Which News is driving the Financial Market?

An Exploratory Analysis of Broadcasting News' Impact on the German Stock Market and European Bank Sector

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ABSTRACT

News (north, east, west, south) streams in from all parts of the globe. It provides information about an event and, as such, may be considered to be an event in itself - news moves the market. The dynamics of the flow of information and market uncertainty impact investor sentiment and then security price formation, price discovery, market participant behavior such as price (over) reaction, price volatility, and market stability(Mitra and Mitra, 2008). Since market prices are driven by expectations of corporate fundamentals and new information leads to a revision of those expectations, here we consider the information contained within news flow as a leading indicator of analyst revisions to understand the complex relationship between news and financial markets.

There is a growing body of research literature regarding the effect of news in the financial market under different perspectives. However, although the mass media is increasingly attracting the interest of researchers, research into the effect of the broadcast (electronic) media in the form of television (TV) programming and transmission still remains limited. This is most likely because, unlike other forms, some difficulty is associated with gaining access to the records of past broadcasts. Secondly, previous studies about the effect of TV on trading concentrate only on a specific TV programs with content related to sell and buy recommendations. Hence, the purpose of our study is to address this deficiency by empirically exploring the impacts of news release via the television (TV) media on the German stock market, which potentially have a wide class of audience, including individuals, among various media types. Characteristics including the position at the top of the news chain, breadth of coverage, reliability and unambiguous format make this type of news transmission an excellent source of information for examining. Moreover, since economic, non-economic and political related topics, are one of the crucial factors

influencing the operation of a country's financial market as widely claimed by numerous studies, this study is unique in its nature as it examines the effect of multiple important news occurring in Germany and other economies on stock market returns (volatility) in Germany, instead of firm-specific news. Major news events can have a significant impact on the market environment and investor sentiment, resulting in rapid changes to the risk structure and risk characteristics of traded assets. Therefore, the study provides fruitful insights regarding the impact of political events on the stock market in Germany that is expected to contribute significantly in the capital market literature of Germany and help policy makers and investors in Germany's capital markets.

We use three kinds of financial data in this research. Firstly, it is the DAX (Deutscher Aktienindex), the most important index in Germany. This index measures the performance of the 30 largest and most liquid companies listed on the Frankfurt Stock Exchange (FSE), which are both a barometer for the German economy and a benchmark for a large number of financial products. The second type is the DAX future, which is traded in Eurex Exchange, the 1st derivatives exchange in Europe, providing investors access to the widest spectrum of Equity Index Derivatives. Lastly, since we are also interested in discovering the influences of events on Bank sector, we will use STOXX Europe 600 Banks, a sub-index of the STOXX Europe 600 index, for our analysis.

Our choice for mainstream news data, the Tagesschau (German for Review of the Day), a German national and international television news service, is broadcasted during 15 minutes from 8.00 pm. Recorded newscasts can also be seen via YouTube internationally. The main categories of news reports might be about macroeconomic announcements, political policies, economic and political situation or extreme events in German and others. We choose broadcasting news from 2010-2012 because important political and economic events occurring in Germany and the remaining countries in this period such as serial financial crises in the Eurozone, the 9/11 attacks, presidential elections, other major battles over fiscal policy. We do not have access to news broadcast transcript (e.g. via Factiva), therefore, we develop a new methodology based on YouTube captions. With our analysis one could analysis all the news broadcasts that are available on YouTube. That is an additional source to traditional newspapers that are available from certain data providers. The programming language used for the whole procedure is Python.

First, we automatically gather and parse subtitles with the support of Selenium and bs4(BeautifulSoup) package. Then, we extract topics (from the descriptions below each video) by using great tools of Python library, namely the requests library for retrieving content from a

webpage, and bs4 for extracting the relevant information. Thirdly, we will extract all frames of each video (one frame per second), employing OpenCV package and then use PIL/ Pillow package to extract only the headline's area on the frame. The next step is to recognize and read the text presenting in outputs. We will use pytesseract, an open source Optical character recognition (OCR) library sponsored by Google to extract text from an image. Then, since we have the topics from the YouTube description we can compare them with the headlines in the video and pick the matches with the highest matching scores. We also have the time (frame) of the image, which means we have a timestamp. The number of the frame is the corresponding second in the video. In our case, we often have the similar pictures since we extract a frame every second. Among the selected outputs, the first time when a new string (with the same or similar name with the topic's name below the video) appears on the frame will be the beginning of a new topic. The period between two consecutive beginning points is the duration of one topic. Based on these durations, we can split the subtitles into corresponding topics.

The next step is that we use clustering algorithm to group the most important topics and then we construct our proxy for topic sentiment (tone). In an attempt to investigate the impact of sentiment on the stock return, we construct the "Positive" and "Negative" measures by counting the number of positive and negative words and normalizing these counts by the total number of words of each article, using the Harvard General Inquirer dictionary. The "Optimism" variable is the difference between the "Positive" and "Negative" measures. All numbers are given in percentages. Since behavioral story also suggests that naive traders will react to extremely positive or negative media content, we only consider extreme top/bottom scores results for tone signals. Topics and tone can then be used in regression analysis to test for statistical significance. While a large amount of empirical evidences typically use daily return data series to study news, and their impact on market interrelation and risk, our paper also uses high frequency (minute, second) data to investigate the impact of real time news on the DAX future. Generally, we have basically two types of analysis. The first one is the end of day relationship between returns (volatility) and topics and the latter is the real-time impact of the Tagesschau on intra-day returns (volatility). These tasks are performed by employing two existing techniques, that is, machine learning and lexicon-based approaches, on both low frequency return (daily) and high frequency (minute,second) return during the Tagesschau.

Our empirical evidences show that topics related to international conflicts as well as macroeconomic and political policies in Germany are associated with the movements of the DAX index and DAX future return. Bank index returns only relate to Sports related news. We also find that European debt crisis, nuclear power issue as well as war and conflicts in the world are three topics that impact the volatility of the DAX and DAX future the most. By contrast, railway projects and natural disaster create smallest volatility to these important indexes. Similarly, European area debt is also the issue that causes the highest volatility for Europe 600 Bank index. By contrast, the topic that has the least influence on this index is nuclear power issues.

Moreover, our results obtained through the statistical studies seem to support the literature of behavior economics that investors are subject to tone of the news and do not always base their decisions on solely rational factors. We find that negative words have a much stronger correlation with stock returns than other words, which are also consistent with a large body of literature in psychology that argues negative information has more impact and is more thoroughly processed than positive information across a wide range of contexts.

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