

What is the relationship between financial news and stock price trends?

Literature Review

1. News and Financial Markets

There are different theories about predicting the future price of stock market. Fama's Efficient Market Hypothesis (EMH) states that asset price fully reflect all available information, thus it is impossible to continuously outperform the market (Fama, 1964). In Random walk theory, stock market price is also believed to be impossible to predict as the stock price is determined randomly and followed a random walk (Malkiel, 1973).

While these theories state that it is impossible to predict stock market movements, there are different trading philosophies emerging and many of them have developed techniques to predict stock prices from financial news. As early as in 1988, Cutler et al.(1988) have investigated into the impact of different kinds of news on the variance of stock returns. In 1992, Campbell and Hentschel (1992) proposed an asymmetric model which measures the feedback effect of changing variance on stock returns, further stating that good news would increase stock prices and bad news would lower stock prices. There are also some researches analyzing real stock data and news article and stating that there is a brief time period before the market correct to itself to equilibrium within which there exists a weak ability to predict for future prices (LeBaron et. al, 1999; Gidofalvi, 2001).

More recently, there are more empirical studies conducted on the relationship between news and financial markets. In 2011, Engelberg et al. (2011) analyzed the causal impact of media in Financial Markets by analyzing "behaviors of investors with access to different media

coverage” (Engelberg et al., 2011, pp 4). After controlling for other variables, they proved that media coverage could strongly predict trading locally. Similarly, Birz et al. (2011) chose newspaper stories as their measure of news to investigate the impact of macroeconomics news on stock returns. Specifically, they found that news about GDP and unemployment could influence stock returns. Alanyali et al. (2013) used a corpus of daily news from Financial Times from 2007 to 2012 to quantify the relationship between the news mentioned about a particular company and this company’s daily transaction volume.

2. Natural Language based Financial Forecasting

Recently, with the advancement of machine learning and NLP (Natural Language Processing) techniques. There are more new researches focusing on the analysis of the news content on stock volatilities and returns.

Some sentiment analysis were conducted based on already processed sentiment data provided by some content vendors. Uhl (2014) has investigated into the relationship between Thomson Reuters Datastream and stock returns and proved there is correlation between them.

Many other researchers conducted their analysis based on some on other techniques. There are different approaches to transform financial text data into features that can be processed by computers for the later modeling phase. One basic and broadly used approach is bag-of-words, which describes the occurrence of each word within a document, thus considering each word count as a feature. Because of its simple nature, there are many researches applying this technique to conduct financial text analysis. For example, Yoshihara et al. (2016) used bag-of-words approach to represent news text and then feed it into a recurrent neural network and RBM model to investigate into the temporal properties of news events for stock market prediction.

To take the context into consideration, some researchers used word embeddings to transform text data to vectors. Word embedding utilizes a dense distributed representation for each word, where words have similar meaning are located closely in vector space. Ding et al. (2015) utilized an event-embedding approach to extract events from news text data and then used a deep convolutional neural network to build a model that could both predict short-term and long-term influence of events on stock market trends.

There are also researches comparing different word representations in textual analysis for prediction. Schumaker et al. (2009) built a text analysis system using bag of words, Noun Phrases and Named Entities as different word representations to conduct news analysis and predict for the discrete stock price. Their results showed that the model with both article terms and stock price at the time the article has been released had the best performance in future stock price prediction. They also compared different word representations and found that a “Proper Noun scheme” performed best among all the different representations (Schumaker et al., 2009, pp45). My paper will also focus on the comparison of different word representation techniques and investigate into the prediction power of different approaches.

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