CORPORATE LOAN SPREADS AND ECONOMIC ACTIVITY

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Motivation

- Credit spreads widely used to forecast business cycle (e.g., Bernanke, 1990; Friedman and Kuttner, 1992, 1993; Gertler and Lown, 1999; Gilchrist and Zakrajišek, 2012; López-Salido, Stein, and Zakrajišek, 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 Zakrajišek, 2017)
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→ This paper: Novel dataset to explore the ability of corporate loan spreads to forecast economic developments
Panel A. Industrial Production and Loan Spread over 2019
1. We develop a new credit spread based on secondary loan market prices
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- Useful? Yes!
  - Most firms don’t have access to bond markets; countries with less developed capital markets; Goodhart’s law
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- Key result: A 1 SD ▲ loan spread predicts a 0.41 SD ▼ industrial production. Twice the economic magnitude of the bond spread. Even when included jointly.
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- Key result: A 1 SD ↑ loan spread predicts a 0.41 SD ↓ 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
2. We investigate possible channels as to the loan spread’s differential predictive power informed by theory.

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- 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)
3. We highlight possible benefits of exploring lower aggregation levels when forecasting economic outcomes.
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- 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 (∼ 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
CONSTRUCTING THE AGGREGATE LOAN SPREAD

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

→ Loan spread (for each loan): $S_{it}[k] = y_{it}[k] - y_{it}^f[k]$

→ Aggregate loan spread: $S_{t\text{Loan}} = \frac{1}{N_t} \sum_i \sum_k S_{it}[k]$
**Aggregate credit spreads (1999-2020)**

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

- $9 / 30$
**Forecasting economic developments**

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

- \(\Delta y\) is the log growth rate of industrial production (in this talk; various other macro variables in the paper)
- \(S_t\) is a credit spread \(\{\text{Loan, Bond}\}\)
- \(TS_t\) 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

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- A 1 std dev ↑ in $S_t^{Loan}$ → 0.410 std dev ↓ in industrial production in subsequent three months.
- $R^2$ ↑ 15 pp relative to benchmark.
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Dynamics - Local Projections

![Graph of Loan Spread](image1)

![Graph of Bond Spread](image2)
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<td></td>
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<tr>
<td>S&amp;P500 return</td>
<td>0.216</td>
<td>+0.041</td>
</tr>
<tr>
<td></td>
<td>(2.921)</td>
<td></td>
</tr>
<tr>
<td><strong>Adj. for contract terms</strong></td>
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<tr>
<td>Residual $\Delta S_{t}^{Loan}$</td>
<td>-0.405</td>
<td>+0.120</td>
</tr>
<tr>
<td></td>
<td>(-5.646)</td>
<td></td>
</tr>
<tr>
<td><strong>Ex. financial crisis</strong></td>
<td></td>
<td></td>
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<tr>
<td>$\Delta S_{t}^{Loan}$</td>
<td>-0.207</td>
<td>+0.034</td>
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<tr>
<td></td>
<td>(-3.047)</td>
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</tr>
<tr>
<td>$\Delta S_{t}^{Bond}$</td>
<td>-0.058</td>
<td>+0.001</td>
</tr>
<tr>
<td></td>
<td>(-0.720)</td>
<td></td>
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</tbody>
</table>
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

<table>
<thead>
<tr>
<th></th>
<th>SLOSS (1)</th>
<th>SLOSS (2)</th>
<th>SLOSS (3)</th>
<th>Commit (4)</th>
<th>Commit (5)</th>
<th>Commit (6)</th>
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<tbody>
<tr>
<td>( \Delta S^L_t )</td>
<td>0.430***</td>
<td>0.418***</td>
<td>-0.351**</td>
<td>-0.287**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3.810)</td>
<td>(5.176)</td>
<td>(-2.435)</td>
<td>(-2.166)</td>
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<tr>
<td>( \Delta S^B_t )</td>
<td>0.290*</td>
<td>0.019</td>
<td>-0.306*</td>
<td>-0.223</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.879)</td>
<td>(0.118)</td>
<td>(-1.922)</td>
<td>(-1.512)</td>
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<tr>
<td>Adjusted R²</td>
<td>0.174</td>
<td>0.073</td>
<td>0.164</td>
<td>0.112</td>
<td>0.082</td>
<td>0.148</td>
</tr>
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<td>Observations</td>
<td>81</td>
<td>81</td>
<td>81</td>
<td>81</td>
<td>81</td>
<td>81</td>
</tr>
</tbody>
</table>

- 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
Excess loan premium (ELP) has some predictive power (intermediary balance sheets frictions)

Predicted spread has economically larger effect (borrower balance sheet frictions)
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% $\leq 5$yrs) and smaller (67% $\leq$ $2$bill)
- Loan spread capturing borrower balance sheet frictions
**SIZE AND AGE DOUBLE-SORT**

<table>
<thead>
<tr>
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<th>(2)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>$\Delta S^\text{Loan}_t$ [Small &amp; young firms]</td>
<td>-0.391</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>(-4.479)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta S^\text{Loan}_t$ [Large &amp; old firms]</td>
<td></td>
<td>-0.212</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-1.762)</td>
<td></td>
</tr>
<tr>
<td>$\Delta S^\text{Loan}_t$ [Private firms]</td>
<td></td>
<td></td>
<td>-0.429</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(-5.465)</td>
</tr>
<tr>
<td>Adjusted R$^2$</td>
<td>0.306</td>
<td>0.204</td>
<td>0.320</td>
</tr>
<tr>
<td>Incremental R$^2$</td>
<td>+0.143</td>
<td>+0.041</td>
<td>+0.157</td>
</tr>
<tr>
<td>Observations</td>
<td>241</td>
<td>241</td>
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</table>
## Size and Age Double-Sort

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Consistent with smaller, private firms being more sensitive to changes in economic conditions (Cloyne, Ferreira, Froemel, and Surico, 2020; Begenau and Salomão, 2019; Asker, Farre-Mensa, and Ljungqvist, 2015; Davis, Haltiwanger, Jarmin, and Miranda, 2006; Pflueger, Siriwardane, and Sunderam, 2020)
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<td>-0.429</td>
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Industrial Production; Forecast horizon: 3 months

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 AND AGE DOUBLE-SORT

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<td>$\Delta S^L_{t^{Loan}}$ [Small &amp; young firms]</td>
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Half of loan market borrowers are private/unrated firms. Limited overlap between bond and loan borrowers.
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.
INDUSTRY LOAN SPREADS

![Graph showing industry loan spreads for various sectors over time.](image)

- Arts and entertainment
- Construction
- Education and healthcare
- Information
- Manufacturing
- Mining
- Professional services
- Retail trade
- Transportation
- Utilities
- Wholesale trade

Industry prediction: [Details here]
Industry heterogeneity

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$S_{bt}^{Loan}$ x Top 5 EFD</td>
<td>$-0.311^{***}$</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>($-4.527$)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$S_{bt}^{Loan}$ x Continuous EFD</td>
<td></td>
<td>$-0.319^{***}$</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>($-2.698$)</td>
<td></td>
</tr>
<tr>
<td>$S_{bt}^{Loan}$ x Top 3 EFD</td>
<td></td>
<td></td>
<td>$-0.519^{***}$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>($-5.408$)</td>
</tr>
<tr>
<td>$S_{bt}^{Loan}$ x Middle 4 EFD</td>
<td></td>
<td></td>
<td>$-0.269^{***}$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>($-2.754$)</td>
</tr>
<tr>
<td>$S_{bt}^{Loan}$ x Bottom 4 EFD</td>
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<td>$-0.139$</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>($-1.606$)</td>
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<td>Yes</td>
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<tr>
<td>Time fixed effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Adjusted R²</td>
<td>0.271</td>
<td>0.268</td>
<td>0.269</td>
</tr>
<tr>
<td>Observations</td>
<td>803</td>
<td>803</td>
<td>803</td>
</tr>
</tbody>
</table>

- 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**

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

<table>
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<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta S_t^{Loan}$ [Base]</td>
<td>-0.410*** (-5.727)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta S_t^{Loan}$ [GDP]</td>
<td></td>
<td>-0.396*** (-5.006)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta S_t^{Loan}$ [Industry]</td>
<td></td>
<td></td>
<td>-0.445*** (-6.236)</td>
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<td></td>
</tr>
<tr>
<td>$\Delta S_t^{Loan}$ [EFD]</td>
<td></td>
<td></td>
<td></td>
<td>-0.443*** (-4.805)</td>
<td></td>
</tr>
<tr>
<td>$\Delta S_t^{Loan}$ [Elastic Net]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.449*** (-5.162)</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.313</td>
<td>0.305</td>
<td>0.343</td>
<td>0.337</td>
<td>0.339</td>
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<tr>
<td>Incremental $R^2$</td>
<td>+0.150</td>
<td>+0.142</td>
<td>+0.180</td>
<td>+0.174</td>
<td>+0.176</td>
</tr>
<tr>
<td>OOS RMSE</td>
<td>0.0132</td>
<td>0.0118</td>
<td>0.0115</td>
<td>0.0117</td>
<td>0.0115</td>
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<td>Observations</td>
<td>241</td>
<td>241</td>
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</tr>
</tbody>
</table>

Forecast horizon: $h = 3$ months
Conclusions

• 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!
• Pre-GFC bid-ask-spread: 68bps (vs. 34bps in the bond market)
• Secondary loan market is highly liquid.
RATING DISTRIBUTION — BOND VS LOAN MARKET

The chart illustrates the distribution of ratings for loans and bonds. The y-axis represents the fraction of loans or bonds, while the x-axis shows the rating categories from AAA to NA. The chart indicates a higher concentration of loans in the lower rating categories compared to bonds, reflecting the risk profile of these financial instruments.
Age/Size distribution — bond vs loan market

Loan Market Borrowers

Bond Market Borrowers

Fraction of borrowers

Fraction of borrowers

Age

Size
### Industrial Production; Forecast horizon: 3 months

<table>
<thead>
<tr>
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<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
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<tbody>
<tr>
<td>$\Delta S_t^{Loan}$</td>
<td>-0.410</td>
<td></td>
<td>-0.396</td>
</tr>
<tr>
<td></td>
<td>(-7.027)</td>
<td></td>
<td>(-4.519)</td>
</tr>
<tr>
<td>$\Delta S_t^{Bond}$</td>
<td></td>
<td>-0.198</td>
<td>-0.030</td>
</tr>
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<td></td>
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<td>(-3.842)</td>
<td>(-0.353)</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.313</td>
<td>0.198</td>
<td>0.311</td>
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<tr>
<td>Incremental $R^2$</td>
<td>+0.150</td>
<td>+0.035</td>
<td>+0.148</td>
</tr>
<tr>
<td>Observations</td>
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</tbody>
</table>

- Results remain highly significant with Hansen-Hodrick standard errors.
### Panel A. Industrial Production

<table>
<thead>
<tr>
<th></th>
<th>(1) (Baseline)</th>
<th>(2) $\Delta S^\text{Loan}_t$</th>
<th>(3) $\Delta S^\text{Bond}_t$</th>
<th>(4) (Both)</th>
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<tr>
<td>RMSE</td>
<td>0.0132</td>
<td>0.0118</td>
<td>0.0131</td>
<td>0.0118</td>
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<td>DM Test p-value (Col(2) = Col(3))</td>
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<td></td>
<td>(0.03)</td>
<td></td>
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<td>Observations</td>
<td>91</td>
<td>91</td>
<td>91</td>
<td>91</td>
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</table>

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

**Manufacturing Index; Forecast horizon: h = 3 months**

<table>
<thead>
<tr>
<th></th>
<th>Germany (1)</th>
<th>France (2)</th>
<th>Spain (3)</th>
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<tr>
<td>$\Delta S_t^{Loan}$</td>
<td>-0.360</td>
<td>-0.340</td>
<td>-0.200</td>
</tr>
<tr>
<td></td>
<td>(-2.300)</td>
<td>(-2.100)</td>
<td>(-1.900)</td>
</tr>
<tr>
<td>$\Delta S_t^{Bond}$</td>
<td>-0.048</td>
<td>-0.009</td>
<td>-0.130</td>
</tr>
<tr>
<td></td>
<td>(-0.690)</td>
<td>(-0.100)</td>
<td>(-1.000)</td>
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<tr>
<td>Adjusted $R^2$</td>
<td>0.260</td>
<td>0.190</td>
<td>0.190</td>
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<tr>
<td>Incremental $R^2$</td>
<td>+0.111</td>
<td>+0.071</td>
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<tr>
<td>% Contribution from $\Delta S_t^{Loan}$</td>
<td>0.86</td>
<td>0.91</td>
<td>0.62</td>
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<td>Observations</td>
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Evidence from Europe
## Industry forecasting results

Industry employment; Forecast horizon: 3 months

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<td>(−3.491)</td>
<td>(−3.534)</td>
<td>(−4.609)</td>
</tr>
<tr>
<td>$S_{t}^{Loan}$</td>
<td>−0.239</td>
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</tr>
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<td></td>
<td>(−3.818)</td>
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<tr>
<td>Year x quarter fixed effects</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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<td>Industry fixed effects</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Adjusted $R^2$</td>
<td>0.452</td>
<td>0.558</td>
<td>0.590</td>
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<td>Incremental $R^2$</td>
<td>+ 0.086</td>
<td>+0.192</td>
<td>+0.224</td>
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## Industry Forecasting Results

Industry employment; Forecast horizon: 3 months

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<tr>
<td>( S_{t}^{Loan} )</td>
<td>−0.239</td>
</tr>
<tr>
<td></td>
<td>(−3.818)</td>
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<table>
<thead>
<tr>
<th>Year x quarter fixed effects</th>
<th>No</th>
<th>Yes</th>
<th>Yes</th>
</tr>
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<tbody>
<tr>
<td>Industry fixed effects</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Adjusted R^2</td>
<td>0.452</td>
<td>0.558</td>
<td>0.590</td>
</tr>
<tr>
<td>Incremental R^2</td>
<td>+0.086</td>
<td>+0.192</td>
<td>+0.224</td>
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<tr>
<td>Observations</td>
<td>803</td>
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### From Spread to Premia

**Decomposing the Loan Spread**

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<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
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<tbody>
<tr>
<td>$DD_{bt}$</td>
<td>$-0.357$</td>
<td>$-0.434$</td>
<td>$-0.435$</td>
<td>$-0.417$</td>
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<tr>
<td></td>
<td>($-35.251$)</td>
<td>($-51.707$)</td>
<td>($-52.299$)</td>
<td>($-51.264$)</td>
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</tr>
<tr>
<td>$DD_{bt}^2$</td>
<td>$0.022$</td>
<td>$0.028$</td>
<td>$0.028$</td>
<td>$0.027$</td>
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</tr>
<tr>
<td></td>
<td>($26.631$)</td>
<td>($41.476$)</td>
<td>($41.888$)</td>
<td>($39.779$)</td>
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</tr>
<tr>
<td>$\sigma DD_{bt}$</td>
<td>$0.023$</td>
<td>$0.010$</td>
<td>$0.010$</td>
<td>$0.010$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>($6.965$)</td>
<td>($3.648$)</td>
<td>($3.582$)</td>
<td>($4.734$)</td>
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</tr>
<tr>
<td>$Ln(AISD)$</td>
<td>$0.735$</td>
<td>$0.732$</td>
<td>$0.642$</td>
<td>$0.685$</td>
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</tr>
<tr>
<td></td>
<td>($38.270$)</td>
<td>($34.482$)</td>
<td>($29.518$)</td>
<td>($32.143$)</td>
<td></td>
</tr>
<tr>
<td>$Ln(Age)$</td>
<td>$0.075$</td>
<td>$0.075$</td>
<td>$0.067$</td>
<td>$0.040$</td>
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</tr>
<tr>
<td></td>
<td>($31.564$)</td>
<td>($31.618$)</td>
<td>($30.144$)</td>
<td>($13.797$)</td>
<td></td>
</tr>
<tr>
<td>$Ln(Amount)$</td>
<td>$-0.078$</td>
<td>$-0.078$</td>
<td>$-0.061$</td>
<td>$-0.093$</td>
<td></td>
</tr>
<tr>
<td>Secured(0/1)</td>
<td>$-0.018$</td>
<td>$0.012$</td>
<td>$0.086$</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>($-0.760$)</td>
<td>($0.499$)</td>
<td>($3.284$)</td>
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</tr>
<tr>
<td>Covenants(0/1)</td>
<td>$-0.011$</td>
<td>$0.011$</td>
<td>$0.035$</td>
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<tr>
<td></td>
<td>($-0.826$)</td>
<td>($0.870$)</td>
<td>($2.611$)</td>
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<tr>
<td>Senior(0/1)</td>
<td>$0.018$</td>
<td>$0.089$</td>
<td>$0.025$</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>($0.404$)</td>
<td>($1.006$)</td>
<td>($4.646$)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loan type fixed effects</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Industry fixed effects</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Rating fixed effects</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>Adjusted $R^2$</td>
<td>$0.087$</td>
<td>$0.407$</td>
<td>$0.407$</td>
<td>$0.456$</td>
<td>$0.315$</td>
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<tr>
<td>Observations</td>
<td>287,811</td>
<td>287,811</td>
<td>287,811</td>
<td>287,811</td>
<td>287,811</td>
</tr>
</tbody>
</table>

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

### Industrial Production; Forecast horizon: 3 months

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta S^L_{t,\text{Loan}}$ [Base]</td>
<td>-0.410 (-5.727)</td>
<td></td>
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<tr>
<td>$\Delta S^L_{t,\text{Loan}}$ [Industry]</td>
<td></td>
<td>-0.445 (-6.236)</td>
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<td></td>
</tr>
<tr>
<td>$\Delta S^L_{t,\text{Loan}}$ [EFD]</td>
<td></td>
<td></td>
<td>-0.443 (-4.805)</td>
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</tr>
<tr>
<td>$\Delta S^L_{t,\text{Loan}}$ [ML]</td>
<td></td>
<td></td>
<td></td>
<td>-0.449 (-5.162)</td>
</tr>
</tbody>
</table>

- 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?
LOAN SPREAD - SMALL v LARGE FIRMS

Aggregate Loan Spread – Small v Large Firms

Small minus Large Loan Spread %

Effect by firm size

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta S_{t}^{Loan}$ [Small firms]</td>
<td>-0.377</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-4.177)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta S_{t}^{Loan}$ [Large firms]</td>
<td></td>
<td>-0.263</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-3.411)</td>
<td></td>
</tr>
<tr>
<td>$\Delta S_{t}^{Loan}$ [Private firms]</td>
<td></td>
<td></td>
<td>-0.429</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(-5.465)</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.296</td>
<td>0.227</td>
<td>0.320</td>
</tr>
<tr>
<td>Incremental $R^2$</td>
<td>+0.133</td>
<td>+0.064</td>
<td>+0.157</td>
</tr>
<tr>
<td>Observations</td>
<td>241</td>
<td>241</td>
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</tbody>
</table>

• Size based on total assets

• Private = issuer cannot be matched to Compustat
## Effect by Firm Age

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>( \Delta S_t^{Loan} ) [Young firms]</td>
<td>-0.340 (-4.525)</td>
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<td></td>
</tr>
<tr>
<td>( \Delta S_t^{Loan} ) [Old firms]</td>
<td></td>
<td>-0.290 (-2.795)</td>
<td></td>
</tr>
<tr>
<td>( \Delta S_t^{Loan} ) [Private firms]</td>
<td></td>
<td></td>
<td>-0.429 (-5.465)</td>
</tr>
<tr>
<td>Adjusted R^2</td>
<td>0.270</td>
<td>0.255</td>
<td>0.320</td>
</tr>
<tr>
<td>Incremental R^2</td>
<td>+0.107</td>
<td>+0.078</td>
<td>+0.157</td>
</tr>
<tr>
<td>Observations</td>
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</table>

Industrial Production; Forecast horizon: 3 months
### Credit conditions — Europe

Credit conditions based on loan officer surveys

<table>
<thead>
<tr>
<th></th>
<th>Column (1)</th>
<th>Column (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Germany</strong></td>
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<td></td>
</tr>
<tr>
<td>$\Delta S_t^{Loan}$</td>
<td>0.376</td>
<td>0.159</td>
</tr>
<tr>
<td></td>
<td>(3.748)</td>
<td>(1.182)</td>
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<tr>
<td>$\Delta S_t^{Bond}$</td>
<td></td>
<td></td>
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<tr>
<td>Adjusted $R^2$</td>
<td>0.128</td>
<td>0.011</td>
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<tr>
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<td>70</td>
<td>70</td>
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<tr>
<td><strong>France</strong></td>
<td></td>
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<tr>
<td>$\Delta S_t^{Loan}$</td>
<td>0.480</td>
<td>0.329</td>
</tr>
<tr>
<td></td>
<td>(3.545)</td>
<td>(1.436)</td>
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<tr>
<td>$\Delta S_t^{Bond}$</td>
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<tr>
<td>Adjusted $R^2$</td>
<td>0.218</td>
<td>0.094</td>
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<tr>
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<td>64</td>
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<tr>
<td><strong>Spain</strong></td>
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<tr>
<td>$\Delta S_t^{Loan}$</td>
<td>0.370</td>
<td>0.176</td>
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<td></td>
<td>(2.018)</td>
<td>(1.008)</td>
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<tr>
<td>$\Delta S_t^{Bond}$</td>
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<tr>
<td>Adjusted $R^2$</td>
<td>0.122</td>
<td>0.015</td>
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Credit conditions and bank health II

<table>
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<tr>
<th></th>
<th>ROA (7)</th>
<th>ROA (8)</th>
<th>ROA (9)</th>
<th>LLP (10)</th>
<th>LLP (11)</th>
<th>LLP (12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \Delta S_{t}^{Loa} )</td>
<td>-0.430** ((-2.163))</td>
<td>-0.492** ((-2.118))</td>
<td>0.465** ((2.203))</td>
<td>0.304** ((2.454))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \Delta S_{t}^{Bond} )</td>
<td>-0.282 ((-1.234))</td>
<td>0.084 ((0.286))</td>
<td>0.442 ((1.604))</td>
<td>0.216 ((0.613))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted R(^2)</td>
<td>0.174</td>
<td>0.068</td>
<td>0.167</td>
<td>0.206</td>
<td>0.185</td>
<td>0.217</td>
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<tr>
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<td>81</td>
<td>81</td>
<td>81</td>
<td>81</td>
<td>81</td>
</tr>
</tbody>
</table>

- 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
Uncertainty proxies contain predictive power for future economic conditions

Uncertainty can, however, not explain the incremental predictive power of the loan spread
**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 overreact in the opposite direction (Bordalo, Gennaioli, and Shleifer (2018)).

- Our focus is 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)
References I


REFERENCES II


REFERENCES III


REFERENCES V


