Bank manager sentiment, loan growth and bank risk

EEA Conference 2023

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August 30, 2023

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However, little is known about how **banks' investment decisions** could be related with their **managers' sentiment**.

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However, little is known about how **banks' investment decisions** could be related with their **managers' sentiment**.

Why is it important to study bank managers' sentiment?

- Overly optimistic managers ⇒ **Financial stability** implications
- Overly pessimistic managers ⇒ **Under-financing the economy**

Research question: Is there evidence for over-optimism/over-pessimism of bank managers and is it related to banks' lending policy?

Based on earnings press releases of more than 200 banks from developed European markets between 2006H1 and 2019H2 (source: S&P Capital IQ).

Example of press release

Data - Textual tone score

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Two alternative approaches to calculate it:

- The dictionary (DICT) approach (Loughran and McDonald, 2011)
  ⇒ Focus of this presentation
- The machine-learning (ML) approach (Yang et al., 2020)
  ⇒ Skipped but similar results

Example of press release

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Data - Textual tone score - DICT approach

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3. For each press release from bank i at time t, calculate the following **textual tone score**:

$$tone_{i,t} = \frac{(\#\ of\ positive\ words_{i,t}) - (\#\ of\ negative\ words_{i,t})}{Total\ \#\ of\ words_{i,t}}$$

$$tone_{i,t} = pos_{i,t} - neg_{i,t}$$

Example - DICT approach

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4. In addition, we take **negations** into account.

Example - DICT approach

Figure 1: Textual tone score averaged over time

Figure 2: Textual tone score - distribution over time
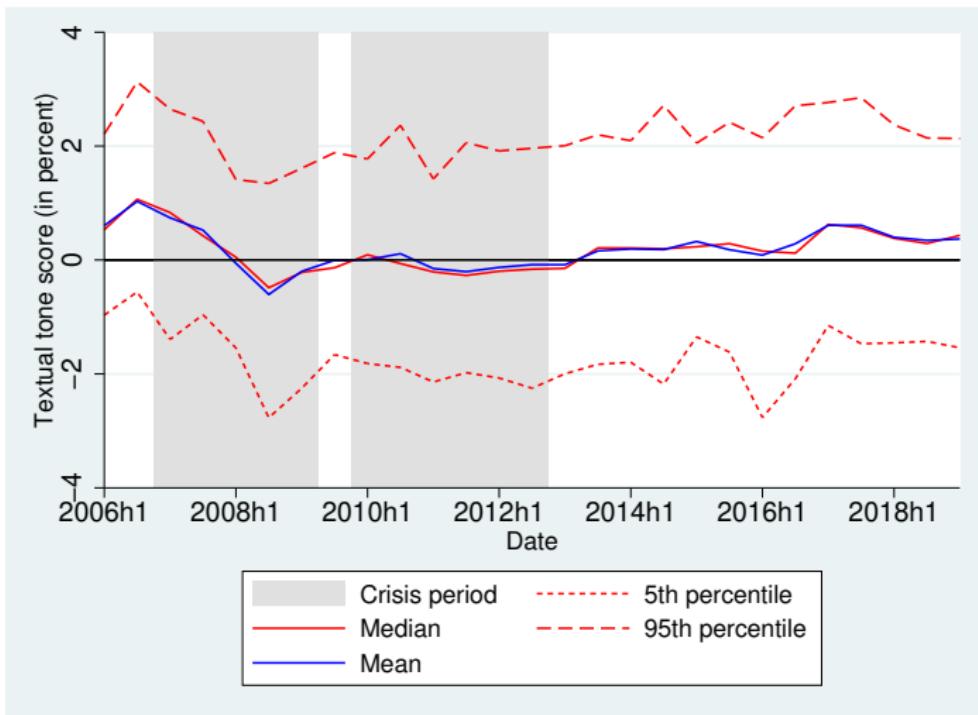
A clear link with bank & macro fundamentals

$$tone_{i,t} = X_{i,t}^{profit} \beta^{profit} + X_{i,t}^{bm} \beta^{bm} + X_{c(i),t}^{macro} \beta^{macro} + u_i + v_h + \epsilon_{i,t},$$

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	$tone_{i,t}$
$\left(\frac{\text{impairments}}{\text{assets}}\right)_{i,t}$	-0.12***
	(0.02)
$\left(\frac{\text{operating income}}{\text{assets}}\right)_{i,t}$	0.10*
	(0.06)
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$ln(assets)_{i,t}$	0.29
	(0.26)
$loans_{i,t}$	0.05
	(0.07)
$deposits_{i,t}$	0.22**
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$equity_{i,t}$	0.10**
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	$tone_{i,t}$
$\Delta GDP_{c(i),t}$	0.07***
	(0.02)
$inflation_{c(i),t}$	-0.00
	(0.02)
interbank rate$_{c(i),t}$	0.13***
	(0.04)
term spread$_{c(i),t}$	-0.08**
	(0.03)
OIS spread$_{c(i),t}$	-0.14***
	(0.02)
$imputed$	0.05
	(0.06)
Constant	0.98***
	(0.10)
Bank FE	Yes
Season FE	Yes
N	2,805
R^2	0.59
Adj. R^2	0.56

A clear link with bank & macro fundamentals

$$tone_{i,t} = X^{profit}_{i,t} \beta^{profit} + X^{bm}_{i,t} \beta^{bm} + X^{macro}_{c(i),t} \beta^{macro} + u_i + v_h + \epsilon_{i,t},$$

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The bank manager sentiment

In the next slides, we study the tone score while controlling for macroeconomic and banks' fundamentals $\Rightarrow$ interpretation of the orthogonal part $=$ **bank manager sentiment**.

We then focus on the bank manager sentiment and study:

- its **extrapolative structure**.
- its relationship with subsequent **loan growth**.
- its relationship with **systemic risk**.
- its relationship with **financial performance indicators**.

Extrapolative structure of sentiment

$$tone_{i,t} = \alpha + \sum_{l=1}^{L} \beta_l tone_{i,t-l} + \sum_{l=0}^{L} \gamma_l X_{i,t-l} + u_i + v_h + \epsilon_{i,t}$$

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	t	$t-1$	$t-2$
$\left(\frac{impairments}{assets}\right)_{i,...}$	-0.14***	0.00	-0.03**
	(0.04)	(0.02)	(0.02)
$\left(\frac{operating\ income}{assets}\right)_{i,...}$	0.22***	-0 .06	0.04
	(0.08)	(0.05)	(0.04)
$\left(\frac{operating\ expenses}{assets}\right)_{i,...}$	-0.21**	-0.04	-0.06
	(0.09)	(0.08)	(0.07)
$\Delta GDP_{c(i)...}$	0.06**	0.09***	0.04
	(0.03)	(0.03)	(0.03)
interbank rate$_{c(i)...}$	-0.22**	0.33***	-0.04
	(0.11)	(0.12)	(0.11)
term spread$_{c(i)...}$	0.14**	-0.03	0.02
	(0.06)	(0.08)	(0.05)
OIS spread$_{c(i)...}$	-0.14***	-0.09	0.05
	(0.04)	(0.06)	(0.04)
$tone_{i,...}$		0.10**	0.13***
		(0.05)	(0.04)
Constant			-0.05
			(0.07)
N			1933
R^2			0.68
Adj. R^2			0.64

Loan growth prediction of sentiment

$$loan\ growth_{i,t+1} = \alpha + \beta tone_{i,t} + \gamma X_{i,t} + u_i + w_{c(i),t} + \epsilon_{i,t}$$

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	$loan\ growth_{i,t+1}$
$tone_{i,t}$	0.0803**
	(0.0319)
imputed	-0.0315
	(0.0845)
Constant	-5.0900
	(9.0336)
Controls	Yes
Bank FE	Yes
Country-time FE	Yes
N	2208
R^2	0.4508
Adj. R^2	0.307

Systemic risk and sentiment

Measure used here (Brownlees and Engle, 2016):

$$SRISK_{i,t} = E_{i,t}\left[k * LVG_{i,t} + (1-k) * LRMES_{i,t} - 1\right]$$

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- k = leverage ratio requirement (3%)
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- k = leverage ratio requirement (3%)
- $LVG_{i,t} = \frac{E_{i,t} + Debt_{i,t}}{E_{i,t}}$
- $LRMES_{i,t}$ = Long Run Marginal Expected Shortfall

Figure 3: The distribution of SRISK over the sample period
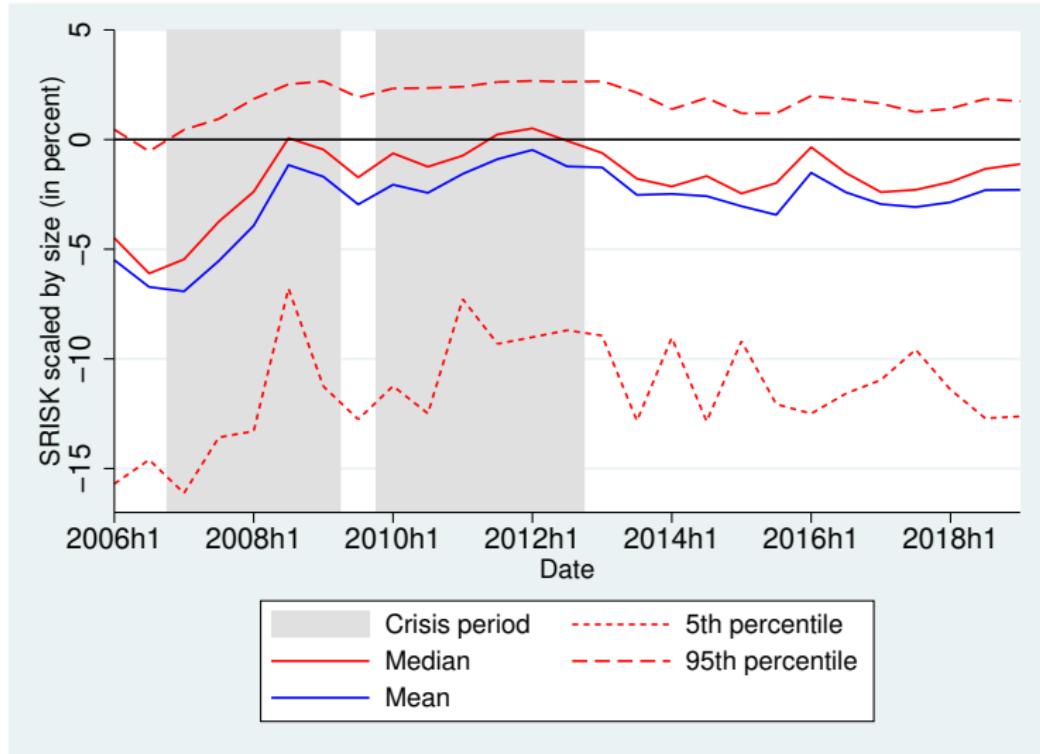
Systemic risk and sentiment

$$SRISK_{i,t+1} = \alpha + SRISK_{i,t} + \beta_1 \times loangrowth_{i,t}$$
$$+ \beta_2 \times tone_{i,t} + \beta_3 \times tone_{i,t} \times loangrowth_{i,t}$$
$$+ X_{i,t}\gamma + u_i + w_{c,t} + \epsilon_{i,t+1}$$

Systemic risk and sentiment

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$$+ X_{i,t}\gamma + u_i + w_{c,t} + \epsilon_{i,t+1}$$

	(1) $SRISK_{i,t+1}$	(2) $SRISK_{i,t+1}$	(3) $SRISK_{i,t+1}$
$loangrowth_{i,t}$	0.0013	0.0019	0.0040
	(0.0101)	(0.0101)	(0.0099)
$tone_{i,t}$		-0.0272**	-0.0204*
		(0.0132)	(0.0119)
$loangrowth_{i,t} \times tone_{i,t}$			-0.0254
			(0.0185)
$SRISK_{i,t}$	0.4229***	0.4207***	0.4214***
	(0.0596)	(0.0587)	(0.0560)
Constant	21.0017	20.7769	21.2870
	(29.3188)	(30.0985)	(29.2500)
Controls	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes
Country-time fixed effects	Yes	Yes	Yes
N	1169	1169	1169
R^2	NA	NA	NA
Adj. R^2	NA	NA	NA

Financial performance prediction of sentiment

$$finperf_{i,t+2} = \alpha + \beta_1\, tone_{i,t+1} + \beta_2\, tone_{i,t} + \gamma_1 \mathsf{X}_{i,t+1} + \gamma_2 \mathsf{X}_{i,t} + u_i + w_{c(i),t} + \epsilon_{i,t+2}$$

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	(1) $\left(\frac{\text{Loan Loss Reserves}}{\text{Gross Loans}}\right)_{i,t+2}$	(2) $\left(\frac{\text{Interest Income}}{\text{Total Assets}}\right)_{i,t+2}$	(3) $\left(\frac{\text{Interest Expenses}}{\text{Total Assets}}\right)_{i,t+2}$	(4) $ROAE_{i,t+2}$	(5) $ROAA_{i,t+2}$	(6) $EPS_{i,t+2}$
$tone_{i,t+1}$	-0.0204*	0.0139	0.0037	0.0000	0.0000	-0.0210
	(0.0116)	(0.0137)	(0.0159)	(0.0000)	(0.0000)	(0.0427)
$tone_{i,t}$	0.0071	-0.0211*	-0.0131	-0.0000*	-0.0000	-0.1252
	(0.0108)	(0.0123)	(0.0138)	(0.0000)	(0.0000)	(0.0814)
imputed	0.0060	0.0593	0.0410	-0.0000	-0.0000	0.0240
	(0.0270)	(0.0384)	(0.0454)	(0.0000)	(0.0000)	(0.1009)
Constant	10.8417	-8.6801	18.7439	-0.0931***	-0.0922	-33.5003
	(11.8348)	(15.8382)	(16.5434)	(0.0012)	(.)	(28.1969)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-time FE	Yes	Yes	Yes	Yes	Yes	Yes
N	1877	1817	1815	1891	1894	1458
R^2	0.8972	0.8787	0.8923	0.6584	0.7184	0.4808
Adj. R^2	0.866	0.840	0.858	0.555	0.634	0.270

Main results

- Bank manager sentiment backward-looking.
- Bank manager sentiment positively associated with loan growth rates and negatively with SRISK over the subsequent six months.
- However, no clear link with subsequent finanical performance of the bank over the next twelve months (even negative in some cases).
- Implications in terms of financial stability / economy financing.

Example of earnings press release

Example:

Overall, the first quarter was a good start to the year but we caution not to extrapolate this result as is traditionally the best quarter of the year.

Negations	Conjunctions
Positive words	**Negative words**
Positive words negated	**Negative words negated**

In the example above, $N_{i,t}^{pos} = 1$, $N_{i,t}^{neg} = 2$, and $N_{i,t} = 28$. Hence, $tone_{i,t} = -\frac{1}{28}$.

Back to DICT approach

Figure 4: Average textual tone score taking or not into account negations
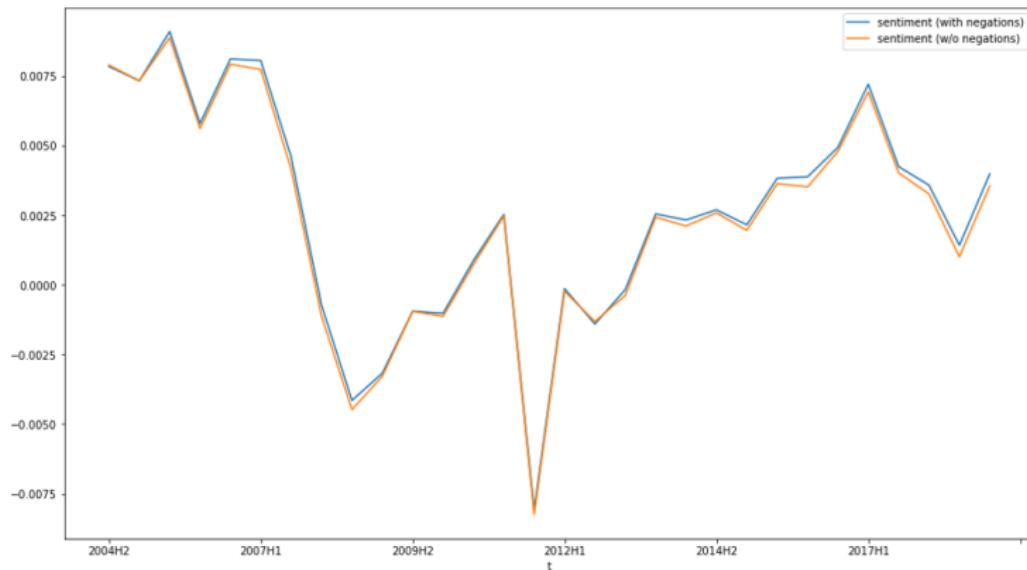
Figure 5: Textual tone score: effect of taking negations into account at the micro-level
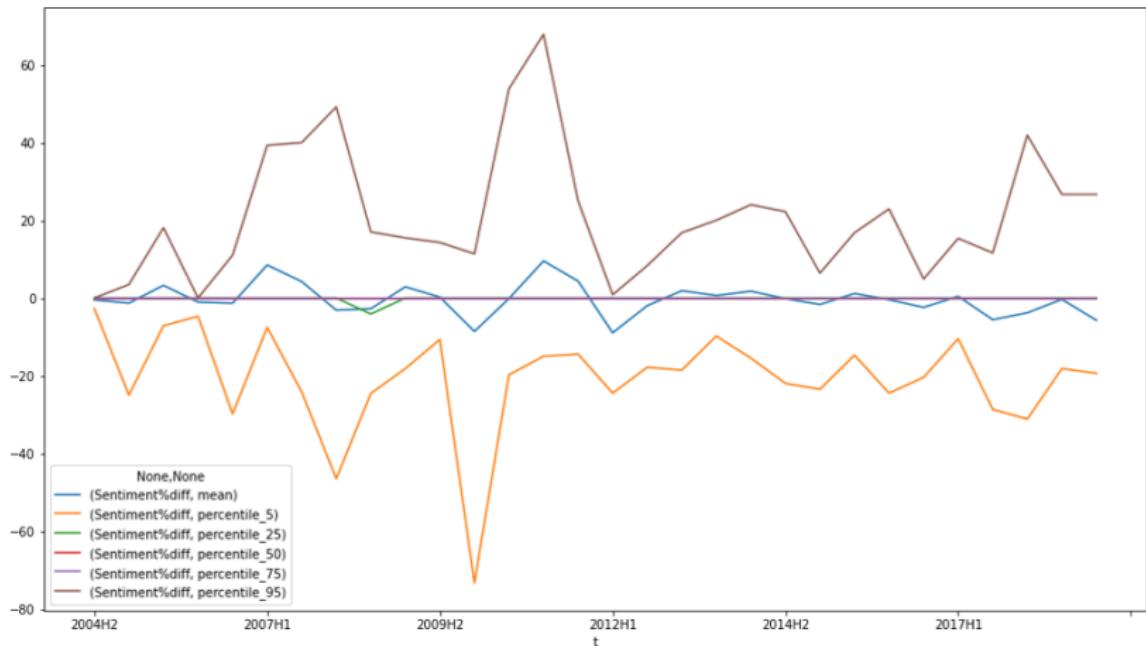
Figure 6: Distribution of the share of negations in the press release documents
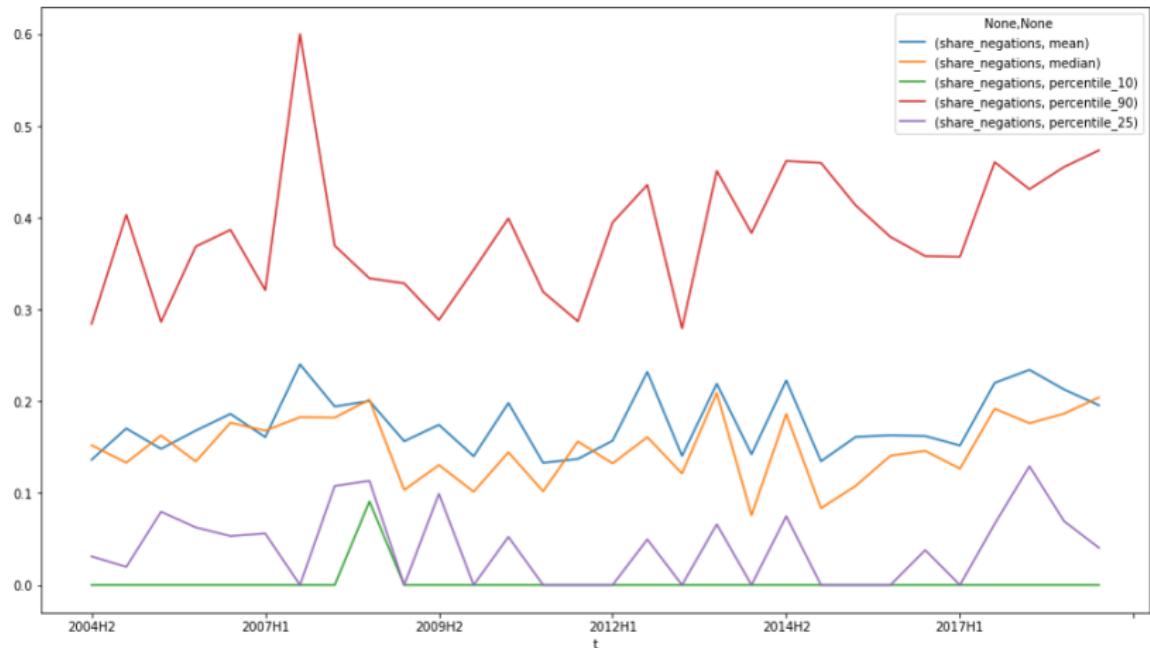
Figure 7: Textual tone score averaged over time (DICT approach)
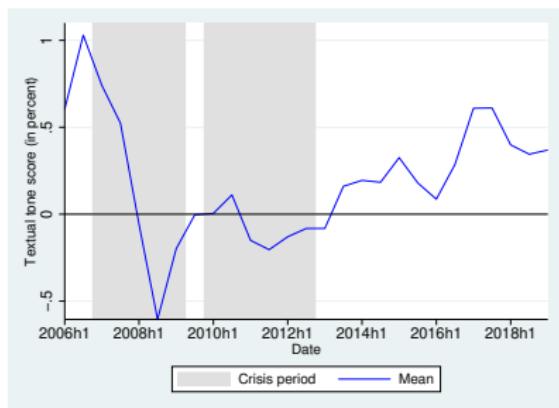
Figure 8: Textual tone score averaged over time (ML approach)
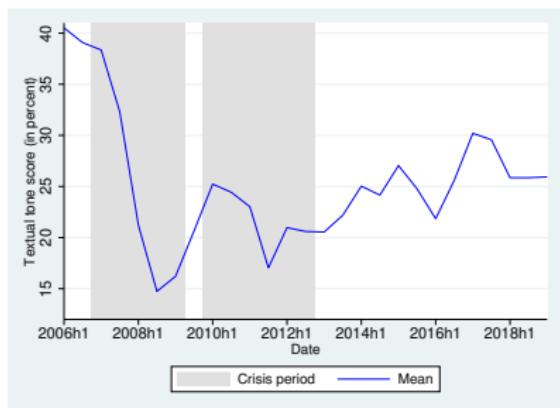
Back to tone score distribution

Figure 9: Textual tone score distribution over time (DICT approach)
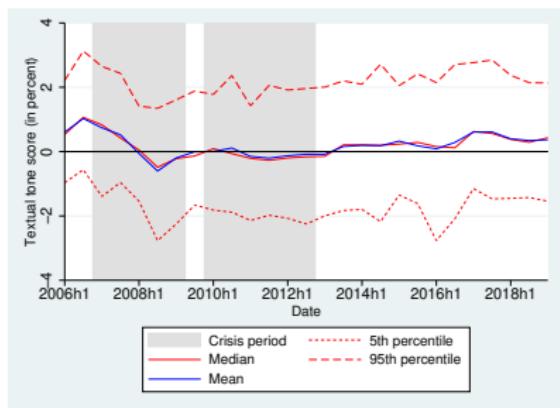
Figure 10: Textual tone score distribution over time (ML approach)
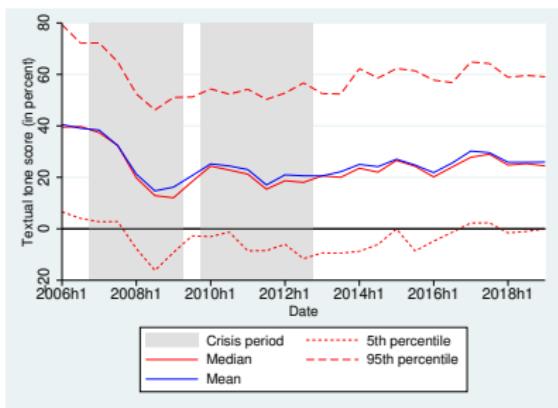
Back to tone score distribution

Textual tone score - DICT vs ML approach

**Table 1:** Regression of the tone score (machine learning approach) over the tone score (dictionary approach)

	$tone_t(ML)$	$tone_t(ML)$	$tone_t(ML)$
$tone_t(DICT)$	11.19***	10.23***	8.96***
	(0.20)	(0.24)	(0.25)
Constant	0.23***	0.38***	0.53***
	(0.00)	(0.09)	(0.09)
Bank fixed effects	No	Yes	Yes
Time fixed effects	No	No	Yes
N	3316	3316	3316
R^2	0.50	0.64	0.67
Adjusted R^2	0.49	0.61	0.64

Back to tone score distribution

Textual tone score - DICT vs ML approach

Table 2: Spearman's rank correlation (ρ) between the tone score from the dictionary and from the machine learning approaches

Time window	ρ	N	Time window	ρ	N
Full period	0.7242***	3316	2012h2	0.7228***	129
2006h1	0.5971***	83	2013h1	0.6862***	127
2006h2	0.7447***	97	2013h2	0.7281***	137
2007h1	0.6444***	101	2014h1	0.7713***	131
2007h2	0.7465***	112	2014h2	0.7510***	131
2008h1	0.6541***	112	2015h1	0.6739***	114
2008h2	0.6613***	123	2015h2	0.6948***	131
2009h1	0.7641***	122	2016h1	0.7757***	127
2009h2	0.6742***	141	2016h2	0.7454***	123
2010h1	0.5848***	127	2017h1	0.7781***	128
2010h2	0.7345***	144	2017h2	0.7124***	129
2011h1	0.6301***	133	2018h1	0.7077***	129
2011h2	0.6090***	142	2018h2	0.8184***	115
2012h1	0.6964***	117	2019h1	0.6265***	109

Back to tone score distribution

Table 3: Summary statistics

| Variables | Textual tone score sample | | | | | | No textual tone score available | | | | | |
	N	mean	std	p5	p50	p95	N	mean	std	p5	p50	p95
Panel A: Bank-level												
1) Balance sheet and income												
ta (in billion Euros)	3,033	228.26	428.94	1.45	45.33	1275.13	3,922	48.06	155.43	0.37	10.71	176.67
loans (in %)	3,022	59.38	18.21	23.71	62.03	84.17	3,896	65.22	20.11	19.44	69.80	87.40
cash (in %)	3,027	4.45	5.59	0.09	2.35	15.391	3,841	5.41	9.54	0.13	1.92	18.71
secs (in %)	3,006	22.29	14.15	4.93	19.33	51.40	3,867	17.70	13.48	1.24	14.88	40.73
deposits (in %)	3,021	51.16	19.39	18.55	51.84	81.96	3,892	50.72	24.16	0.00	55.95	82.27
equity (in %)	3,031	7.05	3.89	2.60	6.46	14.08	3,908	6 8.53	6.15	2.12	7.71	16.47
intinc (in %)	3,033	60.54	21.96	21.14	60.42	100.00	3,922	66.44	21.10	27.03	67.58	100.00
loangrowth (in %)	2,792	2.32	13.06	-7.82	1.39	15.19	3,393	2.63	16.79	-8.22	1.65	13.47
2) Profitability												
opinc (in %)	3,016	1.33	0.88	0.34	1.23	2.64	3,815	1.45	1.44	0.15	1.19	3.21
opexp (in %)	3,020	0.85	0.55	0.21	0.76	1.71	3,812	0.92	1.20	0.07	0.70	2.06
impair (in %)	3,006	0.30	0.75	-0.02	0.11	1.15	3,839	0.27	0.67	-0.04	0.11	1.04
Panel B: Macro-level												
gdp (in %)	3,033	1.22	1.92	-2.08	1.33	3.77	3,886	1.28	1.93	-2.04	1.39	3.82
infl (in %)	3,033	0.71	0.80	-0.40	0.61	2.08	3,886	0.75	0.79	-0.39	0.65	2.21
interbank (in %)	3,033	1.07	1.65	-0.33	0.53	4.67	3,886	1.05	1.61	-0.50	0.52	4.67
term (in %)	3,031	1.71	2.22	-0.46	1.18	4.96	3,884	1.30	1.66	-0.37	0.92	4.08
ois (in %)	2,852	0.26	0.30	0.02	0.14	0.76	3,753	0.27	0.30	0.01	0.20	0.84

Back to tone score validity