

Detecting Deceptive Discussions in Conference Calls

David Larcker and Anastasia Zakolyukina

Linguist 287

Why Conference Calls?

1. Observed **restatements** of financials
2. Q&A section is relatively **unscripted**
3. Poor performance of **accounting models**

Psychological Perspectives

1. **Emotions:** guilt, fear
2. **Cognitive effort:** hard to lie
3. **Attempted control:** caution vs. extensive rehearsal
4. **Lack of embracement:** lack conviction, no personal experience

Research Design

- Bag-of-words
- LIWC + self-constructed categories
- Logistic model: **deceptive** vs. **non-deceptive**
- **Unbalanced** classes
- **Out-of-sample** evaluation with 10-fold cross-validation 10 times

LIWC+ self-constructed categories

1. Reference to general knowledge, e.g. you know, you would agree
2. Shareholders value, e.g. shareholder value, value for investors
3. Value creation, e.g. create value, delivering value
4. Extreme positive emotions, e.g. fantastic, superb
5. Extreme negative emotions, e.g. absurd, insane

Word Categories: deception

Less(-)

More(+)

WC

References

I

we

they ipron genknlref

Positives/Negatives

assent posemone

negate anx anger swear
negemoextr

posemoextr

Cognitive process

certain

tentat

Other cues

hesit shvalue value

Data

- Quarterly Earnings Conference Calls for U.S. firms 2003 - 2007
- FactSet Research Systems Inc.: answers of CFO/CEO from Q&A
- Glass, Lewis & Co. 2003-2009: restatements
- Point-In-Time: originally reported and restated figures
- Compustat, CRSP: replication of Correia (2009)

Deception Criteria

Key assumption

Executive **knows** that **false figures** are reported



More serious restatement is more likely to have deception cues

Serious Restatement = Deceptive Instance

1. Material weakness disclosure or
2. Late filing or
3. Auditor change or
4. Form 8-K filing

Deception Criteria

Size of Restatement: aggregate

Company	Filing date	Restated quarters
Bally Total Fitness Holding Corp.	2004-03-30	Q1 2000 - Q4 2002
Bally Total Fitness Holding Corp.	2005-11-30	Q1 2000 - Q1 2004
Bally Total Fitness Holding Corp.	2006-06-27	Q1 2005 - Q3 2005

⇒ Q3 2005 : $ndNIQ_SUM = 26\%$

Criteria

NT, AS25 (0.06%), AS50 (0.21%), PS25 (0.06%), PS50 (0.24%)

Contingency table

		Predicted Class (PC)	
		Deceptive(B)	Truthful(W)
Actual Class (AC)	Deceptive(B)	True Positives	False Negatives
	Truthful(W)	False Positives	True Negatives

$$Accuracy = \frac{TP + TN}{TP + TN + FP + FN}, \quad Precision = \frac{TP}{TP + FP}$$

$$TPR = \frac{TP}{TP + FN}, \quad FPR = \frac{FP}{FP + TN}$$

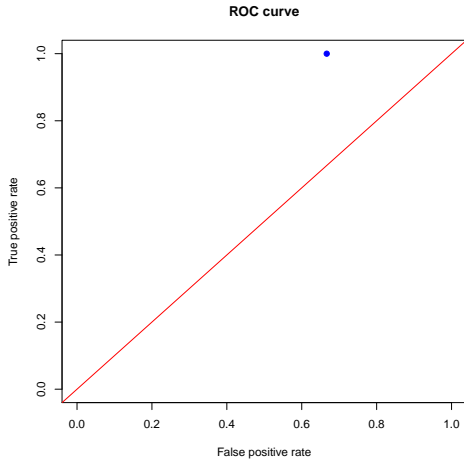
ROC Curve: Simple Example (1)

Cutoff = 0.3

W	W	B	W	B
0.1	0.4	0.5	0.7	0.8

		PC	
		B	W
AC	B	2	0
	W	2	1

$$TPR = \frac{2}{2}, FPR = \frac{2}{3}$$



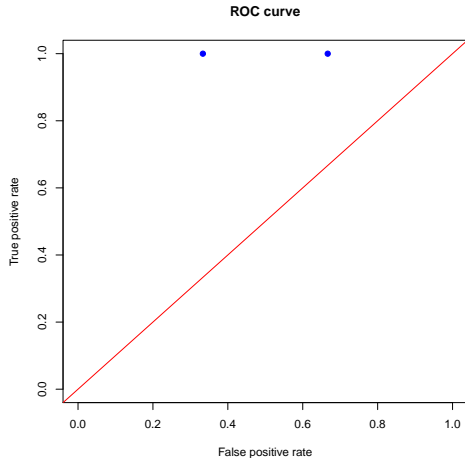
ROC Curve: Simple Example (2)

Cutoff = 0.45

W	W	B	W	B
0.1	0.4	0.5	0.7	0.8

		PC	
		B	W
AC	B	2	0
	W	1	2

$$TPR = \frac{2}{2}, FPR = \frac{1}{3}$$



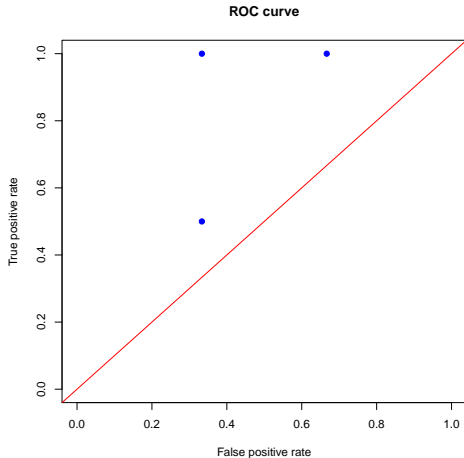
ROC Curve: Simple Example

Cutoff = 0.6

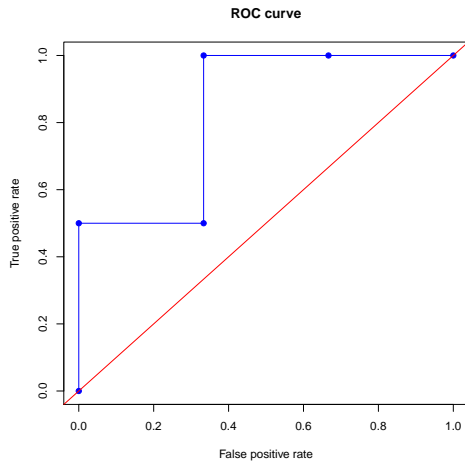
W	W	B	W	B
0.1	0.4	0.5	0.7	0.8

		PC	
		B	W
AC	B	1	1
	W	1	2

$$TPR = \frac{1}{2}, \quad FPR = \frac{1}{3}$$



ROC Curve

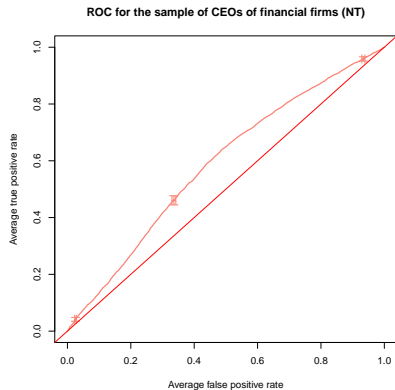


Cross-validation: K folds

1. Randomly split the data into K folds
2. Fix k th fold
3. Estimate classifier using K-1 fold
4. Apply/evaluate classifier using k th fold
5. Rotate folds

10-fold cross-validation 10 times \rightarrow 100 out-of-sample performances

ROC for CEOs of financial firms (NT)



Financial Firms: NT

	Panel A: CEO	Panel B: CFO
Sample composition		
Total firm-quarters	1533	1265
Deceptive firm-quarters	160	130
Deceptive firm-quarters(%)	10.44	10.28
AUC, Precision, and Accuracy in %		
AUC (t-test vs. 50 %)	58.93 (20.26)	53.56 (6.37)
Precision	13.76	11.57
Accuracy	64.27	62.61

CEOs: NT, AS50

Sample composition		
	NT	AS50
Total firm-quarters	16577	16577
Deceptive firm-quarters	2252	825
Deceptive firm-quarters(%)	13.59	4.98
AUC, Precision, and Accuracy in %		
AUC (t-test vs. 50 %)	56.37 (32.05)	56.29 (21.22)
Precision	16.73	5.84
Accuracy	65.03	53.07

CFOs: NT, AS50

Sample composition		
	NT	AS50
Total firm-quarters	14462	14462
Deceptive firm-quarters	2053	720
Deceptive firm-quarters(%)	14.2	4.98
AUC, Precision, and Accuracy in %		
AUC (t-test vs. 50 %)	56.35 (33.53)	54.83 (16.23)
Precision	16.80	5.70
Accuracy	58.31	52.43

CEO sample (N = 16,577)(1)

		NT	AS25	AS50
Word count				
<i>wc</i> [‡]	+/-			1.10*
References				
I	-	0.93**		
we	+	0.94***		1.05*
they	+/-			1.24***
ipron	+/-			1.08***
genknref	+/-	1.49***	1.23***	

CEO sample (N = 16,577)(2)

		NT	AS25	AS50
Positives/Negatives				
assent	–			1.30*
posemone	–	0.93**		
posemoextr	+/-	1.23***		
anx	+	0.67*	0.47**	0.43**
swear [†]	+	0.86**		0.78**
negemoextr	+	0.76**	0.67**	0.63*
Cognitive mechanism				
certain	–			0.85**
Other cues				
hesit [†]	+/-			0.88*
shvalue [†]	+/-	0.84*		
value [†]	+/-	0.75**	0.65***	0.67**

CFO sample

NT, AS25, AS50

Less(-)

More(+)

wc

References

they

genknref

Positives/Negatives

posemone anx

assent

Cognitive process

certain tentat

Other cues

shvalue value

Accounting vs. Linguistics: AUC

NT

	mean %	t-test vs 50%	CFO	DAC
CEO	55.92	18.65	0.80	6.40
CFO	55.59	18.10		5.95
DAC	52.91	9.01		
DAC +CEO	56.47	19.52		
DAC +CFO	55.73	19.17		
DAC +CEO+CFO	57.86	24.30		

Unadjusted vs. Adjusted: NT

Panel A: CEO			
	Unadjusted	Adjusted	t-test
AUC (t-test vs. 50%)	60.20(15.30)	56.99(11.52)	4.27
Precision	2.96	2.74	3.03
Accuracy	61.68	61.22	2.34
Panel B: CFO			
	Unadjusted	Adjusted	t-test
AUC (t-test vs. 50%)	50.50(0.73)	56.14(7.42)	-5.70
Precision	2.00	2.26	-3.26
Accuracy	54.37	61.86	-28.40

Takeaways

- Out-of-sample superiority over random by 4%-6% for CEOs/CFOs
- Out-of-sample accuracy is 50% - 65% for CEOs/CFOs
- Out-of-sample improvement over an accounting model
- Deceptive CEOs vs. Deceptive CFOs