and Moore, 1997)

Credit conditions and bank health

	SLOSS (1)	SLOSS (2)	SLOSS (3)	Commit (4)	Commit (5)	Commit (6)
ΔS_t^{Loan}	0.430***		0.418***	−0.351**		−0.287**
	(3.810)		(5.176)	(−2.435)		(−2.166)
ΔS_t^{Bond}		0.290*	0.019		−0.306*	−0.223
		(1.879)	(0.118)		(−1.922)	(−1.512)
Adjusted R^2	0.174	0.073	0.164	0.112	0.082	0.148
Observations	81	81	81	81	81	81

- Loan spread associated with tightening of lending standards and a reduction of credit lines (bonds do not)
- Consistent with a reduction in the supply of credit

▸ Bank Health

Credit spread decomposition

	Forecast horizon: h = 3 months		
	(1)	(2)	(3)
Panel A. Industrial Production			
$\Delta\hat{S}_t^{Loan}$	-0.376^{***}		-0.401^{***}
	(-5.084)		(-3.143)
ΔELP_t	-0.268^{***}		-0.276^{***}
	(-4.720)		(-4.149)
$\Delta\hat{S}_t^{Bond}$		-0.191^{**}	0.038
		(-2.027)	(0.320)
ΔEBP_t		-0.182^{**}	0.043
		(-2.116)	(0.303)
Adjusted R^2	0.332	0.196	0.328
Incremental R^2	+0.169	+0.030	0.165
Contribution from ΔS_t	0.67	0.69	
Observations	241	241	241

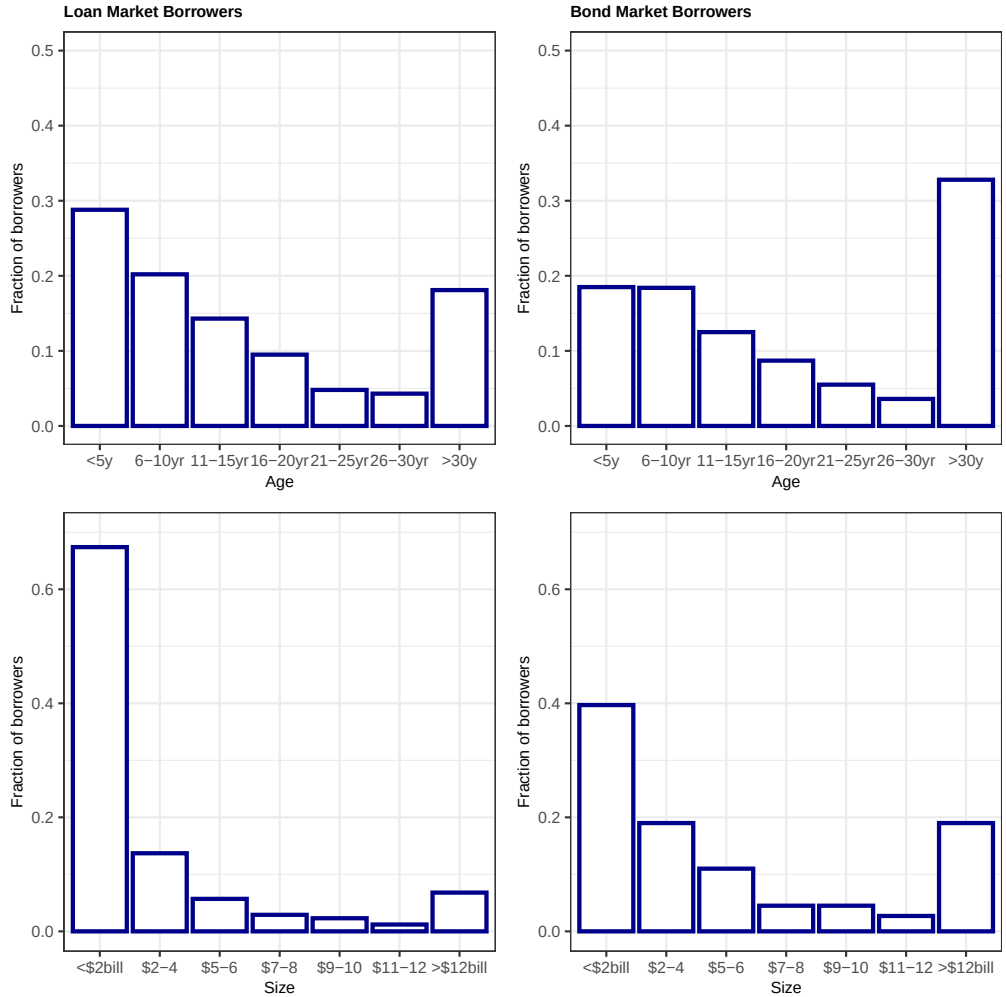
- Excess loan premium (ELP) has some predictive power (intermediary balance sheets frictions)
- Predicted spread has economically larger effect (borrower balance sheet frictions)

▸ Decomposition

Mechanisms II: Borrower balance sheets

- Loan market borrowers may be particularly sensitive to financial frictions that emanate from their own balance sheet
- Wedge between the cost of external funds and the opportunity cost of internal funds, labelled the "external finance premium" (e.g. Bernanke and Gertler, 1989)
- A deterioration in the health of borrower balance sheets is further amplified via a "financial accelerator" effect (e.g. Bernanke, Gertler, and Gilchrist, 1999), which is subsequently reflected in the borrower's cost of credit

Borrower Size and Age



- Loan borrowers younger (29% <= 5yrs) and smaller (67% <= \$2bill)
- Loan spread capturing borrower balance sheet frictions

Size and age double-sort

	Industrial Production; Forecast horizon: 3 months		
	(1)	(2)	(3)
ΔS_t^{Loan} [Small & young firms]	-0.391		
	(-4.479)		
ΔS_t^{Loan} [Large & old firms]		-0.212	
		(-1.762)	
ΔS_t^{Loan} [Private firms]			-0.429
			(-5.465)
Adjusted R^2	0.306	0.204	0.320
Incremental R^2	+0.143	+0.041	+0.157
Observations	241	241	241

Size and age double-sort

	Industrial Production; Forecast horizon: 3 months		
	(1)	(2)	(3)
ΔS_t^{Loan} [Small & young firms]	-0.391		
	(-4.479)		
ΔS_t^{Loan} [Large & old firms]		-0.212	
		(-1.762)	
ΔS_t^{Loan} [Private firms]			-0.429
			(-5.465)
Adjusted R^2	0.306	0.204	0.320
Incremental R^2	+0.143	+0.041	+0.157
Observations	241	241	241

Size and age double-sort

	Industrial Production; Forecast horizon: 3 months		
	(1)	(2)	(3)
ΔS_t^{Loan} [Small & young firms]	-0.391		
	(-4.479)		
ΔS_t^{Loan} [Large & old firms]		-0.212	
		(-1.762)	
ΔS_t^{Loan} [Private firms]			-0.429
			(-5.465)
Adjusted R^2	0.306	0.204	0.320
Incremental R^2	+0.143	+0.041	+0.157
Observations	241	241	241

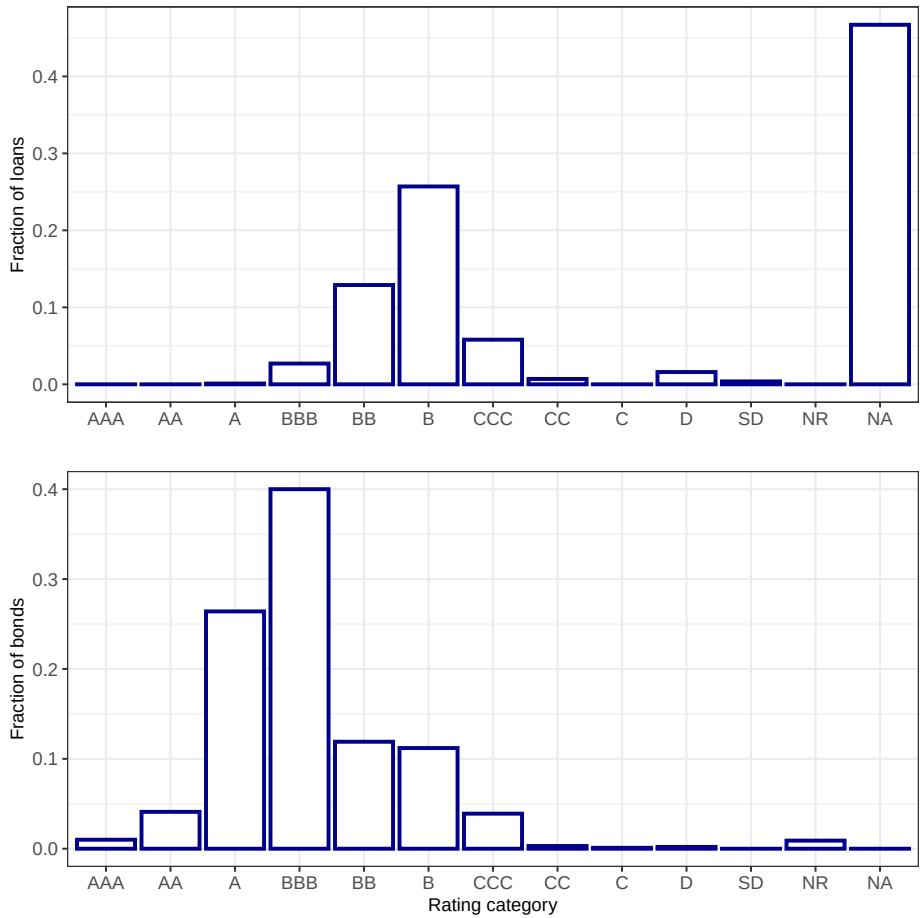
Size and age double-sort

	Industrial Production; Forecast horizon: 3 months		
	(1)	(2)	(3)
ΔS_t^{Loan} [Small & young firms]	-0.391 (-4.479)		
ΔS_t^{Loan} [Large & old firms]		-0.212 (-1.762)	
ΔS_t^{Loan} [Private firms]			-0.429 (-5.465)
Adjusted R^2	0.306	0.204	0.320
Incremental R^2	+0.143	+0.041	+0.157
Observations	241	241	241

- Consistent with smaller, private firms being more sensitive to changes in economic conditions (Cloyne, Ferreira, Froemel, and Surico, 2020; Begenau and Salomao, 2019; Asker, Farre-Mensa, and Ljungqvist, 2015; Davis, Haltiwanger, Jarmin, and Miranda, 2006; Pflueger, Siriwardane, and Sunderam, 2020)

▸ Size sort ▸ Age sort ▸ Small-Large Spread

Borrower Rating



- Half of loan market borrowers are private/unrated firms. Limited overlap between bond and loan borrowers.

Borrower Rating

	Forecast horizon: h = 3 months			
	(1)	(2)	(3)	(4)
Panel A. Industrial Production				
ΔS_t^{Loan}[BBB]	−0.105			
	(−1.557)			
ΔS_t^{Loan}[BB]		−0.260***		
		(−3.538)		
ΔS_t^{Loan}[B and below]			−0.425***	
			(−5.425)	
ΔS_t^{Loan}[Not Available]				−0.415***
				(−4.040)
Adjusted R^2	0.170	0.226	0.322	0.315
Incremental R^2	+0.007	+0.063	+0.159	+0.152
Observations	241	241	241	241

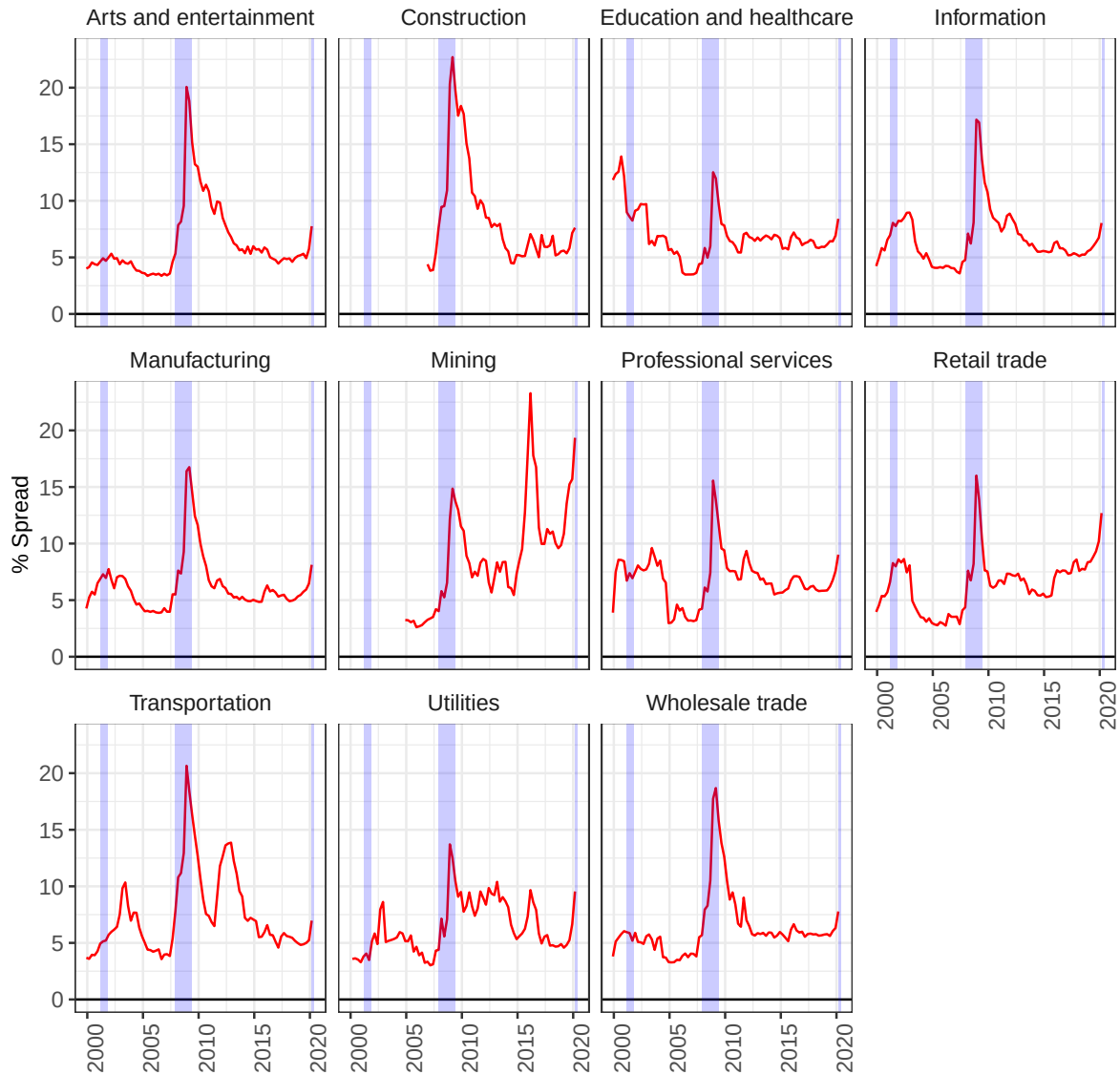
- Repricing of risk by banks may be better reflected in loan spread

Summary of mechanisms

- Evidence consistent with the *joint* role of borrower and intermediary constraints (Rampini and Viswanathan (2019)).
- 2/3 of the predictive power of the loan spread is coming from deterioration of borrower balance sheets.
- Next.... We explore alternative aggregation methods.

▸ Uncertainty ▸ Sentiment

Industry loan spreads



▸ Industry prediction

Industry heterogeneity

	Forecast horizon: h = 3 months		
	(1)	(2)	(3)
S_{bt}^{Loan} x Top 5 EFD	-0.311^{***}		
	(-4.527)		
S_{bt}^{Loan} x Continuous EFD		-0.319^{***}	
		(-2.698)	
S_{bt}^{Loan} x Top 3 EFD			-0.519^{***}
			(-5.408)
S_{bt}^{Loan} x Middle 4 EFD			-0.269^{***}
			(-2.754)
S_{bt}^{Loan} x Bottom 4 EFD			-0.139
			(-1.606)
Industry fixed effects	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes
Adjusted R^2	0.271	0.268	0.269
Observations	803	803	803

- Industries with firms that are more dependent on external finance (Rajan and Zingales (1998)) account for most of the predictive power of the loan spread.

Alternative weighting schemes

	Forecast horizon: h = 3 months				
	(1)	(2)	(3)	(4)	(5)
ΔS_t^{Loan} [Base]	−0.410***				
	(−5.727)				
ΔS_t^{Loan} [GDP]		−0.396***			
		(−5.006)			
ΔS_t^{Loan} [Industry]			−0.445***		
			(−6.236)		
ΔS_t^{Loan} [EFD]				−0.443***	
				(−4.805)	
ΔS_t^{Loan} [Elastic Net]					−0.449***
					(−5.162)
Adjusted R^2	0.313	0.305	0.343	0.337	0.339
Incremental R^2	+0.150	+0.142	+0.180	+0.174	+0.176
OOS RMSE	0.0132	0.0118	0.0115	0.0117	0.0115
Observations	241	241	241	241	241

- Thinking about how to aggregate measures from microdata can help improve business cycle forecast.

Conclusion

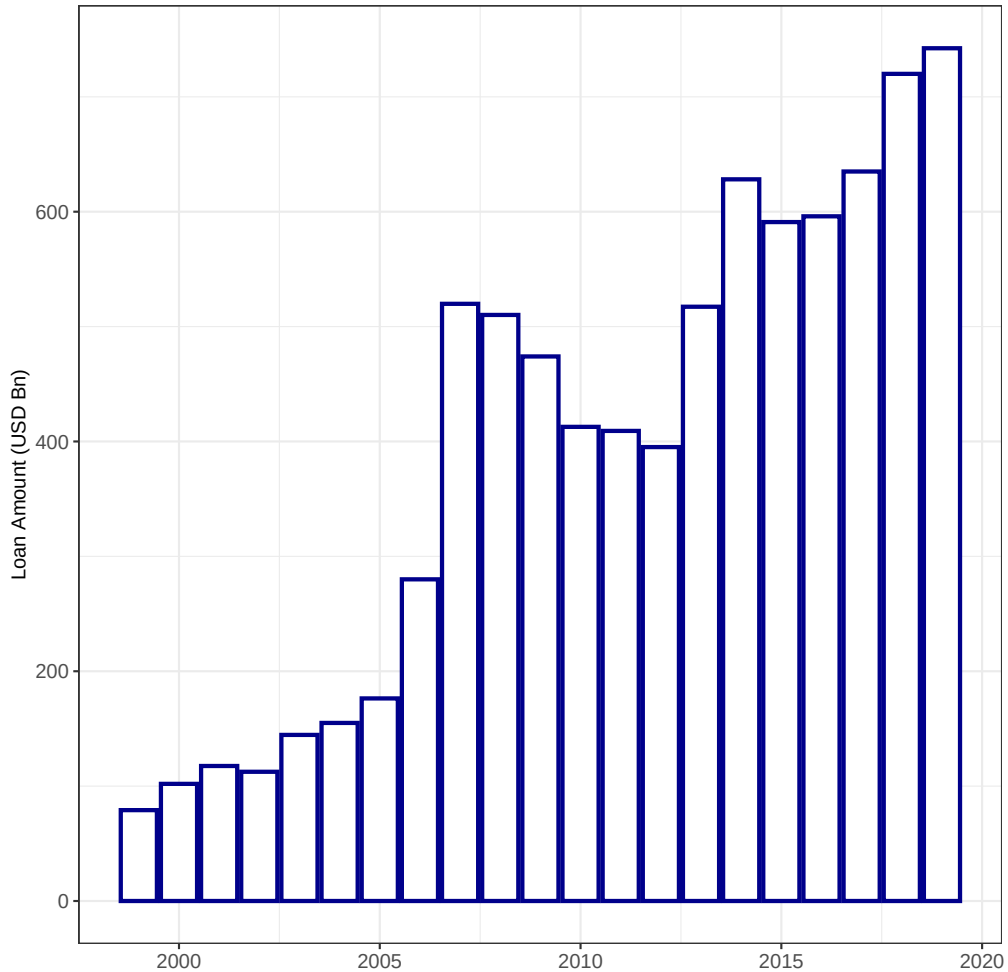
- Introduce a novel measure of credit spreads using secondary loan market prices. Loan spreads contain information about the future business cycle above and beyond other credit spread indicators

- Differential predictive power is (in part) driven by compositional differences btw loan and bond markets (borrower and bank frictions)

- Useful? Most firms don't have access to bond markets; countries with less developed capital markets; Goodhart's law

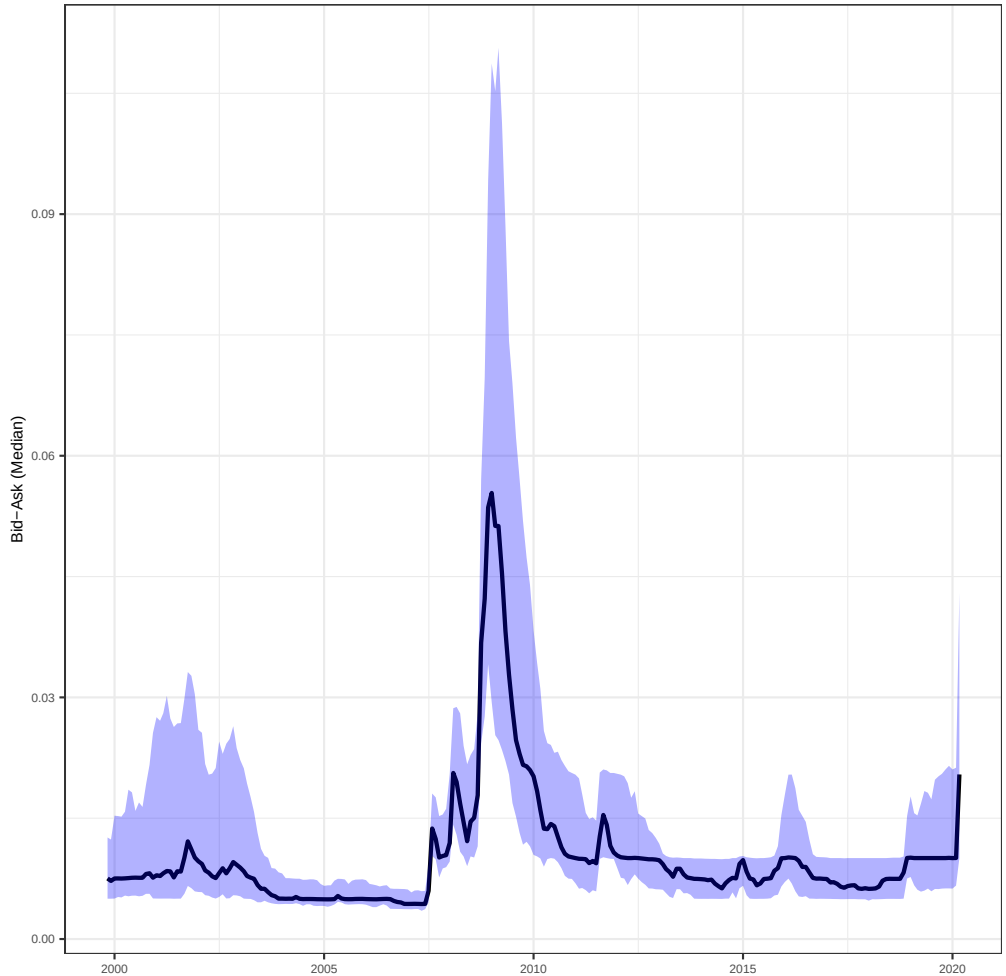
Thanks!

SECONDARY LOAN MARKET TRADING VOLUME



Back

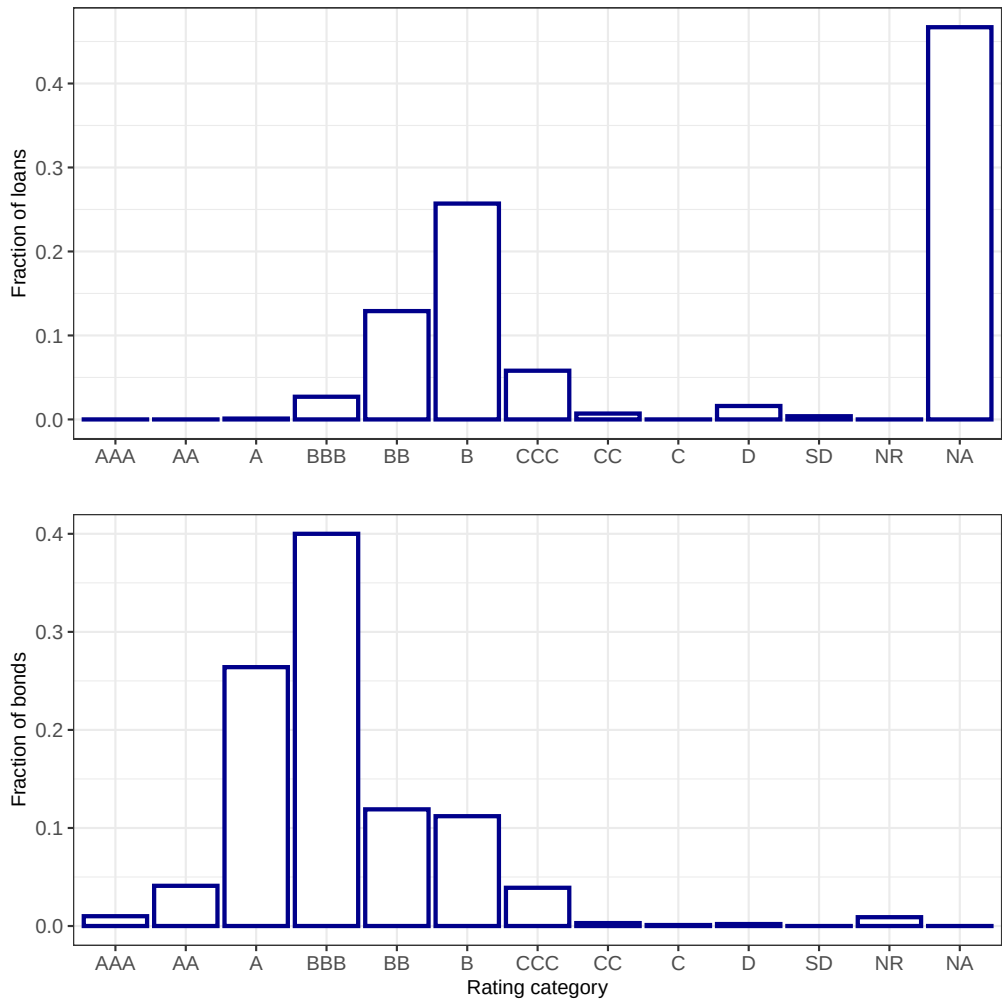
Secondary loan market liquidity



- Pre-GFC bid-ask-spread: 68bps (vs. 34bps in the bond market)
- Secondary loan market is highly liquid.

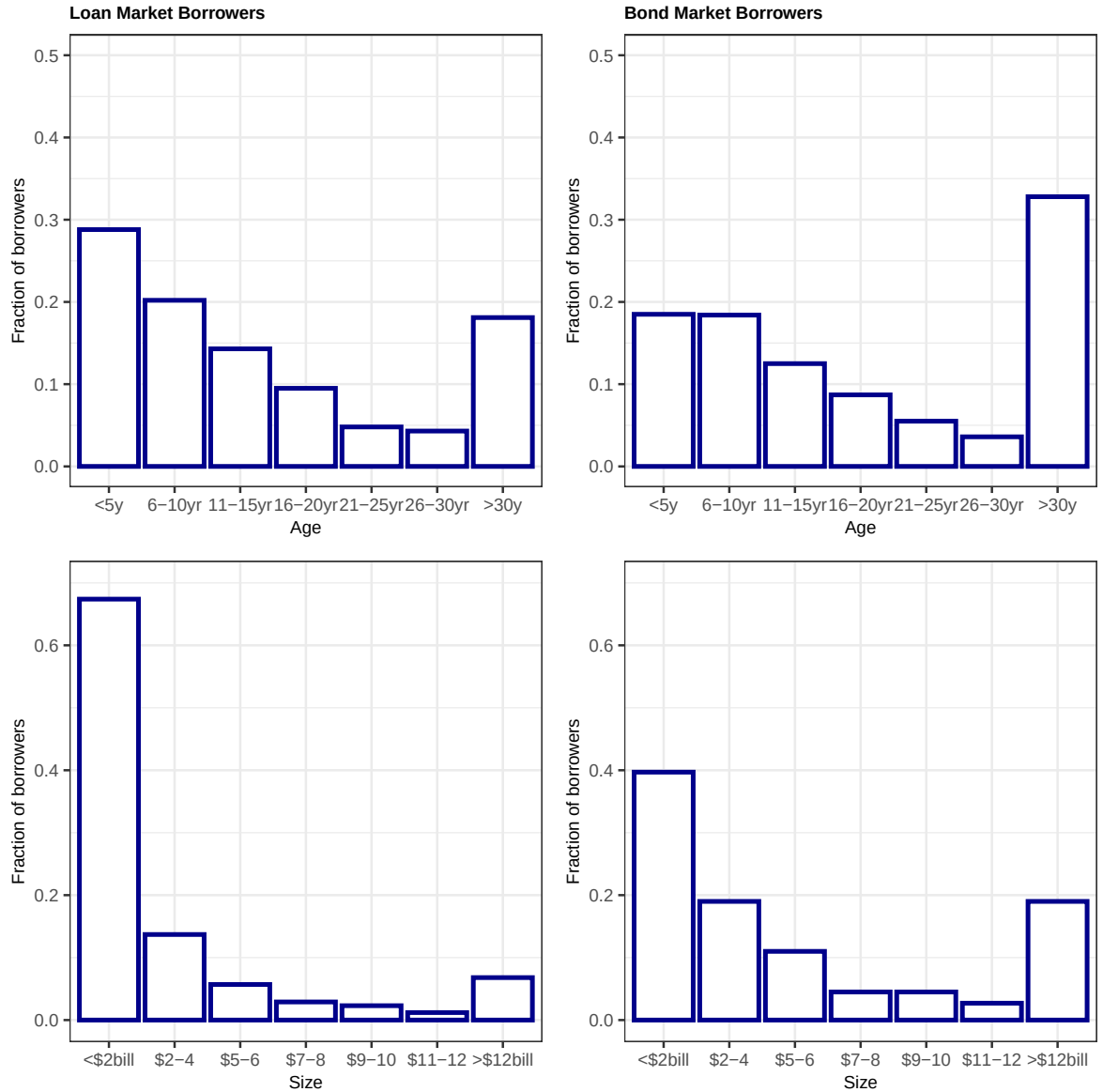
▸ Back

RATING DISTRIBUTION – BOND VS LOAN MARKET



Back

AGE/SIZE DISTRIBUTION – BOND VS LOAN MARKET



Back

Hansen Hodrick SE

	Industrial Production; Forecast horizon: 3 months		
	(1)	(2)	(3)
ΔS_t^{Loan}	-0.410		-0.396
	(-7.027)		(-4.519)
ΔS_t^{Bond}		-0.198	-0.030
		(-3.842)	(-0.353)
Adjusted R^2	0.313	0.198	0.311
Incremental R^2	+0.150	+0.035	+0.148
Observations	241	241	241

- Results remain highly significant with Hansen-Hodrick standard errors.

▸ Back

Out of sample

	(1) (Baseline)	(2) (ΔS_t^{Loan})	(3) (ΔS_t^{Bond})	(4) (Both)
Panel A. Industrial Production				
RMSE	0.0132	0.0118	0.0131	0.0118
DM Test p-value (Col(2) = Col(3))			(0.03)	
Observations	91	91	91	91

- Training set on 150 observations. Expanding rolling window RMSE
- Loan spread significantly better at OOS forecasting

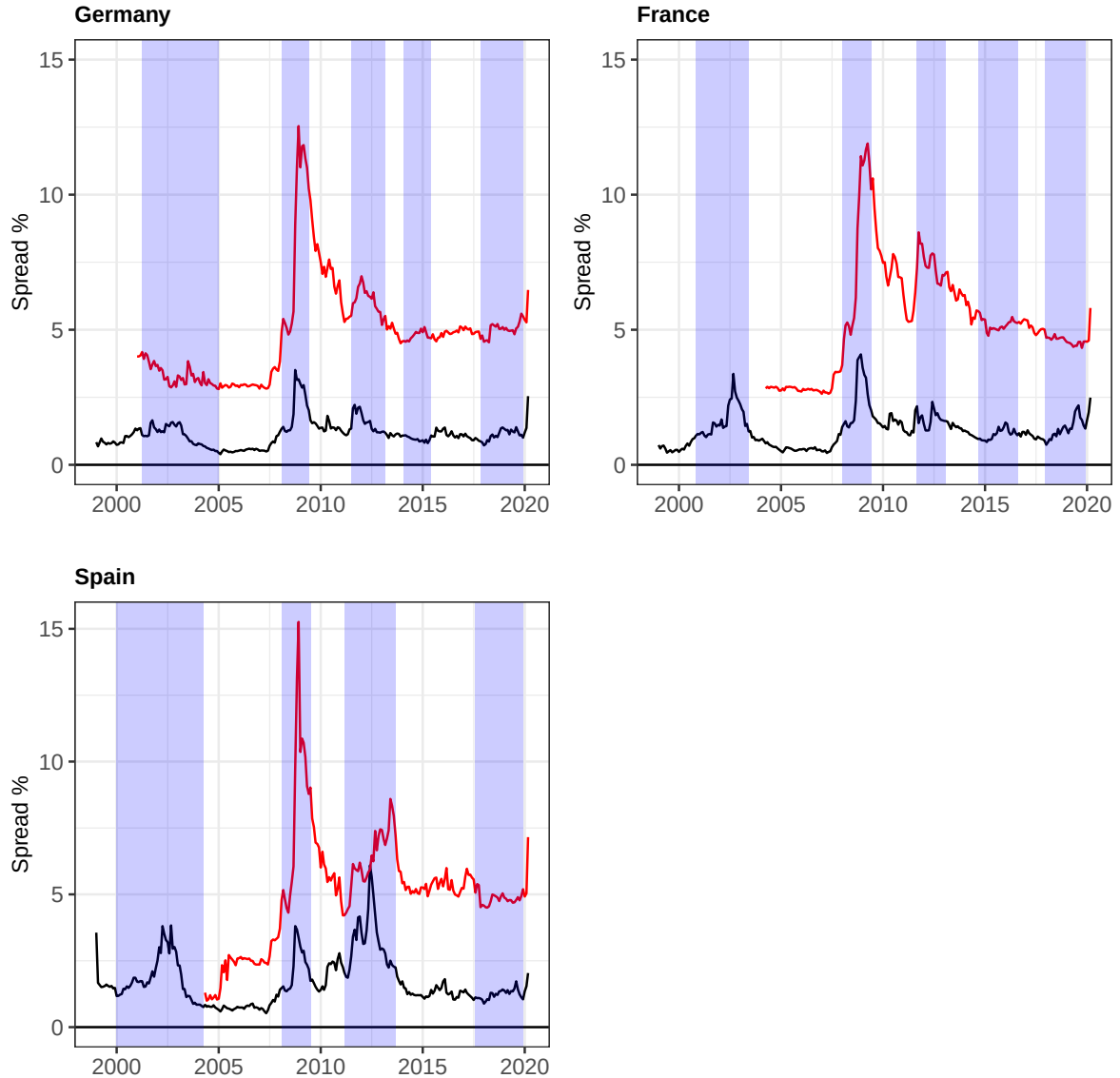
Back

Evidence from Europe

	Manufacturing Index; Forecast horizon: h = 3 months		
	Germany (1)	France (2)	Spain (3)
ΔS_t^{Loan}	-0.360	-0.340	-0.200
	(-2.300)	(-2.100)	(-1.900)
ΔS_t^{Bond}	-0.048	-0.009	-0.130
	(-0.690)	(-0.100)	(-1.000)
Adjusted R^2	0.260	0.190	0.190
Incremental R^2	+0.111	+0.071	+0.058
% Contribution from ΔS_t^{Loan}	0.86	0.91	0.62
Observations	227	188	186

▸ Europe spreads ▸ Back

Evidence from Europe



Back

Industry forecasting results

	Industry employment; Forecast horizon: 3 months		
	(1)	(2)	(3)
S_{bt}^{Loan}	−0.130	−0.171	−0.292
	(−3.491)	(−3.534)	(−4.609)
S_{t}^{Loan}	−0.239		
	(−3.818)		
Year x quarter fixed effects	No	Yes	Yes
Industry fixed effects	No	No	Yes
Adjusted R^2	0.452	0.558	0.590
Incremental R^2	+ 0.086	+0.192	+0.224
Observations	803	803	803

▸ Back

Industry forecasting results

	Industry employment; Forecast horizon: 3 months		
	(1)	(2)	(3)
S_{bt}^{Loan}	−0.130	−0.171	−0.292
	(−3.491)	(−3.534)	(−4.609)
S_{t}^{Loan}	−0.239		
	(−3.818)		
Year x quarter fixed effects	No	Yes	Yes
Industry fixed effects	No	No	Yes
Adjusted R^2	0.452	0.558	0.590
Incremental R^2	+ 0.086	+0.192	+0.224
Observations	803	803	803

Back

From spread to premia

Decomposing the loan spread

	(1)	(2)	(3)	(4)	(5)
$\overline{DD}_{bt}$	−0.357	−0.434	−0.435	−0.417	
	(−35.251)	(−51.707)	(−52.299)	(−51.264)	
$\overline{DD}^2_{bt}$	0.022	0.028	0.028	0.027	
	(26.631)	(41.476)	(41.888)	(39.779)	
σDD_{bt}	0.023	0.010	0.010	0.010	
	(6.965)	(3.648)	(3.582)	(4.734)	
$Ln(AISD)$		0.735	0.732	0.642	0.685
		(38.270)	(34.482)	(29.518)	(32.143)
$Ln(Age)$		0.075	0.075	0.067	0.040
		(31.564)	(31.618)	(30.144)	(13.797)
$Ln(Amount)$		−0.078	−0.078	−0.061	−0.093
		(−12.127)	(−11.963)	(−9.842)	(−13.592)
$Secured(0/1)$			−0.018	0.012	0.086
			(−0.760)	(0.499)	(3.284)
$Covenants(0/1)$			−0.011	0.011	0.035
			(−0.826)	(0.870)	(2.611)
$Senior(0/1)$			0.018	0.089	0.025
			(0.404)	(1.006)	(0.464)
Loan type fixed effects	No	No	No	Yes	No
Industry fixed effects	No	No	No	Yes	No
Rating fixed effects	No	No	No	Yes	No
Adjusted R^2	0.087	0.407	0.407	0.456	0.315
Observations	287,811	287,811	287,811	287,811	287,811

- Use decomposition in (4): ELP $= S_t^{Loan}$ - $\hat{S}_t^{Loan}$

Back

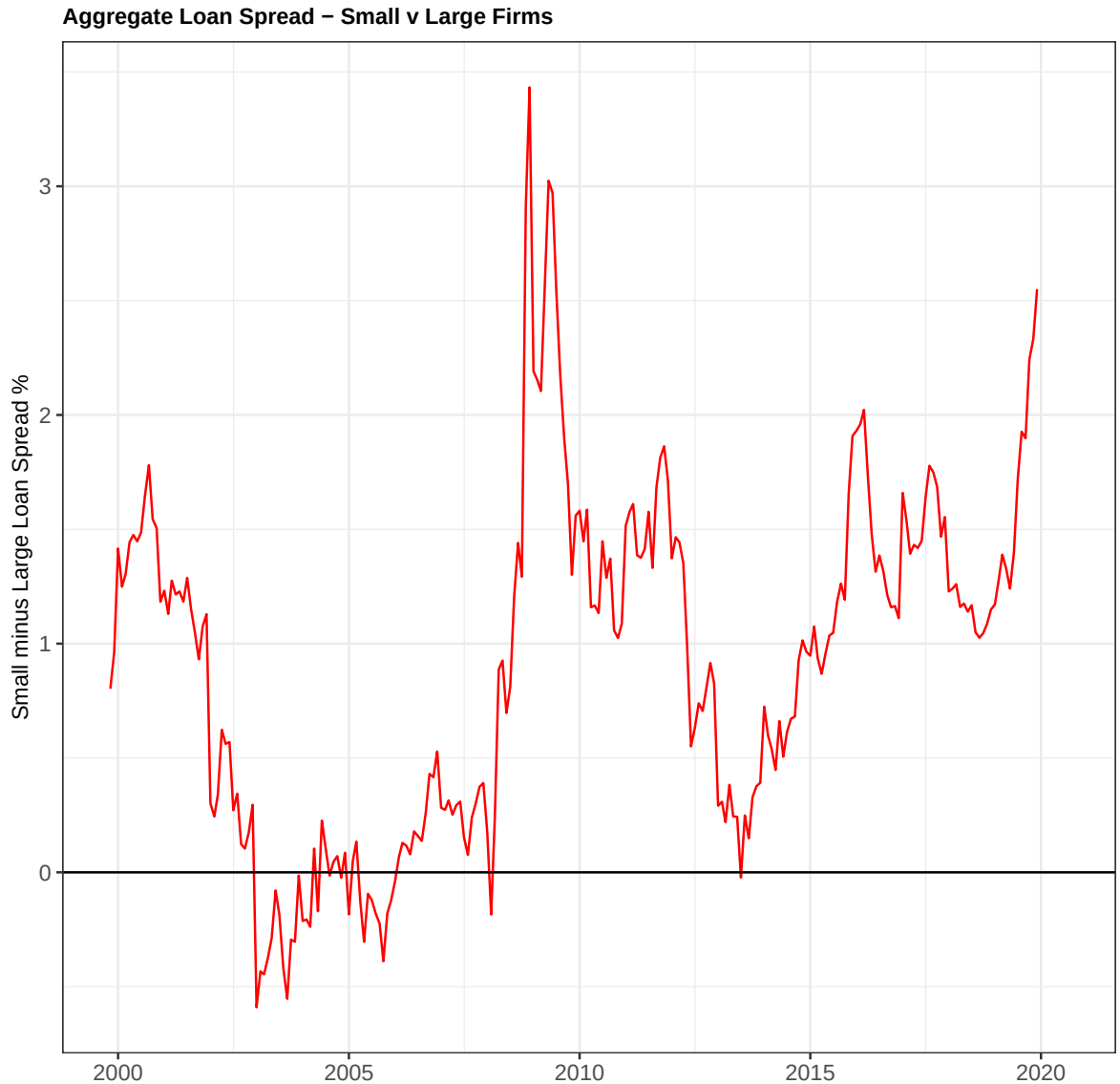
Alternative weighting schemes

	Industrial Production; Forecast horizon: 3 months			
	(1)	(2)	(3)	(4)
ΔS_t^{Loan} [Base]	-0.410			
	(-5.727)			
ΔS_t^{Loan} [Industry]		-0.445		
		(-6.236)		
ΔS_t^{Loan} [EFD]			-0.443	
			(-4.805)	
ΔS_t^{Loan} [ML]				-0.449
				(-5.162)
Adjusted R^2	0.313	0.343	0.337	0.339
Incremental R^2	+0.150	+0.180	+0.174	+0.176
Observations	241	241	241	241

- Use insight to improve aggregate level forecasting?

Back

Loan spread - Small v Large Firms



Back

Effect by firm size

	Industrial Production; Forecast horizon: 3 months		
	(1)	(2)	(3)
ΔS_t^{Loan} [Small firms]	-0.377		
	(-4.177)		
ΔS_t^{Loan} [Large firms]		-0.263	
		(-3.411)	
ΔS_t^{Loan} [Private firms]			-0.429
			(-5.465)
Adjusted R^2	0.296	0.227	0.320
Incremental R^2	+0.133	+0.064	+0.157
Observations	241	241	241

- Size based on total assets
- Private = issuer cannot be matched to Compustat

Back

Effect by firm age

	Industrial Production; Forecast horizon: 3 months		
	(1)	(2)	(3)
ΔS_t^{Loan} [Young firms]	-0.340		
	(-4.525)		
ΔS_t^{Loan} [Old firms]		-0.290	
		(-2.795)	
ΔS_t^{Loan} [Private firms]			-0.429
			(-5.465)
Adjusted R^2	0.270	0.255	0.320
Incremental R^2	+0.107	+0.078	+0.157
Observations	241	241	241

▸ Back

Credit conditions – Europe

	Credit conditions based on loan officer surveys	
	(1)	(2)
Germany		
ΔS_t^{Loan}	0.376	
	(3.748)	
ΔS_t^{Bond}		0.159
		(1.182)
Adjusted R^2	0.128	0.011
Observations	70	70
France		
ΔS_t^{Loan}	0.480	
	(3.545)	
ΔS_t^{Bond}		0.329
		(1.436)
Adjusted R^2	0.218	0.094
Observations	64	64
Spain		
ΔS_t^{Loan}	0.370	
	(2.018)	
ΔS_t^{Bond}		0.176
		(1.008)
Adjusted R^2	0.122	0.015
Observations	63	63

Back

Credit conditions and bank health II

	ROA (7)	ROA (8)	ROA (9)	LLP (10)	LLP (11)	LLP (12)
ΔS_t^{Loan}	−0.430**		−0.492**	0.465**		0.304**
	(−2.163)		(−2.118)	(2.203)		(2.454)
ΔS_t^{Bond}		−0.282	0.084		0.442	0.216
		(−1.234)	(0.286)		(1.604)	(0.613)
Adjusted R^2	0.174	0.068	0.167	0.206	0.185	0.217
Observations	81	81	81	81	81	81

- Bank profitability and LLP/Loans more strongly correlated with loan spreads
- Loan spread appears to better reflect balance sheet frictions of intermediaries, which reduce the supply of credit

▸ Back

Alternative explanation I: Uncertainty

	Forecast horizon: 3 months					
	(1)	(2)	(3)	(4)	(5)	(6)
ΔS_t^{Loan}	−0.410***	−0.261***	−0.442***	−0.389***	−0.325***	−0.243***
	(−5.727)	(−4.468)	(−4.963)	(−5.450)	(−5.271)	(−3.001)
VIX		−0.367***				
		(−3.329)				
PVS Index			0.267**			
			(2.404)			
EPU Index				−0.109		
				(−1.633)		
FU Index					−0.399***	
					(−3.311)	
'Recession' Index						−0.514***
						(−4.408)
Adjusted R^2	0.313	0.393	0.386	0.320	0.432	0.518
Incremental R^2	+0.150	+0.230	+0.223	+0.157	+0.269	+0.355
Observations	241	241	76	241	241	211

- Uncertainty proxies contain predictive power for future economic conditions
- Uncertainty can, however, not explain the incremental predictive power of the loan spread

▸ Back

Alternative explanation II: Sentiment

- Investor sentiment appears important to understand credit spreads:
  - Credit spreads are too narrow during booms and proceed economic downturns (Greenwood and Hanson (2013)), López-Salido, Stein, and Zakrajšek (2017))
  - Investors under-price risk in good times, creating a credit boom. During downturns spreads overract in the opposite direction (Bordalo, Gennaioli, and Shleifer (2018)).
- Our focus in on the *relative* predictive power vis-a-vis bond spreads
- Borrower fundamentals drive relative predictive power of the loan spread (not excess loan premium, which would capture sentiment)

Back

References I

Asker, Farre-Mensa, and Ljungqvist (2015): "Corporate Investment and Stock Market Listing: A Puzzle?," *Review of Financial Studies*, 28(2), 342–390.

Begenau, J., and J. Salomao (2019): "Firm Financing over the Busines Cycle," *Review of Financial Studies*, 32(4), 1235–1274.

Bernanke, B. S. (1990): "On the Predictive Power of Interest Rates and Interes Rate Spreads," *New England Economic Review*, pp. 51–68.

Bernanke, B. S., and M. Gertler (1989): "Agency Costs, Net Worth, and Business Fluctuations," *American Economic Review*, 79(1), 14–31.

Bernanke, B. S., M. Gertler, and S. Gilchrist (1999): *The Financial Accelerator in a Quantitative Business Cycle Framework*chap. 21, pp. 1341–1393. Amsterdam: North-Holland.

References II

Bordalo, P., N. Gennaioli, and A. Shleifer (2018): "Diagnostic Expectations and Credit Cycles," *Journal of Finance*, (1), 199–227.

Cloyne, J., C. Ferreira, M. Froemel, and P. Surico (2020): "Monetary Policy, Corporate Finance and Investment," *Working Paper, University of California Davis*.

Davis, Haltiwanger, Jarmin, and Miranda (2006): "Volatility and Dispersion in Business Growth Rates: Publicly Traded versus Privately Held Firms," *NBER Macroeconomics Annual*, 21, 107–179.

Friedman, B. M., and K. N. Kuttner (1992): "Money, Income, Prices and Interest Rates," *American Economic Review*, 82, 472–492.

References III

——— (1993): "Economic Activity and the Short-Term Credit Markets: An Analysis of Prices and Quantities," *Brookings Papers on Economic Activity*, 24, 192–283.

Gertler, M., and N. Kiyotaki (2010): "Financial Intermediation and Credit Policy in Business Cycle Analysis," *Handbook of Macroeconomics*.

Gertler, M., and C. S. Lown (1999): "The Information in the High Yield Bond Spread for the Business Cycle: Evidence and Some Implications," *Oxford Review of Economic Policy*, 15(3), 132–150.

Gilchrist, S., and E. Zakrajšek (2012): "Credit Spreads and Business Cycle Fluctuations," *American Economic Review*, 102(4), 1692–1720.

References IV

Greenwood, R., and S. G. Hanson (2013): "Issuer Quality and Corporate Bond Returns," *Review of Financial Studies*, 26, 1438 – 1525.

Gürkaynak, R. S., B. Sack, and J. H. Wright (2007): "The U.S. Treasury yield curve: 1961 to the present," *Journal of Monetary Economics*, 54(8), 2291–2304.

He, Z., and A. Krishnamurthy (2013): "Intermediary Asset Pricing," *American Economic Review*, 103(2), 732–770.

Holmström, B., and J. Tirole (1997): "Financial Intermediation, Loanable Funds, and the Real Sector," *Quarterly Journal of Economics*, 112(3), 663–691.

Kiyotaki, N., and J. Moore (1997): "Credit Cycles," *Journal of Political Economy*, 105(2), 211–248.

References V

López-Salido, D., J. C. Stein, and E. Zakrajšek (2017): "Credit-market sentiment and the business cycle," *Quarterly Journal of Economics*, 132(3), 1373–1426.

Pflueger, C., E. Siriwardane, and A. Sunderam (2020): "Financial Market Risk Perceptions and the Macroeconomy," *Quarterly Journal of Economics*, 135(3), 1443 – 1491.

Rajan, R. G., and L. Zingales (1998): "Financial Dependence and Growth," *American Economic Review*, 88(3), 559–586.

Rampini, A. A., and S. Viswanathan (2019): "Financial Intermediary Capital," *Review of Economic Studies*, 86, 413–455.