

Earnings call與股價 平均異常報酬率的關聯

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摘要

01

研究背景(我們如何發現問題)

1. 法說會(Earnings call)對投資者而言, 是了解公司或產業的捷徑。
(財報數字需要文字賦予解釋意義, 才能讓投資人更好了解)
2. 股價產生波動時機, 往往與市場消息面有關(譬如:法說會)。
3. 近來文字探勘技術成熟。

02

研究動機(我們的問題)

Earnings call與股價變動有甚麼關聯嗎?

03

研究目的(我們想要解決的問題)

1. Earnings call文本用斷詞還是斷句分析會比較準確?
2. 發布日前後的平均異常報酬率與文本分析結果的關聯?

04

研究過程(我們如何解決)

1. 研究發佈日前/後之股價變動(平均異常報酬率), 並利用迴歸檢定得出。
2. 對法說會內容進行文字探勘, 得出文本的情緒(正向、中立、負向)與主客觀, 及觀察斷詞、斷句分析的差異。
3. 採用事件研究法, 了解文本與股價變動之間的關係。

名詞介紹

全名「對法人投資機構的業績說明會」(美股法說會稱為Earnings Call)。

法說會目的是說明公司目前營運狀況及未來獲利展望, 相較財報更能完整交代前因後果。

Earnings
call

事件
研究法

是一種統計方法, 用來研究當市場上某一個事件(發佈日)發生的時候, 是否會對股價產生波動。

- 步驟:
1. 研究假說
 2. 事件日的確定
 3. 平均異常報酬率的檢定
 4. 分析結果

平均異常報酬率為「正/負」, 可以推論事件是否對股價有正/負影響; 但此種影響是否足夠明顯, 須進行「顯著性檢定」。

平均異常
報酬率

樣本來源

The logo for Seeking Alpha, featuring the text "Seeking Alpha" in a white serif font, with a superscripted Greek letter alpha (α) to the right, all set against an orange rectangular background.The logo for Yahoo Finance, featuring the word "YAHOO!" in a bold, purple, sans-serif font, with the word "FINANCE" in a smaller, black, sans-serif font directly below it, all set against a white rectangular background.

- Yahoo股票版:抓取5間公司分別在2008、2021年的調整後收盤價資料。
- Seeking Alpha:抓取5間公司在2008、2021年各季的文本。

文獻回顧

研究者	研究期間	研究對象	研究方法	研究結果
Dong Liang(2016)	2007-2015	14間美國航空公司的財報電話會議紀錄	文字探勘、機器學習分類	財報電話會議對股價變化影響小，並不適合用來預測。
蕭惟中(2019)	2007-2008	台灣上市公司	事件研究法	法人說明會召開頻率越高的公司，異常報酬率較低。
陳科翰(2021)	2013-2018	台灣上市公司	文字探勘、情緒分析	年報中，負面詞彙越多，公司產生的異常報酬率越大，即年報中隱含的負面情緒較能反映於股價波動上。

研究方法

一、股價平均異常報酬率：

1. 抓取2008年、2021年收盤價⇒取LOG⇒計算日報酬
2. 抓取2008年、2021年收盤價(十年前收盤價)⇒取LOG⇒計算十年平均日報酬。
3. 結合1.、2.，利用迴歸檢定得出平均異常報酬率與p-value。

二、文字探勘：

利用PYTHON匯入及SPACY分析文本：

1. 斷句分析⇒分類情緒與主客觀⇒視覺化。
2. 斷詞分析⇒刪除贅詞⇒分類情緒與主客觀⇒視覺化。

三、研究結果&貢獻

將平均異常報酬率的結果與文字探勘的結果(圓餅圖)做比對，並歸納結論。

06

平均異常報酬率

抓取收盤價

2008-AAPL-Q1-B7

Date	Open	High	Low	Close	Adj Close	Volume
2008/1/14	6.34	6.4079	6.2561	6.385	5.442689	1100450400
2008/1/15	6.3471	6.4007	5.8807	6.0371	5.146168	2343278000
2008/1/16	5.9011	6.0361	5.5964	5.7014	4.860001	2213845200
2008/1/17	5.7682	5.9057	5.6579	5.7461	4.898052	1757859600
2008/1/18	5.7754	5.9196	5.7004	5.7629	4.912364	1724343600

抓取**每日**收盤價：

1. 年份：2008年、2021年
2. 5家公司：AAPL、JNJ、JPM、MSFT、UNH
3. 1家公司4個發佈日：Q1、Q2、Q3、Q4
4. 1個發佈日有6期：
5. 約3,000筆資料

B30. B14. B7. 發佈日 A7. A14. A30.



2008-AAPL-Q1(十年)

Date	Open	High	Low	Close	Adj Close	Volume
1998/1/26	0.173549	0.174665	0.167969	0.173549	0.147936	1.46E+08
1998/1/27	0.171317	0.175781	0.169643	0.170759	0.145558	1.12E+08
1998/1/28	0.171317	0.172991	0.166295	0.171317	0.146034	1.51E+08
2008/1/16	5.901071	6.036071	5.596429	5.701429	4.859999	2.21E+09
2008/1/17	5.768214	5.905714	5.657857	5.746071	4.898055	1.76E+09
2008/1/18	5.775357	5.919643	5.700357	5.762857	4.912361	1.72E+09

抓取發佈日往前推**十年**之每日收盤價：

1. 年份：2008年、2021年
2. 5家公司：AAPL、JNJ、JPM、MSFT、UNH
3. 1家公司4個發佈日：Q1、Q2、Q3、Q4
4. 約100,000筆資料

修正資料

AAPL-2008-Q1						AAPL-2008-Q1						
B7	A7	B14	A14	B30	A30	B7	A7	B14	A14	B30	A30	
1.85395	1.60277	1.84755	1.60277	1.87794	1.60277	1	-0.056	-0.0253	-0.0366	-0.0253	0.02209	-0.0253
1.79793	1.5775	1.81092	1.5775	1.90003	1.5775	2	-0.0572	-0.0421	0.04649	-0.0421	0.03516	-0.0421
1.74072	1.53541	1.85741	1.53541	1.93519	1.53541	3	0.0078	0	-0.0077	0	0.02491	0
1.74852	1.53541	1.84969	1.53541	1.96009	1.53541	4	0.00292	0.0117	-0.0304	0.0117	0.00075	0.0117
1.75143	1.54711	1.81929	1.54711	1.96085	1.54711	5			0.03466	0.00485	-0.0019	0.00485
		1.85395	1.55196	1.95894	1.55196	6			-0.056	0.02377	0.00633	0.02377
		1.79793	1.57573	1.96526	1.57573	7			-0.0572	-0.012	-0.0088	-0.012
		1.74072	1.56377	1.95647	1.56377	8			0.0078	-0.0158	-0.0165	-0.0158
		1.74852	1.54794	1.93997	1.54794	9			0.00292	-0.0175	0.00046	-0.0175
		1.75143	1.53039	1.94044	1.53039	10			-1.7514	-1.5304	-0.0794	-0.0586
				1.86103	1.47182	11					-0.0135	-0.0062
				1.84755	1.46557	12					-0.0366	0.03437
				1.81092	1.49994	13					0.04649	0.03115
				1.85741	1.53109	14					-0.0077	-0.0361
				1.84969	1.49499	15					-0.0304	0.03572
				1.81929	1.5307	16					0.03466	-0.0151
				1.85395	1.5156	17					-0.056	-0.0225
				1.79793	1.49314	18					-0.0572	-0.0199
				1.74072	1.47329	19					0.0078	0.01333
				1.74852	1.48662	20					0.00292	-0.0186
				1.75143	1.46804	21						

←各期之每日收盤價

往前推十年之每日收盤價↓

1	2008-AAPL-Q1(十年)									
2	Date	Open	High	Low	Close	Adj Close	Volume	取LOG後之收盤價	十年平均月報酬率	
3	1998/1/26	0.173549	0.174665	0.167969	0.173549	0.147936	1.46E+08	-1.910975531	=(H2514-H3)/2512	
4	1998/1/27	0.171317	0.175781	0.169643	0.170759	0.145558	1.12E+08			
5	1998/1/28	0.171317	0.172991	0.166295	0.171317	0.146034	1.51E+08			
2512	2008/1/16	5.901071	6.036071	5.596429	5.701429	4.859999	2.21E+09			
2513	2008/1/17	5.768214	5.905714	5.657857	5.746071	4.898055	1.76E+09			
2514	2008/1/18	5.775357	5.919643	5.700357	5.762857	4.912361	1.72E+09	1.591754682		

每日收盤價取LOG值：
修正資料視覺化的趨勢錯覺
以及消除季節性變化。

求日報酬率：
利用日報酬率，計算後續平
均異常報酬率。
公式： $(t+1)$ 收盤價- t 收盤價

每日收盤價取LOG值：
修正資料視覺化的趨勢錯覺
以及消除季節性變化。

求十年平均日報酬率：
利用十年平均日報酬率，計算後
續平均異常報酬率。
公式： $\frac{(t+n)$ 收盤價- (t) 收盤價
 $(t+n)-(t)+1$

註：設 t 為天數，則 $t=1$ 為第1天； $t+n$ 為該季收盤價的最後一天。

$t \geq 0$ 且 $t \in \mathbb{R}$; $n \geq 0$ 且 $n \in \mathbb{R}$.

平均異常報酬率

2008-AAPL-Q1-(日報酬-十年平均日報酬)

B7	A7	B14	A14	B30	A30	x的範圍
-0.058	-0.027	-0.039	-0.027	0.0199	-0.027	1
-0.059	-0.044	0.0443	-0.044	0.0329	-0.044	1
0.0056	-0.002	-0.01	-0.002	0.0227	-0.002	1
0.0007	0.0095	-0.033	0.0095	-0.001	0.0095	1
		0.0324	0.0026	-0.004	0.0026	1
		-0.058	0.0215	0.0041	0.0215	1
		-0.059	-0.014	-0.011	-0.014	1
		0.0056	-0.018	-0.019	-0.018	1
		0.0007	-0.02	-0.002	-0.02	1
		-1.754	-1.533	-0.082	-0.061	1
				-0.016	-0.008	1
				-0.039	0.0321	1
				0.0443	0.0289	1
				-0.01	-0.038	1
				-0.033	0.0335	1
				0.0324	-0.017	1
				-0.058	-0.025	1
				-0.059	-0.022	1
				0.0056	0.0111	1
				0.0007	-0.021	1

迴歸

輸入

*輸入 Y 範圍(O):

*輸入 X 範圍(O):

☐ 標記(L) ☒ 常數為零(Z) %

☐ 信賴度(O)

輸出選項

☒ 輸出範圍(O):

☐ 新工作表(P):

☐ 新活頁簿(W)

殘差

☐ 殘差(R) ☐ 殘差圖(D)

☐ 標準化殘差(I) ☐ 樣本迴歸線(I)

常態機率

☐ 常態機率圖(N)

確定 取消 說明(H)

公司 (股票代碼)	季度	平均異常報酬率					
		B7	A7	B14	A14	B30	A30
AAPL	Q1	-0.028	-0.016	-0.187	-0.163	-0.009	-0.009
	Q2	0.008	0.005	-0.171	-0.182	0.004	0.001
	Q3	-0.015	-0.014	-0.186	-0.178	-0.006	0.002
	Q4	-0.016	0.005	-0.118	-0.126	-0.019	-0.011
JNJ	Q1	-0.014***	-0.007	-0.012***	-0.009***	-0.010***	-0.011***
	Q2	-0.010	-0.012	-0.008**	-0.010***	-0.011***	-0.010***
	Q3	-0.008	0.004	-0.020	-0.002	-0.014*	-0.007
	Q4	-0.011	-0.002	-0.012***	-0.003	-0.009***	-0.009**
JPM	Q1	-0.012	0.001	-0.010*	0.007	0.008	0.003
	Q2	0.016	0.000	0.010	0.007	0.001	0.003
	Q3	0.006	-0.024	-0.025	-0.017	0.002	-0.010
	Q4	-0.003	0.025	-0.014	0.023	-0.002	0.014
MSFT	Q1	-0.005	0.008	-0.001	-0.007	-0.003	-0.009**
	Q2	-0.016	-0.008	-0.014**	-0.023**	-0.013***	-0.015***
	Q3	0.015	-0.007	0.005	-0.006	0.000	-0.006
	Q4	0.018	-0.003	0.007	0.000	-0.002	0.004
UNH	Q1	-0.008	-0.022	-0.013	-0.018**	-0.009	-0.011***
	Q2	0.010	-0.009	-0.004	0.004	-0.014**	-0.003
	Q3	0.043	-0.011	-0.021	-0.016	-0.017	-0.019
	Q4	0.002	-0.002	-0.013	-0.005	-0.009	-0.008

機率註解: *p < .1, **p < .05, ***p < .01

求每一期的平均異常報酬率：

了解各期收盤價與十年平均比有無差異，及其p-value有無顯著。
 若平均異常報酬率為正且顯著，則推論事件對股價有明顯正影響，
 若平均異常報酬率為正且不顯著，則推論事件對股價無明顯正影響。

文本抓取

```
import requests
from bs4 import BeautifulSoup
from lxml.html.clean import Cleaner

url = 'https://seekingalpha.com/article/72409-johnson-and-johnson-q1-2008-earnings-call-transcript'
html = requests.get(url)
html.encoding = 'UTF-8'
sp = BeautifulSoup(html.text, 'html5lib')
#print(sp.text)
sp.find_all("div", class_="ks-gl")|
```

[]

```
file = open("JNJ_2008_Q1_20080415發布.txt", "w", encoding="utf-8")
for item in sp.find_all('p'):
    print(item.text)
    file.write(item.text)
file.close()
```

➡ 列出所有含P標籤的結果，並只顯示文字。

文本抓取

Apple Inc. (NASDAQ:AAPL) F1Q08 Earnings Call January 22, 2008 5:00 PM ET Executives Nancy Paxton - Investor Relations Peter Oppenheimer - Chief Financial Officer, Senior Vice President Timothy D. Cook - Chief Operating Officer Analysts Katy Huberty - Morgan Stanley Bill Fearnley - FTN Midwest David Bailey - Goldman Sachs Bill Shope - J.P. Morgan Richard Gardner - Citigroup Ben Reitzes - UBSShannon Cross - Cross Research Keith Bachman - Bank of Montreal Charles Wolf - Needham & Company Gene Munster - Piper Jaffray Andrew Neff - Bear Stearns Toni Sacconaghi - Sanford Bernstein Mike Abramsky - RBC Capital Markets Tavis McCourt - Morgan Keegan Shaw Wu - American Technology Research Chris Whitmore - Deutsche Bank Andy Hargreaves - Pacific Crest Securities Operator Good day and welcome to the Apple Incorporated first quarter 2008 quarterly results conference call. Today's call is being recorded. At this time, for opening remarks and introductions, I would like to turn the conference over to Ms. Nancy Paxton, Senior Director of Investor Relations and Corporate Finance. Please go ahead, Madam. Nancy Paxton Thank you. Good afternoon and thanks for joining us. Speaking today is Apple CFO Peter Oppenheimer and he'll be joined by Apple COO Tim Cook and Treasurer Gary Wipfler for the Q&A session with analysts. Please note that some of the information you'll hear during our discussion today may consist of forward-looking statements regarding revenue, gross margin, operating expenses, other income and expense, stock-based compensation expense, taxes and earnings. Actual results or trends could differ materially from our forecast. For more information, please refer to the risk factors discussed in Apple's Form 10-K for 2007 and the Form 8-K filed with the SEC today in the attached press release. Apple assumes no obligation to update any forward-looking statements or information which speak as of their respective dates. With that, I would like to turn the call over to Peter Oppenheimer for introductory remarks. Peter Oppenheimer Thank you, Nancy. Thank you for joining us. We are very pleased to report our best quarter ever, with the highest revenue and earnings in Apple's history. Revenue grew 35% year over year to \$9.6 billion, an increase of almost \$2.5 billion over the previous December quarter's record-breaking results. The revenue growth was driven by record Mac, iPod, and iPhone sales and strong demand for our recent software releases. Our domestic business performed very well, with revenue growing 27% year over year and we were especially pleased with our international business, which grew 46% year over year. Operating margin for the quarter was better than expected at 22.1%, resulting primarily from higher-than-anticipated gross margin and revenue. Net income was \$1.58 billion, which was up 57% over the prior December quarter's results and translated to earnings per share of \$1.76. Cash generation for the quarter was over \$3 billion, or approximately two times net income. I'd like to first talk about our Mac products and services, which represented 47% of total quarterly revenue. We are extremely pleased to have shipped 2.32 million Macs, exceeding the previous December quarter shipments by over 700,000 units and representing 44% year-over-year growth. That's more than 2.5 times the overall market rate of growth for the December quarter based on the latest forecast published by IDC. Sales of the new iMac we announced in August continued to be very robust, helping drive 53% year-over-year growth in desktop systems. Sales of portables were also strong, increasing 38% year over year. We began and ended the quarter with less than three weeks of Mac channel inventory. We are extremely pleased with the very successful launch of Leopard on October 26th and the response from both customers and reviewers has been terrific. Total Leopard revenue was about \$170 million during the quarter, a significant increase from about \$100 million in revenue generated by the Tiger release in its first quarter. We believe that 19% of the Mac OS 10 installed base is already using Leopard. Now I'd like to discuss our music products and services, which accounted for 30% of total revenue during the quarter. We sold over 22.1 million iPods, surpassing the record levels sold in the year-ago quarter. We began and ended the quarter within our target range of four to six weeks of iPod channel inventory. One of our primary goals for this holiday season was to establish an entirely new type of iPod in the marketplace, the iPod Touch. This new iPod has the potential to grow the iPod from being just a music and video player into being the first mainstream Wi-Fi mobile platform running all kinds of mobile applications. Because of the higher cost associated with the large touch screen and more powerful processor required to run applications like Safari, this was the most expensive iPod we've brought to market for some time. So we had the challenge of establishing a completely new type of iPod at the top of the line at a price point above where we've been for quite some time, and we succeeded. In addition to selling very successfully, the iPod touch was responsible for the overall increase in iPod ASPs to \$181, which drove revenue up 17% year over year. Last week we announced a major software upgrade for the iPod Touch, including five great mobile applications and the ability to watch iTunes movie rentals on its gorgeous screen. According to the latest data from NPD, iPod's share of the U.S. market for MP3 players in the December quarter was consistent with the year-ago quarter and in international markets, according to GfK, we continued to gain market share year over year in virtually all European and Asian countries. We were very pleased with the iPhone momentum and customers continued to rave about their iPhones. We sold over 2.3 million iPhones during the quarter and executed successful launches in the U.K., Germany, and France. Total revenue recognized during the quarter from sales of iPhone, iPhone accessories, and payments from carriers was \$241 million. Total deferred revenue from iPhone and Apple TV was \$1.44 billion at the end of the December quarter compared to \$636 million at the end of the September quarter. I would like to turn to the Apple retail stores, which also posted record quarterly results. Revenue was \$1.7 billion, representing 53% year-over-year growth. The stores generated \$405 million in segment margins compared to \$259 million in the year-ago quarter. We opened our third store in Manhattan on West 14th street, which is off to a great start and devotes an entire floor to the Genius Bar, personal training, and pro lab. We opened six other new stores during the quarter, ending with 204 stores. With an average of 201 stores open during the quarter, average revenue per store was \$8.5 million compared to \$6.6 million in the year-ago quarter. The stores sold a record 504,000 Macs during the quarter, representing 64% year-over-year growth. Once again, over 50% of the customers buying Macs in our stores during the quarter were new to Mac. Store traffic hit a new record with 38.4 million visitors during the quarter, representing 14,700 visitors per store per week, an increase of over 10 million visitors from the prior December quarter. Our stores continued to innovate and provide outstanding customer service. The new concierge teams that were added to all stores were exceptionally well-received by customers and helped direct traffic to the store's personal shoppers, express bays, genius bars, and studios for training and other services.

註:上圖為文本抓取結果

07

文字探勘

文字探勘工具

spaCy

自然語言處理(NLP)套件

en_core_web_sm

訓練套件

- 用來提取文本的詞彙、句法、實體
- 常被用在新聞、評論、blog

spacytextblob

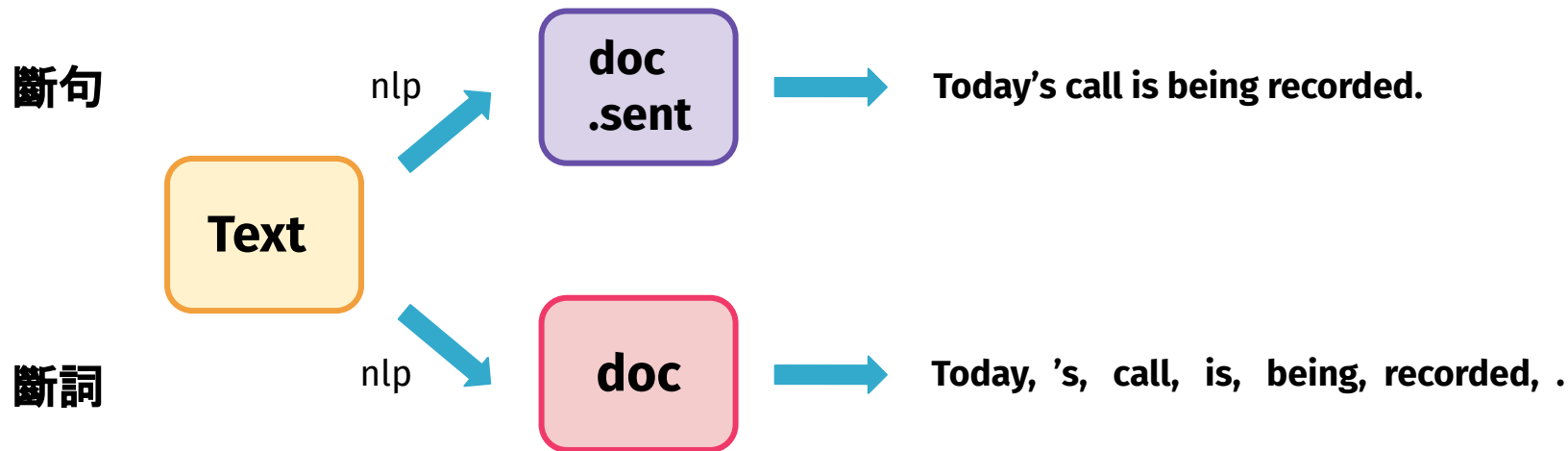
分析管道

- 使用TextBlob詞庫
- 專門做情緒語言分析

文字探勘步驟



切割文本



語言處理

en_core_web_sm

spacytextblob

spaCy

doc
.sent

doc



	Sentence	Polarity	Subjectivity
0	Apple Inc. (NASDAQ:AAPL) F1Q08 Earnings Call J...	0.000	0.000000
1	Deutsche Bank Andy Hargreaves - Pacific Crest ...	0.525	0.616667
2	Today's call is being recorded.	0.000	0.000000
3	At this time, for opening remarks and introduc...	0.000	0.000000
4	Please go ahead, Madam.	0.000	0.000000

	Word	Polarity	Subjectivity	Alpha	Stopword	Punct	Num	Pos	Dep
0	Apple	0.0	0.0	True	False	False	False	proper noun	compound
1	Inc.	0.0	0.0	False	False	False	False	proper noun	root
2	(	0.0	0.0	False	False	True	False	punctuation	punctuation
3	NASDAQ	0.0	0.0	True	False	False	False	proper noun	appositional modifier
4	:	0.0	0.0	False	False	True	False	punctuation	punctuation

語言處理 - 情緒欄位

Polarity

極性, spacytextblob內建函式支援, 可得出語言情緒。
分數範圍 $[-1, 1]$, -1為負向情緒最大值; 1為正向情緒最大值; 0則為中立。

Subjectivity

主觀性, spacytextblob內建函式支援, 可得出觀點分數。
分數範圍 $[0, 1]$, 0為最客觀; 1為最主觀。

應去除字詞的原因(斷詞限定)

以2008年AAPL Q1為例：

專有名詞、縮寫、
標點符號皆不具情緒

2008

5:00

數字
表述事實

to

in

連接詞、
介系詞
連接詞語

	Word	Polarity	Subjectivity
0	Apple	0.0	0.0
1	Inc.	0.0	0.0
2	(	0.0	0.0
3	NASDAQ	0.0	0.0
4	:	0.0	0.0
...
9737	have	0.0	0.0
9738	a	0.0	0.0
9739	wonderful	1.0	1.0
9740	day	0.0	0.0
9741	.	0.0	0.0
9742 rows x 9 columns			

足足有9262個詞的Polarity為
0.0
佔總數9742裡的95%

不含情緒的詞會影響分析結果

去除字詞 - 詞種欄位(斷詞限定)

Alpha

布林值, 如果為`False`代表詞參雜字母外的詞種, 需要去除。

Stopword

布林值, 如果為`True`代表詞種為停用詞, 需要去除。

Punct

布林值, 如果為`True`代表詞種為標點符號, 需要去除。

Num

布林值, 如果為`True`代表詞種為數字, 需要去除。

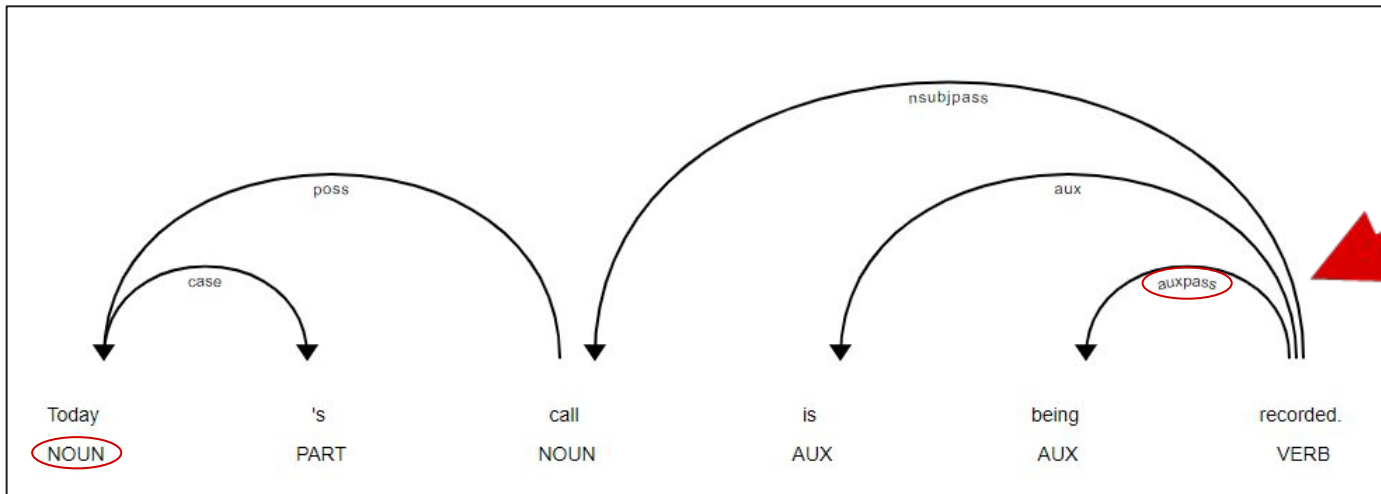
去除字詞 - 詞標籤欄位(斷詞限定)

Pos

詞性標註, 全名為Part-of-speech tagging
主要用途為消除“歧義”。

Dep

依存句法分析, 全名為Dependency parsing
為句子查找依賴關係結構。



詞標籤去除一覽表

Pos

- proper noun(專有名詞)
- adposition(同位語 on, in, for, towards)
- auxiliary(助動詞 is、will do)
- coordinating conjunction(並列連詞 for、and)
- numeral(數字)
- pronoun(代詞)
- subordinating conjunction(從屬連詞 because、when)

Pos & Dep

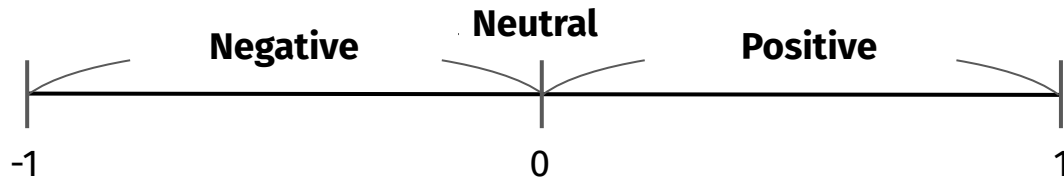
- [coordinating conjunction, coordinating conjunction] (並列連詞, 並列連詞)
- [noun, direct object] (名詞, 直接賓語)
- [verb, direct object] (動詞, 直接賓語)
- [noun, adverbial clause modifier] (名詞, 狀語從句修飾詞)
- [verb, adverbial clause modifier] (動詞, 狀語從句修飾詞)
- [verb, clausal complement] (動詞, 從句補充)
- [noun, clausal complement] (動詞, 從句補充)
- [verb, relative clause modifier] (動詞, 關係從句)
- [noun, noun phrase as adverbial modifier] (名詞, 名詞短語作為狀語修飾語)
- [verb, clausal subject] (動詞, 從主關係)
- [interjection, interjection] (感嘆詞, 感嘆詞)
- [verb, root] (動詞, 中心詞)
- [noun, root] (名詞, 中心詞)

Dep

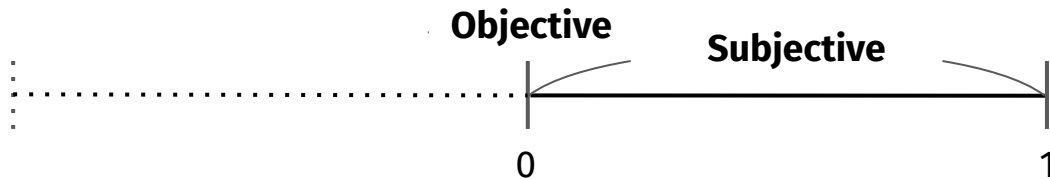
- auxiliary (passive)(被動式助動詞)
- coordinating conjunction(連接詞)
- clausal subject(從句主語)
- complement of preposition(介詞補語)
- conjunct(連接詞)
- nominal subject(名詞性主語)
- open clausal complement(開放從句補語)
- punctuation(標點符號)
- modifier of quantifier(量詞修飾語)
- object of preposition(介詞賓語)
- attribute (定語)
- modifier of nominal (名詞性修飾語)
- prepositional modifier(介詞性修飾語)
- appositional modifier(同位語)
- possession modifier(所有格)
- nominal subject (passive)(被動式主語)
- punctuation(標點符號)
- dative(標記動詞的間接賓語)
- numeric modifier(數字修飾語)

建構指標

Polarity



Subjectivity



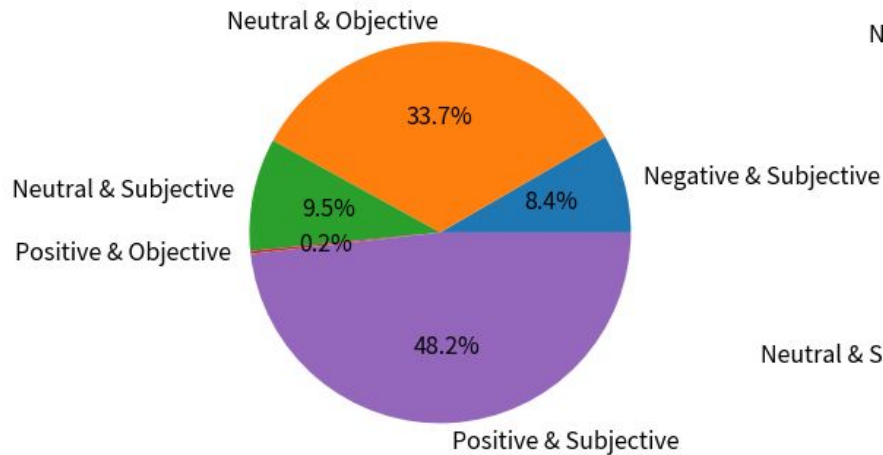
合併分組

	Sentiment	Opinion	總數
0	Negative	Subjective	35
1	Neutral	Objective	141
2	Neutral	Subjective	40
3	Positive	Objective	1
4	Positive	Subjective	202

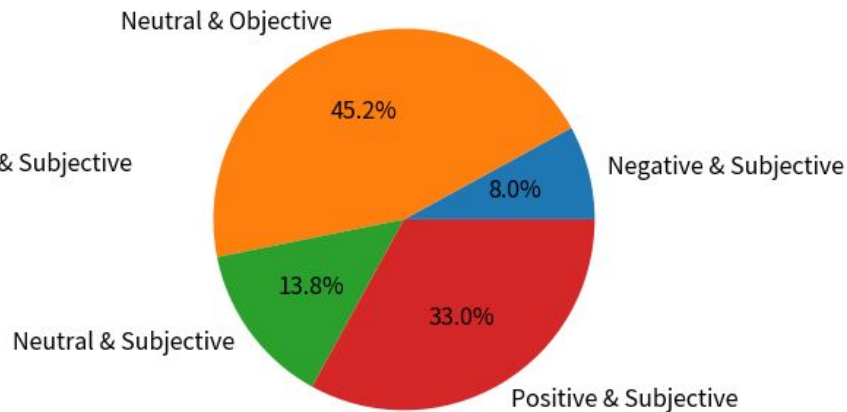
共分6組
分析結果**不一定**囊括全指標

視覺化

2008_AAPL_Q1斷句分析



2008_AAPL_Q1斷詞分析



判讀：組佔比滿50%為分析結果，皆不滿50%則取佔比前兩大組

08

研究結果&貢獻

2008年結果

表1 2008年情緒語言分析及異常報酬率對照表

公司 (股票代碼)	季度	斷句				斷詞				異常報酬									
		Pos & Obj	Pos & Sub	Neu & Obj	Neu & Sub	Neg & Obj	Neg & Sub	Pos & Obj	Pos & Sub	Neu & Obj	Neu & Sub	Neg & Obj	Neg & Sub	B7	A7	B14	A14	B30	A30
AAPL	Q1		1	2					2	1				-0.028	-0.016	-0.187	-0.163	-0.009	-0.009
	Q2		1	2					2	1				0.008	0.005	-0.171	-0.182	0.004	0.001
	Q3		1	2					2	1				-0.015	-0.014	-0.186	-0.178	-0.006	0.002
	Q4		1	2					2	1				-0.016	0.005	-0.118	-0.126	-0.019	-0.011
JNJ	Q1		1	2						1				-0.014***	-0.007	-0.012***	-0.009***	-0.010***	-0.011***
	Q2		1	2						1				-0.010	-0.012	-0.008**	-0.010***	-0.011***	-0.010***
	Q3		1	2						1				-0.008	0.004	-0.020	-0.002	-0.014*	-0.007
	Q4		1	2						1				-0.011	-0.002	-0.012***	-0.003	-0.009***	-0.009**
JPM	Q1		1	2					2	1				-0.012	0.001	-0.010*	0.007	0.008	0.003
	Q2		1	2					2	1				0.016	0.000	0.010	0.007	0.001	0.003
	Q3			1					2	1				0.006	-0.024	-0.025	-0.017	0.002	-0.010
	Q4			1					2	1				-0.003	0.025	-0.014	0.023	-0.002	0.014
MSFT	Q1		1	2						1				-0.005	0.008	-0.001	-0.007	-0.003	-0.009**
	Q2			1					2	1				-0.016	-0.008	-0.014**	-0.023**	-0.013***	-0.015***
	Q3			1	2					1				0.015	-0.007	0.005	-0.006	0.000	-0.006
	Q4			1						1				0.018	-0.003	0.007	0.000	-0.002	0.004
UNH	Q1			1						1				-0.008	-0.022	-0.013	-0.018**	-0.009	-0.011***
	Q2			1						1				0.010	-0.009	-0.004	0.004	-0.014**	-0.003
	Q3			1					2	1				0.043	-0.011	-0.021	-0.016	-0.017	-0.019
	Q4			1					2	1				0.002	-0.002	-0.013	-0.005	-0.009	-0.008

註：Pos = Positive, Neu = Neutral, Neg = Negative, Obj = Objective, Sub = Subjective.

A = After, B = Before.

AAPL = 蘋果, JNJ = 嬌生, JPM = 摩根, MSFT = 微軟, UNH = 聯合.

機率註解：*p < .1, **p < .05, ***p < .01

- 以橘框為例，此狀況代表稍微樂觀。
- 橫排若只有1個數字，代表此結果符合該組。
- 根據斷詞斷句的結果，由於基本上都是(正向&主觀)或是(中立&客觀)，我們可以推論，公司在發布內容時，為了維持公司形象、安定投資者信心，因此會保持樂觀的態度。
- 斷句方面，句子整體以正向為主，斷詞則是以中立為主，推論可能是因為，詞語需要組織在一起較能構成觀點(斷句)，詞語本身含觀點的字則佔少數(斷詞)。

2021年結果

表1 2021年情緒語言分析及異常報酬率對照表

公司 (股票代碼)	季度	斷句				斷詞				異常報酬									
		Pos & Obj	Pos & Sub	Neu & Obj	Neu & Sub	Neg & Obj	Neg & Sub	Pos & Obj	Pos & Sub	Neu & Obj	Neu & Sub	Neg & Obj	Neg & Sub	B7	A7	B14	A14	B30	A30
AAPL	Q1		1					2	1					0.019*	-0.007	0.011	-0.002	0.003	-0.007*
	Q2		1					2	1					0.001	-0.011	0.001	-0.010	0.004	-0.004
	Q3		1					2	1					0.004	0.003	0.002	0.000	0.004	0.000
	Q4		1	2				2	1					-0.002	0.001	0.003	-0.002	0.001	0.004
JNJ	Q1		1							1				0.004	-0.006	-0.001	0.000	0.000	0.001
	Q2		1	2						1				-0.003	0.003	-0.001	0.002	0.001	0.002
	Q3		1							1				0.003	0.003	0.001	-0.001	-0.002	-0.001
	Q4		1							1				-0.007*	0.003	-0.007***	0.002	-0.002	-0.003
JPM	Q1		1	2				2	1					-0.002	-0.003	0.000	-0.001	-0.001	0.003
	Q2		1	2				2	1					0.007	-0.010	0.003	-0.003	-0.001	0.001
	Q3		1	2				2	1					-0.006	0.01*	-0.001	0.002	0.001	0.000
	Q4		1	2				2	1					0.001	-0.011*	0.007	-0.003	0.003	0.000
MSFT	Q1		1	2						1				-0.006	0.004	-0.007	0.004	-0.001	0.002
	Q2		1	2						1				0.014	0.006	0.005	0.004	0.001	-0.002
	Q3		1	2						1				0.002	-0.008	0.000	-0.005	0.005	-0.002
	Q4		1	2						1				0.008	0.000	0.002	-0.001	0.003	0.001
UNH	Q1		1					2	1					0.006	0.003	0.000	0.002	0.002	0.001
	Q2		1	2						1				0.002	-0.003	0.003	-0.003	0.001	-0.002
	Q3		1	2						1				-0.002	0.007	0.003	0.006	-0.002	0.002
	Q4		1					2	1					-0.005	-0.003	-0.008	0.003	-0.004	0.000

註：Pos = Positive, Neu = Neutral, Neg = Negative, Obj = Objective, Sub = Subjective.

A = After, B = Before.

AAPL = 蘋果, JNJ = 嬌生, JPM = 摩根, MSFT = 微軟, UNH = 聯合.

機率註解：*p < .1, **p < .05, ***p < .01

- 整體而言，21年異常報酬的檢定結果相較於08年，多數呈現不顯著。



研究結果 - 2008年平均異常報酬率與情緒語言分析

AAPL
JPM
UNH

沒有顯著的異常報酬
法說會的結果有所保留

MSFT

金融風暴的影響導致低的異常報酬

JNJ

在Q1與之後有顯著異常報酬

公司 (股票代碼)	季度	斷句						斷詞						異常報酬					
		Po & Ob j	Pos & Sub j	Ne & Ob j	Neu & Sub	Neg & Obj	Neg & Sub	Po & Ob j	Pos & Sub j	Ne & Ob j	Ne & Sub	Ne & Ob j	Ne & Sub	B7	A7	B14	A14	B30	A30
AAPL	Q1		1	2				2	1					-0.028	-0.016	-0.187	-0.163	-0.009	-0.009
	Q2		1	2				2	1					0.008	0.005	-0.171	-0.182	0.004	0.001
	Q3		1	2				2	1					-0.015	-0.014	-0.186	-0.178	-0.006	0.002
	Q4		1	2				2	1					-0.016	0.005	-0.118	-0.126	-0.019	-0.011
JNJ	Q1		1	2						1				-0.014***	-0.007	-0.012***	-0.009***	-0.010***	-0.011***
	Q2		1	2						1				-0.010	-0.012	-0.008**	-0.010***	-0.011***	-0.010***
	Q3		1	2						1				-0.008	0.004	-0.020	-0.002	-0.014*	-0.007
	Q4		1	2						1				-0.011	-0.002	-0.012***	-0.003	-0.009***	-0.009**
JPM	Q1		1	2				2	1					-0.012	0.001	-0.010*	0.007	0.008	0.003
	Q2		1	2				2	1					0.016	0.000	0.010	0.007	0.001	0.003
	Q3		1					2	1					0.006	-0.024	-0.025	-0.017	0.002	-0.010
	Q4		1					2	1					-0.003	0.025	-0.014	0.023	-0.002	0.014
MSFT	Q1		1	2						1				-0.005	0.008	-0.001	-0.007	-0.003	-0.009**
	Q2		1					2	1					-0.016	-0.008	-0.014**	-0.023**	-0.013***	-0.015***
	Q3		1	2						1				0.015	-0.007	0.005	-0.006	0.000	-0.006
	Q4		1							1				0.018	-0.003	0.007	0.000	-0.002	0.004
UNH	Q1		1							1				-0.008	-0.022	-0.013	-0.018**	-0.009	-0.011***
	Q2		1							1				0.010	-0.009	-0.004	0.004	-0.014**	-0.003
	Q3		1					2	1					0.043	-0.011	-0.021	-0.016	-0.017	-0.019
	Q4		1					2	1					0.002	-0.002	-0.013	-0.005	-0.009	-0.008

研究結果 - 2021年平均異常報酬率與情緒語言分析

JNJ
UNH
MSFT

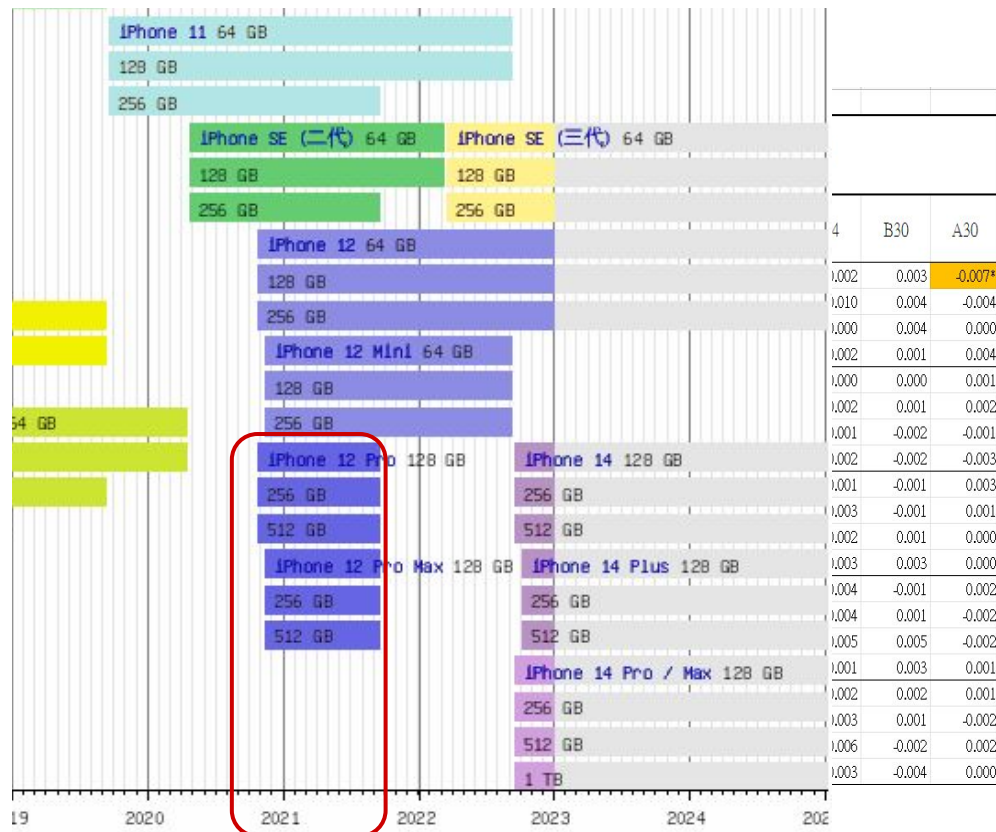
沒有顯著的異常報酬
法說會的結果有所保留

JPM

第三季異常報酬有顯著

AAPL

蘋果公司推出iPhone 12



結論&研究貢獻

01

整體法說會與股價異常報酬性沒有明顯顯著

02

情緒分析結果以(正向&主觀)和(中立&客觀)為大宗

03

斷詞與斷句兩者相比之下的準確率: 斷詞>斷句

04

在國外法說會主要呈現是中立(微信心)



結果來看較不能影響股價波動上

Thanks !
