News and Expected Volatility in the Stock Market

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Introduction

Research Question:

- What is the relationship between news and expected volatility in stock market?

Background:

- VIX: measure of the stock market's expectation of volatility
- Summarize real-time data from news
- Both are utilized to design investment strategy

Introduction

Lit Review:

- Antweiler and Frank (2004) used document length and sentiment analysis to fuel NB (Rainbow) and SVM classification algorithms, showing that financial news correlate with stock returns, trading volume and stock volatility

- Manela and Moreira (2013) constructed news implied volatility index to predict disasters and returns

- Smales (2014) constructed sentiment indicator to confirm the ‘significant negative relationship’ between 2000–2010 news releases and market volatility.

Data

1. News articles:
    - Financial Times API
    - Scrape from websites: Wall Street Journal, New York Time
2. VIX: Chicago Board Options Exchange website

Computational Tools & Methods

1. Sentiment analysis (positive & negative attitudes)
2. Topic modeling
3. Bag-of-Words & Word2Vec

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Models

- VIX and news sentiment:
  - OLS:

$$\Delta VIX_t = \beta_0 + \beta_1 News_t + \varepsilon_i$$

$$\Delta VIX_t = \beta_0 + \beta_1 News_t^+ + \beta_1 News_t^- + \varepsilon_i$$

- VIX and news topics:
  - OLS:

$$\Delta VIX_t = \beta_0 + \sum_{i=1}^{N} \beta_i Topic_{it} + \varepsilon_i$$

- VIX and news content (Bag-of-Words and Word2Vec):
  - Lasso Regression:

$$\Delta VIX_t = \beta X_t + \varepsilon_i$$

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Potential Contributions:

1. Analyzing both news sentiment and detailed content
2. Predict VIX in the future:
    - Improve investment strategy in the financial market
    - Improve investment strategy in VIX futures and options market
3. Estimate a measure of implied volatility that extends backwards (before 1980’s)

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