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Political Risk and Foreign Exchange Market: An Exploration of the Brexit Impact on the Sterling

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Declaration of originality

I hereby declare that this work has not been previously accepted in substance for any degree and is not being concurrently submitted by another candidate for any degree.

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ABSTRACT

The political risk is part of the multiple financial risks investors are facing daily. Numerous researches suggest investment analysis should integrate the effect of political risk on financial assets. There is only weak evidence of political risk management being done efficiently and with precision by market operators. This thesis study the impact of the political risk, from the Brexit referendum of June 2016, on the foreign exchange market, the period starts in January 2015 and end in June 2016. The political risk is proxied by political news from the *Financial Times* articles, and the foreign exchange market is proxied by seven exchange rates. The research includes the study of daily returns and GARCH(1.1) volatility through multiple regression and Wilcoxon test. The results indicate that political news impacted significantly daily exchange rates returns and volatility. Positive news and negative news provided positive and negative returns, respectively, with asymmetric levels. The GBP/USD and EURO/USD exchange rates provided the most significant results. The semi-strong form of market efficiency holds for GBP/USD and EURO/USD while it does not hold for the GBP/EURO. The GBP/EURO is immune to political news impact on returns and volatility for the Brexit case.

1 INTRODUCTION

1.1 Background

The political risk conceptualization is challenged by nonlinear theories and models, which made the task of analyzing the issue very subjective and complex (Sottilotta, 2013, Jarvis, 2008, Sethi & Luther, 1986). Some researchers would try to evaluate the political risk as the impact on the net present value of cash flows due to political events (Suarez, 2015). Clark (1997) would try to create a stochastic model, in which the political risk is valued as being the potential explicit losses generated from a political event. A generalist approach would be to assess the impact of political risk on market returns; researchers through different ways have done this. Chan and Wei (1996), Bittlingmayer (1998), Beaulieu et al (2005) have been looking at the returns and volatility in the stock markets during periods of high political risk. All of them evidenced the increase of volatility.

From different methodologies, different time periods and countries, the literature covered resulted with common conclusions. First, the political risk is impacting financial markets. Several studies about the relationship between political risk and volatility have concluded that, in times of political uncertainty, volatility tends to increase (Doutriaux De La Rianderie & Cosset, 1985, Chan & Wei, 1996, Lobo and Tufte, 1998, Bittlingmayer, 1998, Beaulieu et al, 2005, Jamus, 2003, Ramesh, 2015). Secondly, the response of volatility differs in magnitude with regard to the positive or negative political outcomes. Positive outcomes have less effect on volatility than negative outcomes.

1.2 Brexit

For the second time in its history, the British electorate has been asked to vote about Britain's membership in the European Union. In January 2013, while trying to negotiate new agreements with the European Union under the pressure of Conservative Members of Parliament, David Cameron, British Prime Minister, promised that he would proceed a referendum about staying or leaving the union if the Conservative party won the 2015 general election (BBC, 2013). The Brexit is a major concern for European countries, it is recognized as one the world’s major political risk to watch in 2016 (Political Monitor, 2016). There are many reasons for this.

First, the city of London is the biggest financial center in Europe and many large international companies, especially financial services companies, have their headquarters there. The Brexit could mean a limited access to the European single market, and the costly necessity for banks to move staff to the European continent (Jenkins, 2016). Second, in the case of Britain leaving the European Union, the country may be facing a downgrade in its credit rating, as rating agencies find European Union membership safer. Borrowing would become more expensive, and economic growth would be impacted (Milas, 2013). Several international treaties might be renegotiated, decisions on monetary policies such as interest rates increase might change, and large amount of capital leaving the country for safer places might occur. Third, the credibility of this union is being weakened by such event and a possible contagion effect can arise within the Eurozone.

The result of the referendum has been the main source of the uncertainty in the country's business environment, which couldn't be resolved until the vote took place. This uncertainty is expected to be expressed in higher volatility in financial markets as a reflection of investors' worry and change in expectations.

1.3 Research objectives

The study of the variability of returns during days of apparent increased political risk, which we would identify thanks to newspapers articles, is relevant. The research aims at using volatility as a measure of political risk impact on the markets. A country's currency appreciation or depreciation is a relevant indicator of investors' perceptions of a country's situation and investment climate, hence, its volatility should be the subject of the research.

Fama (1970) formulated the efficient-market hypothesis through three forms: the weak-form efficiency, the semi-strong-form efficiency and the strong-from efficiency. The semi-strong form of market efficiency states that prices on markets adjust instantaneously to new incoming publicly available information, such as newspaper articles or political announcement. Event study methodologies enable us to test this hypothesis by studying market returns behaviours at dates of newly published information.

1.4 Research questions

This research examines the historical impact of political news in the United Kingdom – using the *Financial Times* articles – on the foreign exchange market. Here, the political risk characterizes the uncertainty surrounding the possibility of Britain exiting the European Union. The political risk issue is covered with regard to foreign exchange market's return and volatility with a geographic location, as well as recent data which both have not been explored by researchers. So far, we are not aware of any academic study that accepts or refutes the claim that Brexit impacts the sterling currency volatility, therefore, our thesis will be an original research. We will further investigate the existence of asymmetric impact of positive and negative political news. We consider positive news as being favourable to the business environment and negative news unfavourable to the business environment. Positive news will be related to information supporting the Britain is likely to stay in the European Union, and negative news, information supporting the Britain is likely to leave the European Union.

The following questions will be answered:

- ***Are the volatility and returns of the sterling currency higher during days of published news about the Britain leaving the European Union than during days without news on the subject?***
- ***Do positive (or favourable) news and negative (or unfavourable) news have different impact on volatility and returns?***

1.5 Significance of the study

The understanding of the impact of political risk on a country currency's return is significant from an academic and professional point of view. The empirical literature on the relationship between political risk and volatility is weak and overdated. We found few academic research investigating the subject and many of them were dated earlier than the 2000s. The results will be contributing to fill the existing gap in the field in providing recent evidence of the phenomenon.

Our research project is set with the aim of helping the analysis of political risk within the investment decision process. Risk-averse investors, when investing in a foreign country, are willing to assess how their profit could be eroded in the case of political uncertainty in order to provide the respective hedging strategies. Thus, it is essential for them to understand the markets behaviours

during episodes of high political risk. Also, our results will be beneficial to asset management and pricing of derivative securities, as volatility is a component of derivative pricing models and a common proxy for risk used by asset managers.

The United Kingdom's foreign exchange market is well developed; financial information is public and easily available for market participants. Consequently, testing the semi-strong form of market efficiency on the foreign exchange market is feasible, and it will also contribute to the literature on efficient market theories.

1.6 Outlines and research structure

The first chapter is aimed at introducing the study background in order to understand the reasons that motivated our investigation of the Brexit. The research questions and hypotheses are formulated, and the significance of the study is argued by locating the contribution to the relevant literature and concrete applications. The second chapter is the literature review, in which the political risk is appropriately defined and the principal ideas related to it are explained. Relevant literature are used to give an overview of the empirical studies and the methodologies researchers used, in order to investigate both the equity and the foreign exchange market. At the end of the chapter, the research questions and the following hypothesis of our research are reminded. The third chapter is the methodology, the focus is on the data analysis process of the research. The model used for our data analysis and the methodology of data collection are defined, and their relevance justified. All variables of the models, the calculations of returns and the volatility estimation are defined. The fourth chapter will provide the statistical results of the data analysis. The statistical results of the research are presented and explained. In order to interpret the findings, the meaning of the results with regard to the research question and hypothesis will be stated. The fifth chapter concludes on the principal findings of this research. The strengths and limitations of the study are highlighted, and further research are suggested.

2 LITERATURE REVIEW

2.1 Introduction

Along this chapter, the empirical conclusions resulting from the studies, which investigated the role of political risk on financial markets, are discussed. The many evidences of the impact of the political risk on assets' returns and volatility are argued. With the purpose of providing the definition used for the research, the review begins with an investigation of how different researchers have tried to define political risk. In the literature of political risk related to financial markets, two major themes have been found, the relationship with stock markets and foreign exchange markets, the common conclusions will be emphasized. However, the focus is more on the foreign exchange market, as this market will be used as a proxy for financial markets in the research. We demonstrate how historical studies followed similar patterns with the use of newspaper articles to identify political risk situations, as well as the common features of their methodologies.

2.2 Overview of the political risk

2.2.1 Conceptualisation

Even if it has been the subject of several studies during the past decades, the conceptualization of political risk is still challenging. Regardless of the geographic location or predominant ideology within a society, the political risk is present in every country. However, political risk is not a constant variable and may have different implications in function of countries, industries, time and exposure relative to entities (Sethi & Luther, 1986). For example, the impact of a pro-austerity political party coming to power with the willing of increasing corporate taxes is different from the impact of a political party that would decide to leave a strategic union such as the Brexit actual situation. Both are political risk, but each has very different characteristics and implications.

Also, political risk is quite singular from other types of risk as its signification can vary from a country to another, more, its impact is not certain (De la Torre & Neckar, 1988). In the case of the Brexit, the uncertainty about leaving or staying as a European country left in the hands of the referendum does not tell us if the country is actually leaving or not, unless the vote takes place.

Political risk is first concerned with possible negative activities from governments with consequences for business practitioners. Hasmi and Guvenli (1992) listed these activities such as being: import restriction, unexpected currency devaluation or revaluation of non-floating

currencies, delays in profit repatriation, currency in-convertibility, terrorism, unfair tax laws, labour strikes and trade union power, production or export restrictions, contract repudiation, restrictions on local market access, expropriation or nationalization, confiscation of property, restrictions on information flow. An accurate and recent example is August 2015, the People's Republic of China surprise devaluation of the Yuan, a non-floating currency, creating a 2% drop for the FTSE 100, a major British equity Index (The Guardian, 2015).

Jarvis (2008) considered this approach of political risk, classifying each negatives governmental activities, as being the "catalogue book" approach. He also noted other types of approach during his research, such as the "system-event school", which tries to overcome the limits of the preceding approach by analyzing the correlation between political systems and political risk events.

2.2.2 Misunderstandings

As stated by Sottilotta (2013) but also by Jarvis (2008), political risk is subject to conceptual confusion, such as thinking that western countries have "low political risk and high political stability" because of their liberal democratic and capitalistic system. This way, it irrelevantly makes all other types of system in high political risk categories. France's experience in 2016 is well suited to explain how false this statement is. The new project of labour law or "Loi Travail" resulted in months of strikes, petroleum refineries blocked, violence in the streets of major French cities. For the tourist industry, the amount of potential missed turnover is valuated at 460 millions of euros during the first four months of the year (Bancaud, 2016).

Robock (cited in Jarvis, 2008) tried to clarify the confusion that could be made between political risk and political instability. Political instability might not always be a risk for investors if it does not incorporate political risk content. Political instability may be considered as higher in a country where regimes changed several times within a decade, however, if no political actions or events have created losses for companies, there is no political risk content. The political risk has a context, which characterizes its singularity. Its impact on the profitability of firms differs from a political situation to another (Jarvis, 2008). This argument is in favour of our research with the analysis of a single political risk event, the case of the Brexit.

2.2.3 Definition

One of the main problems that political risk raises is its definition. Political risk is viewed as the uncertainty related to political events such as international conflicts, elections or policy changes. Robock (cited in Alan & Herbert, 2009) provided a first stone and determined that the political risk could be divided into two different categories, micro and macro. The micro-political risk would be industry, geography or company specific, whereas the macro-political risk would affect each of the companies in the country in the same manner. Researchers have majorly approved this definition over time and used it as the main reference for their research (Sottilotta, 2013, Clark, 1997, Sethi & Luther, 1986, Doutriaux De La Rianderie & Cosset, 1985). With regard to our subject, we are working on the macro-political risk, as changes resulting from the Brexit might not impact selectively a specific field of business, but all institutions in the country.

Robock (cited in Jarvis, 2008) aimed at finding a universal definition, which would be used for theoretical research, and in turn, helps the conceptualization of the political risk. He distinguished its approach from both the "catalogue school" and "system-event school", his definition focuses more on political processes such as the British referendum. For the purpose of our study, and with regards to the literature, the Robock (cited in Jarvis, 2008 and Doutriaux De La Rianderie & Cosset, 1985) political risk definition will be used, as it has been of most common usage and fits better the case of the Brexit:

"Political risk in international business exists when discontinuities occur in the environment, when they are difficult to anticipate and when they result from political change."

2.3 Foreign exchange market

2.3.1 Semi-strong form of market efficency

Cheung and Chinn (2001) studied the dynamics of the United States foreign exchange market and currency traders using surveys. They evidenced that macroeconomic news is rapidly incorporated, as currency traders argued that major news release changed their expectations and increased volatility, and thus, arguing in favour of the semi-strong form of market efficiency. Bernhard and Leblang (2002) studied how political processes impact the foreign exchange market. For this, they investigated the relationship between spot and forward exchange rates and evidenced the existence of a risk premium during periods of political changes. With regard to the efficient market hypothesis, they concluded that forward exchange rates were bias predictors of spot exchange rates because of the currency traders' difficulties to forecast accurately during these periods, and demanding a premium to hold the currency.

Cosset and Doutriaux De La Rianderie (1985), studied abnormal returns of the foreign exchange market during different political event windows. They used the *Wall Street Journal*'s articles published between 1973 and 1983 in order to identify political news increasing the political risk context in the markets. They concluded that political news provided information that caused exchange rates to move in non-usual high levels, reinforcing the market efficiency theory. They also evidenced an asymmetric response between positive and negative news, the foreign exchange market seemed to react more dramatically to negative news. The respective currencies would depreciate more than they would appreciate.

According to the results of similar studies, there is more evidence of the semi-strong form of market efficiency holding in the equity market. Bittlingmayer (1998) found that the World War I and the German revolution increased volatility of the stock market significantly. Chan and Wei (1996) focused on the risk associated with the Sino-British confrontation about the exercise of the sovereignty of Hong Kong, and found an increased volatility related to political news on the subject. Beaulieu et al (2005) research focused on the impact of the uncertainty caused by a possible Quebec separation from Canada on the Canadian stock market between 1990 and 1996, which is a very similar case to the Brexit. Their research resulted with the volatility of Quebec-based firm's returns being impacted significantly by political news. Ramesh (2015) studied the investors' abnormal returns on stock markets using different event windows for the 2014 general elections in India, and found that average abnormal returns were statistically significant.

2.3.2 Sources of exchange rates volatility

According to Dornbusch (1978), exchange rate volatility has two sources, which are changes in demand and supply of money - which could be a result of monetary policies - and "news" – which affect investors' expectations for the future. Political matters are considered to affect a country's investment climate in providing new information about the business environment and potential macroeconomic or microeconomic policy changes. In turn, investors might integrate this information and adjust their positions on the markets. The resulting would be increased volume of trading, abnormal returns and higher volatility in the foreign exchange markets to reflect market participants' behaviours.

Lobo and Tufte (1998) examined the volatility of the U.S Dollar against a basket of major currencies such as the British Pound, the Japanese Yen or the German Mark during years of political elections. The study was conducted using data from 1973 to 1992; they found that the volatility was higher during these periods. According to them, the political impact on exchange rates could have two main sources: direct policies with macroeconomic effect or investor's anticipation of policy changes. Their results also provided evidence that the political risk was affecting volatility through the specific political process of "reelection-motivated policy and major United States elections". Lobo and Tufte (1998) also noted an asymmetric effect between positive and negative innovations on exchange rates.

Bloomberg and Hess (1997) study investigated the poor performance of exchange rate models such as the random walk models or other economic models. They analyzed the behaviours of the British pound, the United States dollar and the Deutsche mark during political election cycles between 1974 and 1994. The model developed by the researchers outperformed the conventional models for the majority of the currencies studied. The research conclusion is that the political factor needs to be taken into account in the forecasting model of exchange rates, as it influences the prices. The impact of political uncertainty on the foreign exchange market volatility have also been evidenced by Freeman and Hays (2000). They integrated political information into a Markov switching model with time-varying transition probabilities and resulted with the conclusion that political uncertainty impacts the currency market with higher volatility. According to their research, this impact is a result of currency trader changing their expectations with opinion polls results, therefore, integrating news information to the decision process.

Jamus (2003) results - covering twenty-five countries between 1995 and 2002 – provided evidence of political risk being a key factor of exchange rates' switching behaviour. The study was

conducted using both a Markov Regime Model and a Panel Probit Model, with ten different measures of political risk. Jamus (2003) resulted with the conclusion that a further theoretical framework, which will integrate the political risk factor, is needed for exchange rate determination models, as its impact on currencies movement is statistically significant.

Table 1. Summary of empirical studies

Date	Authors	Country	Study Period	Results	Market
1978	Dornbusch	Germany, Switzerland, Japan, United Kingdom, United States	1975-1978	News increases volatility of returns	Foreign Exchange
1985	Cosset and Doutriaux De La Rianderie	Canada, France, Britain, Italy, Japan, Netherlands, Switzerland, Germany	1973-1983	Political news increases returns' volatility Negative news had higher volatility than positive news	Foreign Exchange
1996	Chan and Wei	China	1990-1993	Political news increases returns' volatility Negative news had higher volatility than positive news	Equity Market
1997	Bloomberg and Hess	United States, Germany, United Kingdom	1974-1994	Political risk is a determinant of exchange rate	Foreign Exchange
1998	Lobo and Tufte	United States	1973-1992	Political risk increases volatility Negative innovations had higher volatility than positive	Foreign Exchange
1998	Bittlingmayer	Germany	1880-1940	Political risk increases returns' volatility	Equity Market
2000	Freeman and Hays	United States, United Kingdom, Australia	1979-1995	Political risk increases returns' volatility	Foreign Exchange
2001	Cheung and Chinn	United States	1996-1997	Macroeconomic news increased returns' volatility	Foreign Exchange
2002	Bernhard and Leblang	France, Britain, Italy, Japan, Netherland, Germany, Canada, Belgium	1974-1995	Political risk increase returns volatility Forward prices have a political risk determinant	Foreign Exchange
2003	Jamus	25 countries	1995-2002	Political risk increases returns' volatility	Foreign Exchange
2005	Beaulieu et al	Canada	1990-1996	Political risk increases returns' volatility Negative news had higher volatility than positive news	Equity Market
2015	Ramesh	India	2014	Political risk increases returns' volatility	Equity Market

2.4 Empirical methodologies for political risk

2.4.1 Volatility

In several researches, the GARCH types of models have been preferred to Market Models or Risk Adjusted Models with constant variance. The heteroskedastic character of volatility, period of high and low volatility, could not be captured with a constant variance model, a conditionally normal time-varying variance like provided by the GARCH models is more realistic for volatility estimations and forecasting. Bittlingmayer (1998) noticed that daily data were far better for volatility estimation, which also argues in favour of a GARCH model rather than the standard deviation. In the study of Chan and Wei (1996) the volatility is calculated through the GARCH-M model, which has been modified to allow positive news and negative news having respectively positive and negative impacts on returns. Hence, they have been able to study the positive news and the negative news impact comparatively and provide more precise conclusions. Lobo and Tufte (1998) decide to use the EGARCH model as it is supposed to allow greater movements in prices to be reflected more precisely and it also allows the study of positive and negative variations. Beaulieu et al (2005) study used the GJR-GARCH model developed by Glosten, Jagannathan and Runkle, which allows the political risk dummy variables to be integrated.

Conventional models such as Mean Adjusted Return and Market and Risk Adjusted Return models have also been of common usage by Cosset and Doutriaux De La Rianderie (1985), Bin et al (2005), and Ramesh (2015). The models use homoscedastic variance, which means that the variance is constant overtime and less realistic compared to the GARCH models. Less common, the Markov Regime Model and a Panel Probit Model had been of usage by Freeman and Hays (2000) and Jamus (2003).

Table 2. Summary of volatility models

Autor	**Model**
Lobo and Tufte (1998)	EGARCH
Chan and Wei (1996)	GARCH-M
Beaulieu et al (2005)	GJR-GARCH
Bittlingmayer (1998)	Standard Deviation
Cosset and Doutriaux De La Rianderie (1985)	Market and Risk Adjusted abnormal returns
Bin et al (2005)	Market and Risk Adjusted abnormal returns
Freeman and Hays (2000)	Markov Regime Model, Panel Probit Model
Jamus (2003)	Markov Regime Model, Panel Probit Model

2.4.2 Political news

Cosset and Doutriaux De La Rianderie (1985), Chan and Wei (1996), Beaulieu et al (2005), but also Bin et al (2005) found relevant to investigate newspapers in order to identify days with major political news that would affect the market returns. Most of them classified the news with regard to its potential impact on the business environment in order to provide further precision on market behaviours. Cosset and Doutriaux De La Rianderie (1985) used the *Wall Street Journal* to study political risk in several countries. They thought that the newspaper was the most recognized in the business community between 1973 and 1983, hence, they understood that it would be most likely to consider any political event worldwide. In order to classify favourable and unfavourable events, they used a survey asking graduate students to determine if the event would be considered as positive or negative for the business environment.

Chan and Wei (1996), in their investigation, used the front-page political headlines of the *South China Morning Post* to identify days with increased political risk. For their investigation on the Hong Kong sovereignty, "positive news" were those of information about cooperation between the British and the People's Republic of China, whereas "negative news" were about confrontations. The distinction has been recognized as subjective and sometimes difficult to estimate. Beaulieu et al (2005) methodology shows a similar pattern with Chan and Wei (1996) as they decided to use the *Wall Street Journal* articles to identify days with increased political risk. News classified as positive or favourable were those benefiting to the business environment of the Canada, and therefore, reducing the uncertainty about firm's cash flows. To identify days of increased political risk between 1996 and 2002, Bin et al (2005) used several Taiwanese newspapers such as the Liberty Times or China Times. However, they did not classify news about the tension between Taiwan and China with regard to their positive or negative impact on returns.

Table 3. Summary of newspapers

Autor	**Newspaper**
Cosset and Doutriaux De La Rianderie (1985)	Wall Street Journal
Chan and Wei (1996)	South China Morning Post
Beaulieu et al (2005)	Wall Street Journal
Bin et al (2005)	Liberty Times, China Times

2.5 Hypotheses development

Our literature review brought the necessary knowledge of empirical studies directly relevant to the political risk associated with financial markets. Now we have the ability to formulate appropriate hypotheses and engage in the process of data analysis to answer the following questions:

1. ***Are the volatility and returns of the exchange rates higher during days of published news about the Britain leaving the European Union than during days without news on the subject?***

2. ***Do positive (or favourable) news and negative (or unfavourable) news have different impact on volatility and returns?***

To answer the research questions the following research hypothesis are developed:

Hypothesis 1-4 (H1, H2, H3, H4) are developed to answer research question one. According to Cosset and Doutriaux De La Rianderie (1985), the volatility of exchange rates returns is different when political news are published, as market operators change their expectation with new information. Accorrding to Cheung and Chinn (2001), the publication of news increases the volatility of exchange rates returns. Hence, this research propose the following hypothesis 1, 2, 3 and 4, for testing the semi-strong form of market efficiency.

Hypothesis 1

H1a : *The daily volatility of exchange rates returns is significantly different during days of published news about the Britain leaving the European Union than during days without news on the subject.* $(\sigma_E \neq \sigma_N)$

H1b : *The daily volatility of exchange rates returns is not significantly different during days of published news about the Britain leaving the European Union and during days without news on the subject.* $(\sigma_E = \sigma_N)$

Hypothesis 2

H2a*: The daily volatility of exchange rates returns is significantly higher during days of published news about the Britain leaving the European Union than during days without news on the subject.* $(\sigma_E > \sigma_N)$

H2b*: The daily volatility of exchange rates returns is not significantly higher during days of published news about the Britain leaving the European Union than during days without news on the subject.* $(\sigma_E < \sigma_N)$

Hypothesis 3

H3a*: The daily returns of exchange rates are significantly different during days of published news about the Britain leaving the European Union than during days without news on the subject.* $(|R_E| \neq |R_N|)$

H3b*: The daily returns of exchange rates are not significantly different during days of published news about the Britain leaving the European Union than during days without news on the subject.* $(|R_E| = |R_N|)$

Hypothesis 4

H4a: *The daily returns of exchange rates are significantly higher during days of published news about the Britain leaving the European Union than during days without news on the subject.* $(|R_E| > |R_N|)$.

H4b : *The daily returns of exchange rates are not significantly higher during days of published news about the Britain leaving the European Union than during days without news on the subject.* $(|R_E| < |R_N|)$.

Hypothesis 5-8 (H5, H6, H7, H8) are developed to answer research question two. According to Cosset and Doutriaux De La Rianderie (1985), the impact of negative news and positive news on the volatility of exchange rates are asymmetric. The negative news impact is greater than the positive news. Hence, this research propose the following hypothesis 5, 6, 7, and 8, for testing the response to positive and negative news.

Hypothesis 5

H5a : *The daily volatility of exchange rates returns is significantly different during days of published positive (favourable) news about the Britain leaving the European Union than during days of negative (unfavourable) news published.* $(\sigma_P \neq \sigma_{Ne})$

H5b : *The daily volatility of exchange rates returns is not significantly different during days of published positive (favourable) news about the Britain leaving the European Union than during days of negative (unfavourable) news published..* $(\sigma_P = \sigma_{Ne})$

Hypothesis 6

H6a*: The daily volatility of exchange rates returns is significantly higher during days of published positive (favourable) news about the Britain leaving the European Union than during days of negative (unfavourable) news published.* $(\sigma_P > \sigma_{Ne})$

H6b*: The daily volatility of exchange rates returns is not significantly higher during days of published positive (favourable) news about the Britain leaving the European Union than during days of negative (unfavourable) news published.* $(\sigma_P < \sigma_{Ne})$

Hypothesis 7

H7a : *The daily returns of exchange rates are significantly different during days of published positive (favourable) news about the Britain leaving the European Union than during days of negative (unfavourable) news published.* $(|R_P| \neq |R_{Ne}|)$

H7b : *The daily returns of exchange rates are not significantly different during days of published positive (favourable) news about the Britain leaving the European Union than during days of negative (unfavourable) news published.* $(|R_P| = |R_{Ne}|)$

Hypothesis 8

H8a*: The daily returns of exchange rates are significantly higher during days of published positive (favourable) news about the Britain leaving the European Union than during days of negative (unfavourable) news published. (*$|R_P| > |R_{Ne}|$*)*

H8b: *The daily returns of exchange rates returns are not significantly higher during days of published positive (favourable) news about the Britain leaving the European Union than during days of negative (unfavourable) news published. (*$|R_P| < |R_{Ne}|$*)*

Table 4. Summary of hypothese

Hypotheses	
H1a	$\sigma_E \neq \sigma_N$
H1b	$\sigma_E = \sigma_N$
H2a	$\sigma_E > \sigma_N$
H2b	$\sigma_E < \sigma_N$
H3a	$\|R_E\| \neq \|R_N\|$
H3b	$\|R_E\| = \|R_N\|$
H4a	$\|R_E\| > \|R_N\|$
H4b	$\|R_E\| < \|R_N\|$
H5a	$\sigma_P \neq \sigma_{Ne}$
H5b	$\sigma_P = \sigma_{Ne}$
H6a	$\sigma_P > \sigma_{Ne}$
H6b	$\sigma_P < \sigma_{Ne}$
H7a	$\|R_P\| \neq \|R_{Ne}\|$
H7b	$\|R_P\| = \|R_{Ne}\|$
H8a	$\|R_P\| > \|R_{Ne}\|$
H8b	$\|R_P\| < \|R_{Ne}\|$

2.6 Conclusion

The literature covered a wide range of research examining the relationship between the political risk and financial markets while reminding the current issue surrounding the political risk conceptualization. Both the equity market and the foreign exchange market are described with a relatively large time and geographic scope. The political risk remains a subject of interest in the academic field because of its complexity, but the work of Robock has been of great influence in the definition of the terms. Researches on the relationship between equity markets' return and political risk proved to use a relatively homogeneous methodology of single political event study. Whereas the researches on the relationship between foreign exchange market and the political risk is more diverse. Researchers have tried to assess the political risk using a variety of methodologies such as stochastic models, market models, risk-adjusted models or other econometric techniques. Still, some common characteristics have been identified. The use of newspaper articles to identify periods of increased the political risk and the use of the GARCH types of models to estimate the volatility are common. The increased volatility during period of high political risk is a common conclusion of all the researches investigated in both equity and foreign exchange markets. The evidence of asymmetric effects from positive and negative information on returns have been highlighted.

3 RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the methodologies that are applied in the research. Our models and the variables, which will help identify the role of political risk in the foreign exchange market, are defined. The reasons of the GARCH model selection, the currencies, the period length and the newspaper are justified. Our research determines the impact of the political risk on the foreign exchange market by looking at identified periods of high political risk. Our method tests whether foreign exchange market returns and volatility have been different on days in which there were major political news released compared to days in which there were none. To do so, the identification of days with political news is needed, they will be considered as "event-days". Then, the returns are calculated and the daily volatility estimated. Finally, the statistical test are applied to assess the consistence of our results.

3.2 Sample construction

3.2.1 Event-days

In order to test the semi-strong form of market efficiency, our data needs to be publicly available, with information being clear and reliable for investors (Cosset and Doutriaux De La Rianderie, 1985). As seen in the literature, political news has often been used as a proxy for political risk. The uncertainty changes with new information available, if political news provides information on the political event, it can alter its occurrence probability or change investors' expectations, favourably or unfavourably. We remind that the risk related to the uncertainty is present unless the vote of the Brexit takes place. Once the vote is done the uncertainty disappears. Accordingly, the period of study start at January 2015, until the date of the vote, when the uncertainty leaves. The study period is from January 1, 2015 to June 23, 2016. The selection of days is done through the identification of published articles from the *Financial Times* newspaper exclusively. Cosset and Doutriaux De La Rianderie (1985) and Beaulieu et al (2005), both choose the *Wall Street Journal* as being the most relevant business newspaper of their time. We consider the Financial Times as being the most recognized financial newspaper in the United Kingdom, and therefore, the most likely to publish headlines concerning matters affecting the business environment in the country.

The method applied is to search through the *Financial Times* archives, which are publicly available online. Only a single key word is used, which is "Brexit", to look for headlines exclusively. We believe that headlines will help us identify easily relevant news, regarding the United Kingdom leaving the European Union. The methodology is similar to that of the investigation of the Sino-British confrontation by Chan and Wei (1996). Then, if the news is considered as being a major one, the day will be defined as an "event day", otherwise it will be a "non-event day". For example a relevant information in the study is considered to be a business leader opinion and public statement, political or governmental institutions reports, polls. At times, it may appear that a single information is covered with multiple articles on consecutive days, in which case, the first article only is considered as relevant, as the investors reaction would be on the first day only. Also, all articles published during non-trading days are excluded, as markets are closed and no data analysis could be performed.

Then, each of these news are classified with regard to their potential positive or negative impact on the business environment in order to analyze the levels of impact of each independently. We define as "positive news", information indicating that the United Kingdom is more directed to stay in the European Union and "negative news" information supporting the exit of the union. Also, information concerning negative direct effects or future consequences of the potential Brexit, as well as, political supports for Brexit and polls' results for the Britain exiting the union are considered as negative. Some articles provided information that neither proved to be clearly negative nor positive, this ambiguity forced us to classify these as neutral political news. This classification is subjective, as we consider the exit of the union as being harmful for the Britain economy as explain in **1.2.** The Appendix A presents the event days, with the headlines and classifications.

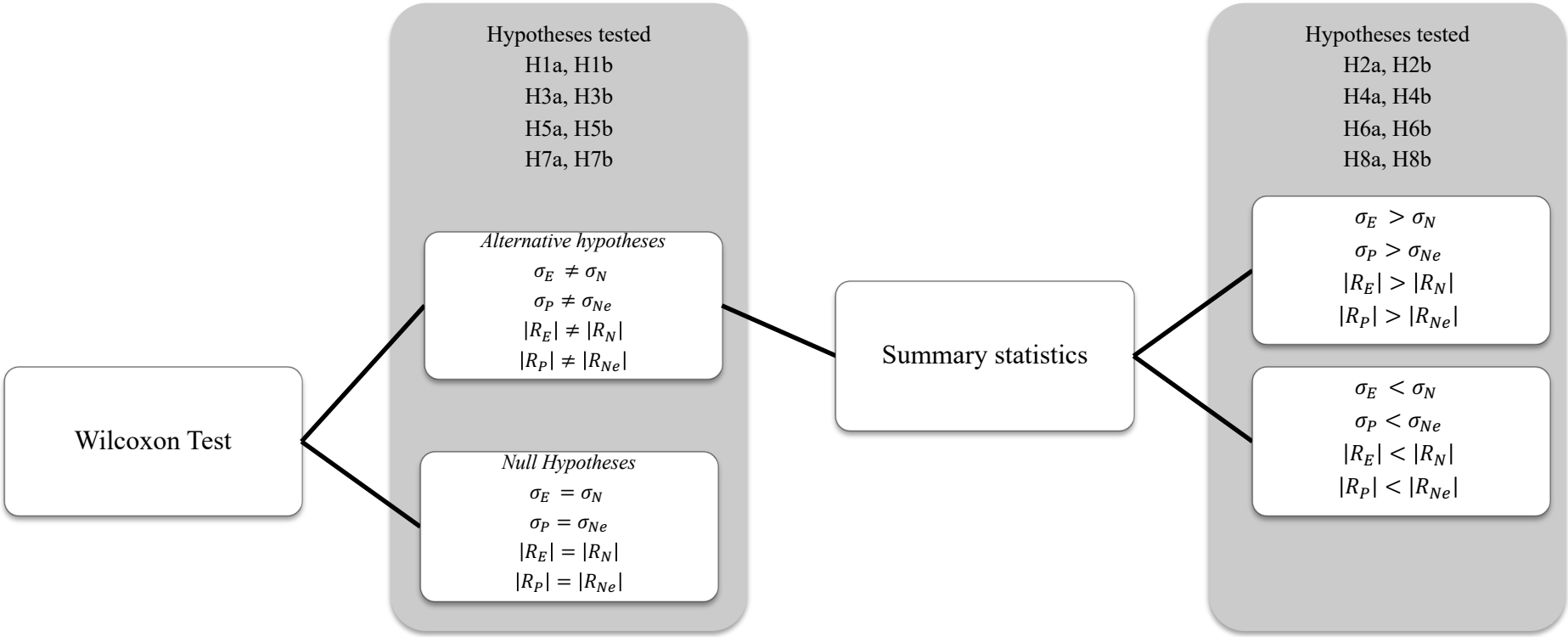
3.2.2 Currencies

The publication of information should lead to capital inflows or outflows resulting from investors' operations, and causing the exchange rate to appreciate or depreciate (Cosset and Doutriaux De La Rianderie, 1985). The currency price or exchange rate reacts to new information. Looking at the currency seems appropriate in the sense that it is uniformly impacting returns of firms working in the country. In our case, if the United Kingdom leaves the European Union, the country would seem less attractive for investors, hence, a depreciation of the sterling can rationally be expected. Thus, news relating information about the United Kingdom more likely to stay in the union should change investors' expectation and the currency should appreciate.

A basket of seven currencies will be investigated: GBP/EURO, GBP/USD, GBP/CAD, GBP/AUD, GBP/NZD, GBP/JPY, EURO/USD. The study of six major sterling currency exchange rates and the EURO/USD will enable us to isolate the impact of the Brexit on the British Pound as well as the Euro currency. Bittlingmayer (1998) and Cosset and Doutriaux De La Rianderie (1985) recommended the use of daily data, as in an efficient market prices are expected to integrate arrival of information rapidly. Weekly data could compromise the results. For example, if more than a single “event-day” are identified in a same week, the impact of two different news would be measured a unique news. Also, daily data permit a more precise measure of the short-run impact of the political risk. However, as the foreign exchange market does not close between Monday and Friday, we will collect exchange rate prices at the equity market closing, as exchange volumes are less important and variations of prices as well.

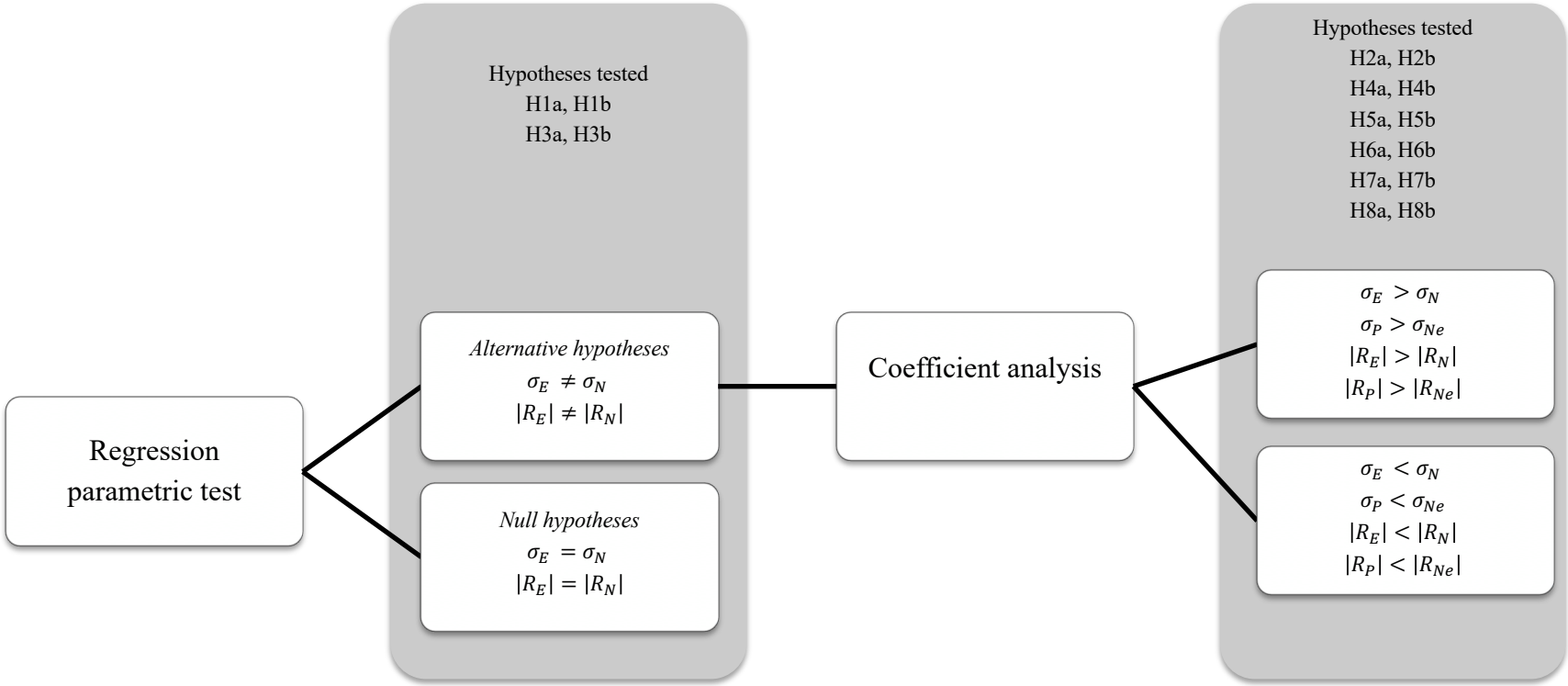
3.3 Research procedure

Chart 1. Wilcoxon hypotheses testing



The first step is the Wilcoxon test, this non-parametric test assumption is that exchange rate returns and volatility are not normally distributed. The result of the Wilcoxon test in Table 8 will inform us if the two tested samples are statistically different, therefore testing : H1a,H1b ; H3a, H3b ; H5a,H5b ;H7a,H7b. If the null hypothesis (the two samples are not statistically different) is rejected, it will be statistically sound to state that one of the two sample is strictly superior in value compared to the other sample, as Chart 1 illustrate. Accordingly to the sample construction, we are assuming that the difference is due to political news impact on returns and volatility. Hence, we just have to analyze the average returns and volatility provided by the summary statistics from Table 6 and Table 7 to test the remaining hypotheses : H2a, H2b ; H4a, H4b ; H6a, H6b ; H7a, H7b ; H9a, H9b ; H10a, H10b. If the null hypothesis cannot be rejected, the remaining hypotheses cannot be tested by looking only at the summary statistics. The full results of the test are provided in Appendix C.

Chart 2. Regression hypotheses testing



The second step of our statistical testing procedure is the multiple linear regression. The coefficient of the dummy variables (EV, P, N) will provide us information about the statistical significance of political news in explaining the variations of the daily returns and volatility. Hence, it will test : H1a,H1b ; H3a, H3b. The statistic test, which results are provided in Table 9 and Table 10, assumes that the returns and volatility are normally distributed (parametric test). If these dummy variables are significant, we will analyze the value of the coefficients to test the remaining hypotheses : H2a, H2b ; H4a, H4b ; H5a, H5b ; H6a, H6b ; H7a, H7b ; H8a, H8b. For the EV dummy we will be looking at a significant coefficient to reject the null hypothesis stating that the returns and volatility are not higher when political news are published. For the positive and negative news we compare their coefficient to see which one is higher than the other. The full results of the test are provided in Appendix D.

3.4 Research models

3.4.1 Exchange rates returns

We first define R_t, the daily exchange rate return at day *t*, measured by $\frac{Ln(S_t)}{Ln(S_{t-1})}$, where S_t is the exchange rate quotation at day *t*.

$$R_t = \frac{Ln(S_t)}{Ln(S_{t-1})} \quad (1)$$

S_{t-1} and S_t are the spot exchange rates, expressed in indirect quotation, i.e., the number of units of the foreign country currency for one unit of the home country currency (pound sterling £), at day t-1 and t, respectively. Only closing prices are used. The spot exchange rates are collected from the *Ukforex* website and takes only trading days into account.

3.4.2 GARCH (1.1)

The model used to estimate the volatility is the GARCH (1.1) model. As seen in the literature, the GARCH class of models have proven to be the most accurate to estimate the volatility of assets in markets. GARCH models are preferred for their performance in the analysis of clustering time-series. Market data are known to evidence periods of high volatility and periods of low volatility, also known as heteroskedasticity (Lobo and Tufte, 1998). The GARCH model enables the study of negative and positive impact of news on volatility separately; it enables a more precise conclusion for our research. As we want our analysis to be precise in estimating the short-run impact of political news, the volatility will be estimated daily, with the variance and squared returns of the model are those of the preceding day.The GARCH (1.1) model uses three components to estimate the volatility, the long run variance, V_L, the most recent squared return of the exchange rate, R_{t-1}^2, and the most recent estimated variance, σ_{t-1}^2.

To find the appropriate weights, the maximum likelihood method is used, it aims at maximizing the occurrence of historical data behaviours with the parameters (Hull, 2009). The parameters (γ, α, β) are the ones that maximize the maximum likelihood equation, the Excel Solver tool is used to determine them.

GARCH (1.1)

$$\sigma_t^2 = \omega + \alpha R_{t-1}^2 + \beta\sigma_{t-1}^2 \quad (2)$$

$$V_L = \frac{\omega}{\gamma} \quad (3)$$

$$\gamma = 1 - \alpha - \beta \quad (4)$$

Maximum Likelihood equation

$$\sum_{t=1}^{m}\left[-Ln(\sigma_t^2) - \frac{R_t^2}{\sigma_t^2}\right] \quad (5)$$

σ_{t-1}^2= *variance at time t-1*

R_{t-1}^2= *squared returns at time t-1*

V_L, = *long-run variance*

γ= *weight assigned to the long run variance*

α=*weight assigned to the squared returns*

β=*weight assigned to the variance*

$\omega = long\ run\ variance, V_L, multiplied\ by\ the\ weight, \gamma$

3.4.3 Multiple regression

In order to test if the political news, either positive or negative, have a statistically significant impact on the returns and the volatility, multiple linear regressions will be performed.

In Eq(6), the returns, R_t, will be the dependent variable, to be explained by the independent variables that are the event-day dummy, EV, positive news dummy, P, negative news dummy, N, and the estimated daily GARCH(1.1) volatility, σ_t.

$$R_t = a_0 + a_1\sigma_t + a_2P + a_3N + a_4EV + \in \quad (6)$$

Where,

$R_t = logarithmic\ daily\ returns$ of the exchange rate

σ_t = *GARCH(1.1) daily volatility at time t*

$a_0 = constant$

$a_1 = coefficient\ of\ the\ volatility$

$a_2 = coefficient\ of\ the\ positive\ news\ dummy$

$a_3 = coefficient\ of\ the\ negative\ news\ dummy$

$a_4 = coefficient\ of\ the\ event\ day\ dummy$

P= dummy variable taking the value of 1 for positive news, 0 otherwise

N= dummy variable taking the value of 1 for negative news, 0 otherwise

EV = dummy variable taking the value of 1 for event days, 0 otherwise

$\in$= *error term*

In Eq(7), the GARCH (1.1) volatility, σ_t, will be the dependent variable, to be explained by the independent variables that are the positive news dummy, P, negative news dummy, N,and the volatility of the preceding day, σ_{t-1}.

$$\sigma_t = b_0 + b_1\sigma_{t-1} + b_2P + b_3N + b_4EV + \in \quad (7)$$

Where,

σ_t = *GARCH(1.1) daily volatility at time t*

σ_{t-1} = *GARCH(1.1) daily volatility at time t-1*

$b_0 = constant$

$b_1 = coefficient\ of\ the\ past\ day\ GARCH(1.1)\ daily\ volatility$

$b_2 = coefficient\ of\ the\ positive\ news\ dummy$

$b_3 = coefficient\ of\ the\ negative\ news\ dummy$

$b_4 = coefficient\ of\ the\ event\ day\ dummy$

P= dummy variable taking the value of 1 for positive news, 0 otherwise

N= dummy variable taking the value of 1 for negative news, 0 otherwise

EV = dummy variable taking the value of 1 for event days, 0 otherwise

$\in$= *error term*

To interpret the results with regard to the hypotheses, we will analyze the parametric tests of the dummy coefficient a_2, a_3, a_4 for the returns, and b_2, b_3 for the volatility. The null hypothesis states that there is no relationship between the dependent variable and the independent variable. Consequently, we look at rejecting the null hypothesis for our dummy variable to find a statistically significant impact of political news on the returns and the volatility of the exchange rate. To reject the null hypothesis at the 95% confidence level, either to find a T-statistic > 1.96 or a P-value < 0.05 is needed. For a 90% confidence level, either a T-statistic > 1.65 or a P-value < 0.1 is needed.

3.4.4 Nonparametric test

In order to evidence the soundness of the data analysis results, we will also make use of non-parametric tests .Exchange rate data have evidenced to have fat tails distribution rather than normal distribution or Gaussian process, making parametric test more likely to be unrealistic and to compromise the results (Cosset and Doutriaux De La Rianderie, 1985, Chan and Wei, 1996, Serra, 2002). With this in mind, non-Parametric tests have been preferred to deal with non-Gaussian process. Cosset and Doutriaux De La Rianderie (1985), and Chan and Wei (1996), who both followed similar methodology of research to ours, used the Wilcoxon Test. The variation levels as well as the signs of the returns are taken into account in the Wilcoxon Test (Serra, 2002). Hence, it suits better our analysis of positive news and negative news asymmetric impact on returns and volatility. Here, the null hypothesis will be tested on four samples event days and non-event days, positive news and negative news. Here, the null hypothesis states that the two samples tested are from the same population, therefore, they follow the same distribution and are of same levels.

a. Equality between "event-days" and "non-event days" returns and volatility

$$R_N = R_E \quad (8)$$

$$\sigma_N = \sigma_E \quad (9)$$

The first sample will be the returns and volatility of "event-days", R_E and σ_E, and "non-event days", R_N and σ_N. The null hypothesis states that the returns and volatility of the two types of days are equally likely. If the null hypothesis is rejected, we can state that "event-days" result in returns and volatility different in magnitude from "non-event days". This means that political news about the Brexit is impacting exchange rate returns and volatility significantly.

b. Positive news and negative news

$$R_P = R_{Ne} \quad (10)$$

$$\sigma_P = \sigma_{Ne} \quad (11)$$

The second sample will be the returns and volatility of positive news, R_P and σ_P, negative news, $R_{Ne}$and σ_{Ne}. Here, the null hypothesis is the equally likely positive and negative returns and volatility. If the null hypothesis is rejected, we can state that positive and negative news have impacts of different magnitudes on returns and volatility, or asymmetric impacts.

4 EMPIRICAL RESULTS

4.1 Introduction

In this section, the results of our data analysis are presented and interpretations regarding our research questions and hypotheses are made. First, the summary statistics of the exchange rates will permit to find hints about which hypotheses might reveal true after statistical tests. Secondly, the Wilcoxon test results are described and interpreted for event days and non-event days samples, as well as for positive and negative news samples, for both returns and volatility. This will enable us to state our first statistically sound findings. Third, the results of the linear regressions with regard to the respective parametric tests are described and interpreted. Finally, we will conclude this section with a table resuming the statistical tests performance and interpretation of the results.

4.2 Political news

For the research, as illustrated by Table 5, we found 777 articles which contained the word « Brexit » in its headline for the period 01/01/2015 to 23/06/2016, and 170 of them have been selected following the criteria stated in the methodology section. In turn, we have 170 event days out of 387 observations and 214 non-event days. We classified 96 articles as providing negative news about the Brexit and 33 providing positive news. By comparison, Chan and Wei (1996) had 223 observations, 56 event days, and classified 7 as being positive news, and 49 as being negative news. The list of articles and the link of the source are provided in Appendix A.

Table 5. Articles cleaning process (31/12/2014 – 23/06/2016)

Process	Start	End
Removing « Blogs » and « Multimedia » contents	1, 100	777
Selecting « Brexit » topics only	777	660
Selecting « United Kingdom » section only	660	457
Removing week end articles and irrelevant articles following methodology criteria	457	170

Chart 3. GBP/USD returns 31/12/2014-23/06/2016

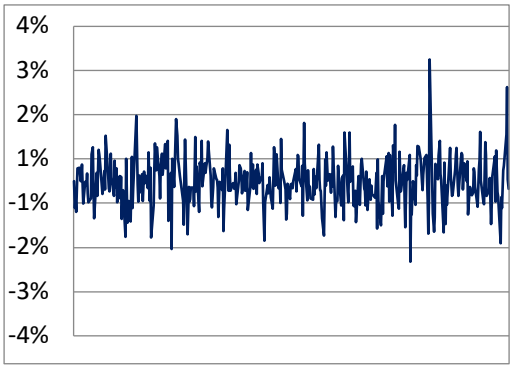


Chart 4. EURO/USD returns 31/12/2014-23/06/2016

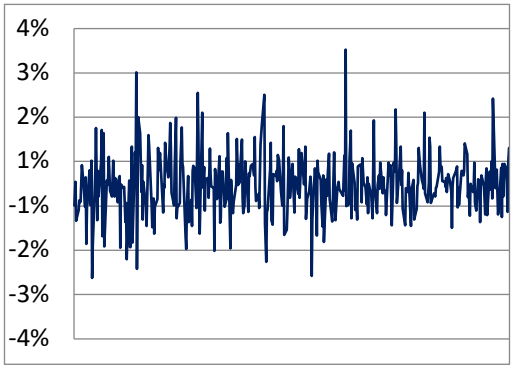


Chart 5. GBP/EURO returns 31/12/2014-23/06/2016

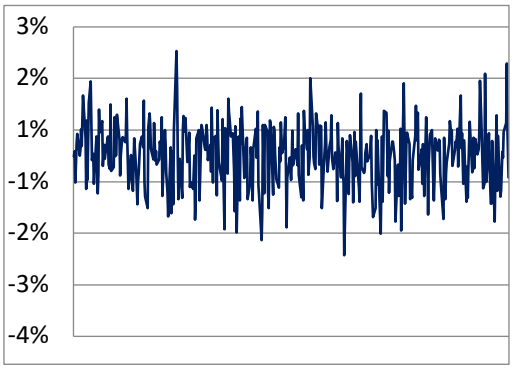


Chart 6. GBP/JPY returns 31/12/2014-23/06/2016

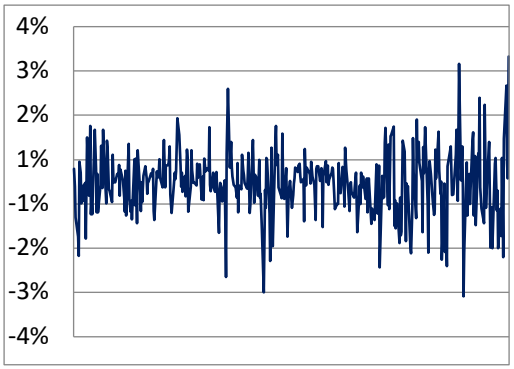


Chart 7. GBP/AUD returns 31/12/2014-23/06/2016

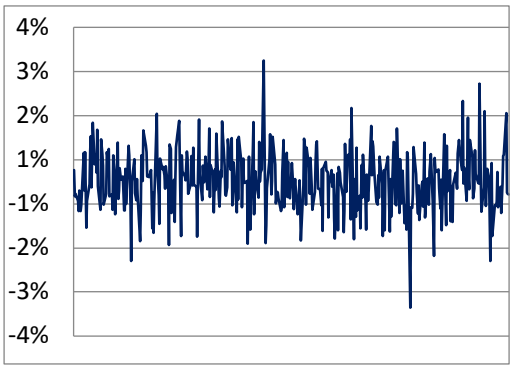


Chart 8. GBP/NZD returns 31/12/2014-23/06/2016

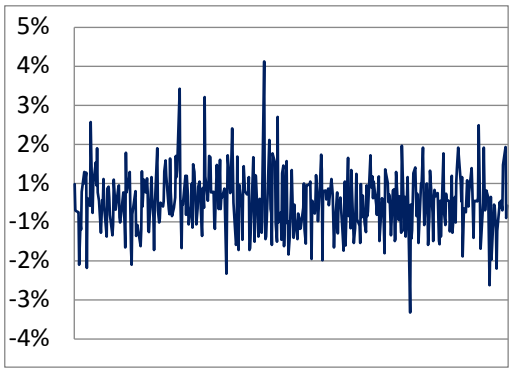


Chart 9. GBP/CAD returns 31/12/2014-23/06/2016

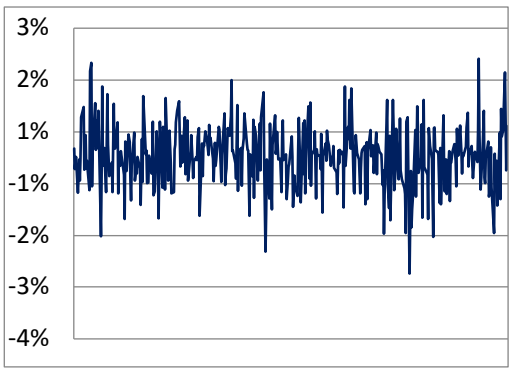


Chart 3 to Chart 9 illustrate the daily returns of each exchange rate between the 31/12/2014 and the 23/06/2016. The charts evidence numerous great spikes, which are days with higher than usual returns. We believe that part of them are resulting from new information about the Brexit. In chart 6, it can be seen that a period of low returns preceded a period of higher returns for the GBP/JPY. This phenomenon increases our confidence in the choice of a GARCH type of model for volatility estimation. The GBP/EURO seem to have relatively uniform returns with very few great spikes, as it can be seen on Chart 5.

Chart 10. GBP/USD GARCH(1.1) 31/12/2014-23/06/2016

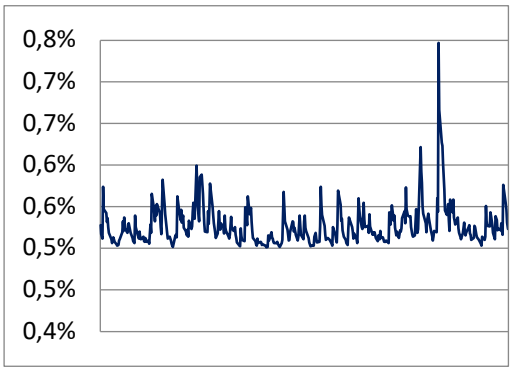


Chart 11. EURO/USD GARCH(1.1) 31/12/2014-23/06/2016

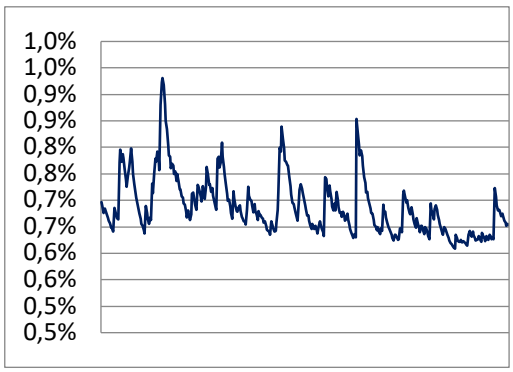


Chart 12. GBP/EURO GARCH(1.1) 31/12/2014-23/06/2016

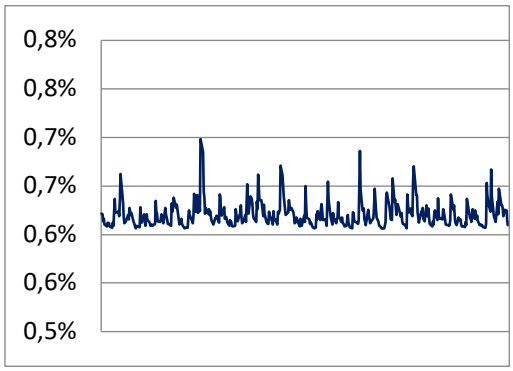


Chart 13. GBP/JPY GARCH(1.1) 31/12/2014-23/06/2016

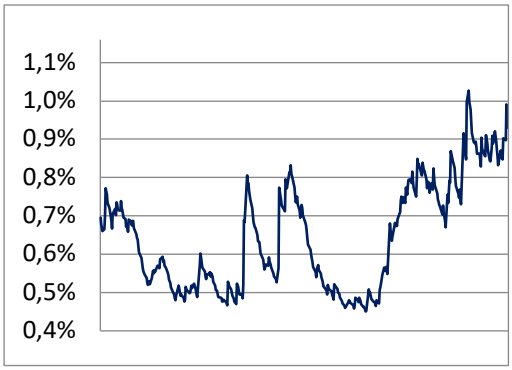


Chart 14. GBP/AUD GARCH(1.1) 31/12/2014-23/06/2016

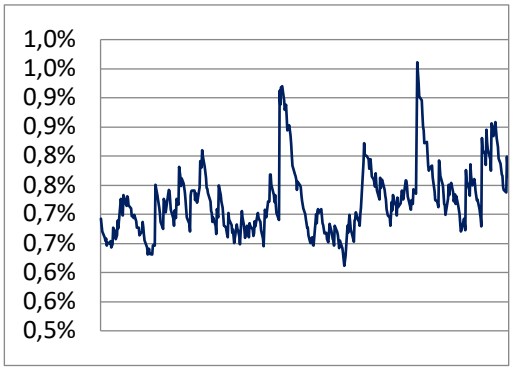


Chart 15. GBP/NZD GARCH(1.1) 31/12/2014-23/06/2016

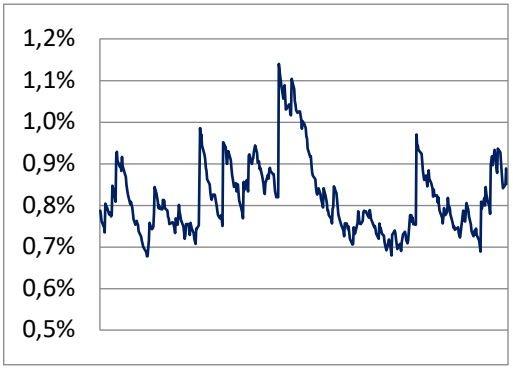


Chart 16. GBP/CAD GARCH(1.1) 31/12/2014-23/06/2016

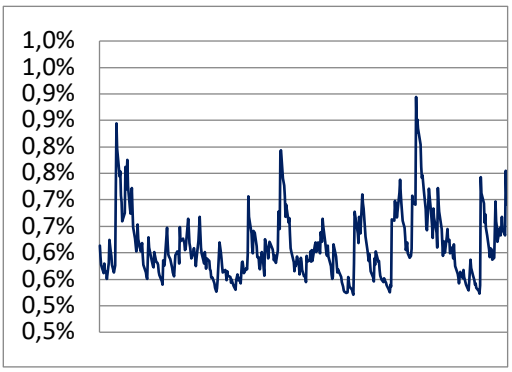


Chart 10 to Chart 16 illustrate the GARCH(1.1) daily volatility estimated, between the 31/12/2014 and the 23/06/2016. As anticipated thanks to Chart 6, the daily volatility of the GBP/JPY, shown on Chart 13, evidenced clustering periods of low and high volatility. The GBP/EURO volatility, shown on Chart 12, evidenced low and stable daily volatility during the study period.

4.3 Summary statistics

Table 6 presents the summary statistics of the daily returns for the exchange rates for the 31/12/2014-23/06/2016 period, the full results are provided in Appendix B. On average, event days provided negative returns for five of the seven exchange rates. This is explained by the fact that we had a majority of 96 negative news providing on average negative returns. Non-event days provided negative returns for four exchange rates and positive returns for three. The absolute value of the average returns for event days were higher than the absolute returns of non-event days for four exchange rates. The GBP/CAD and GBP/JPY were the exchange rates to have higher absolute returns for non-event days, and the GBP/EURO is the only exchange rate to have equally likely absolute values.

For the sample, Table 6 shows that the returns of negative news have provided negative returns on average for six of the seven exchange rates, only the EURO/USD negative news returns were positive. For the entire sample, the positive news provided positive returns. For six exchange rates, positive news absolute returns were higher than negative news absolute returns. On average, positive news provided more than two times the absolute value of negative returns. The only exchange rate which negative news absolute returns were greater is GBP/EURO. The samples characteristics show similar features with the samples of Chan and Wei (1996) and Cosset and Doutriax De La Rianderie (1985), with positive and negative news providing positive and negative returns respectively. However, the samples also evidence opposite characteristics, with positive news providing higher absolute returns compared to negative news.

The Table 7 presents the summary statistics of the daily GARCH(1.1) volatility for the exchange rates for the 31/12/2014-23/06/2016 period, the full results are provided in Appendix B. In the sample, four of the seven exchange rates have average daily volatility marginally greater for event days than non-event days. GBP/NZD and GBP/USD have greater volatility for non-event days, and the GBP/EURO has equally likely values. Table 7 shows that on average the daily volatility of five exchange rates are marginally greater for negative news than positive news. Only the GBP/EURO and EURO/USD had greater volatility for positive news. Looking at the low values of the standard deviations for the daily volatility, we can note that the exchange rates studied evidence a period a relatively stable volatility, especially for the GBP/EURO which value is the lowest (0.013%).

Without providing statistical evidence, Table 6 and Table 7 can be interpreted as providing preliminary signs of political news impacting the returns. Event days, characterized by published news related to the Brexit, seem to provide greater absolute returns. Also, positive news seem to have a greater impact on the returns than negative news. The statistics of Table 7 show signs of relatively stable daily volatility, and do not provide serious signs of volatility being impacted by political news on the Brexit.

Table 6. Summary statistics of exchange rates daily returns (31/12/2014- 23/06/2016)

	Rt			
	Negative news	*Positive News*	*Event Days*	*Non-Event Days*
Number of observations	96	33	170	217
GBP/CAD				
Mean	-0.064%	0.168%	-0.017%	0.036%
Standard Deviation	0.645%	0.627%	0.650%	0.584%
Variance	0.004%	0.004%	0.004%	0.003%
GBP/NZD				
Mean	-0.074%	0.082%	0.012%	0.005%
Standard Deviation	0.701%	0.888%	0.771%	0.801%
Variance	0.005%	0.008%	0.006%	0.006%
GBP/AUD				
Mean	-0.074%	0.151%	0.029%	-0.010%
Standard Deviation	0.758%	0.823%	0.756%	0.641%
Variance	0.006%	0.007%	0.006%	0.004%
GBP/JPY				
Mean	-0.176%	0.285%	-0.027%	-0.054%
Standard Deviation	0.809%	0.924%	0.819%	0.663%
Variance	0.007%	0.009%	0.007%	0.004%
GBP/EURO				
Mean	-0.022%	0.005%	-0.028%	0.028%
Standard Deviation	0.566%	0.634%	0.582%	0.651%
Variance	0.003%	0.004%	0.003%	0.004%
GBP/USD				
Mean	-0.020%	0.083%	-0.037%	-0.006%
Standard Deviation	0.619%	0.682%	0.592%	0.559%
Variance	0.004%	0.005%	0.004%	0.003%
EURO/USD				
Mean	0.032%	0.055%	-0.028%	-0.008%
Standard Deviation	0.556%	0.778%	0.621%	0.752%
Variance	0.003%	0.006%	0.004%	0.006%

Table 7. Summary statistics of exchange rates daily GARCH(1.1) volatility (31/12/2014- 23/06/2016)

	σ_t			
	Negative news	*Positive News*	*Event Days*	*Non-Event Days*
Number of observations	96	33	170	217
GBP/CAD				
Mean	0.628%	0.615%	0.621%	0.605%
Standard Deviation	0.075%	0.060%	0.070%	0.057%
Variance	0.000056%	0.000036%	0.000050%	0.000032%
GBP/NZD				
Mean	0.813%	0.795%	0.808%	0.829%
Standard Deviation	0.080%	0.085%	0.083%	0.096%
Variance	0.000064%	0.000072%	0.000069%	0.000092%
GBP/AUD				
Mean	0.745%	0.736%	0.738%	0.715%
Standard Deviation	0.068%	0.051%	0.062%	0.058%
Variance	0.000046%	0.000026%	0.000039%	0.000033%
GBP/JPY				
Mean	0.756%	0.748%	0.729%	0.654%
Standard Deviation	0.147%	0.167%	0.151%	0.125%
Variance	0.000217%	0.000278%	0.000228%	0.000157%
GBP/EURO				
Mean	0.622%	0.624%	0.623%	0.622%
Standard Deviation	0.011%	0.015%	0.012%	0.013%
Variance	0.000001%	0.000002%	0.000001%	0.000002%
GBP/USD				
Mean	0.577%	0.574%	0.574%	0.562%
Standard Deviation	0.038%	0.032%	0.033%	0.021%
Variance	0.000014%	0.000010%	0.000011%	0.000004%
EURO/USD				
Mean	0.672%	0.731%	0.673%	0.701%
Standard Deviation	0.050%	0.058%	0.048%	0.058%
Variance	0.000025%	0.000033%	0.000023%	0.000034%

4.4 Models Results

4.4.1 Wilcoxon test

The Table 8 presents the results of the nonparametric tests for returns and volatility of event days and non-event days samples, as well as, negative news and positive news samples, the full results are provided in Appendix C. The hypothesis H1b is rejected for the majority of exchange rates but the GBP/EURO. For the GBP/EURO, the alternative hypothesis H1a is rejected. H1b is rejected, at the 99% confidence level for GBP/AUD, GBP/JPY, GBP/USD, and EURO/USD ; and at the 95% confidence level for the GBP/CAD and GBP/NZD. The Wilcoxon test provided strong evidence that the daily GARCH(1.1) volatility of event days were statistically different from the volatility of non-event days. According to Table 7, and as H1b was rejected, we can note that H2b is rejected for GBP/CAD, GBP/AUD, GBP/JPY, GBP/USD. Therefore, for these exchange rates the volatility of event days is higher than the volatility of non-event days. For GBP/NZD and EURO/USD the hypothesis H2a is rejected, the volatility of event days is inferior to the volatility of non-event days. The political news publication increased the volatility of the majority of the exchange rates studied.

The hypothesis H3b has not been rejected by any exchange rate. The alternative hypothesis H3a is rejected for all exchange rates, and we cannot state that the returns of event days and non-event days are statistically different, and referring to Chart 1, the remaining hypothesis H4a and H4b cannot be tested. The hypothesis H5b has been rejected for only one exchange rate, EURO/USD, at the 90% confidence level. For this exchange rate, the daily GARCH(1.1) volatility of the positive and negative news are statistically different. The alternative hypothesis H5a is rejected for GBP/CAD, GBP/NZD, GBP/AUD, GBP/ JPY, GBP/EURO, GBP/USD. Looking at the summary statistics, and as H5b was rejected, the hypothesis H6b is rejected for EURO/USD, the daily GARCH(1.1) volatility of positive news is higher than the volatility of the negative news.

The hypothesis H7b is rejected for three of the seven exchange rates : at the 99% confidence level for GBP/JPY, 95% confidence level for GBP/CAD, and 90% confidence level for GBP/AUD. Thus, the returns from positive news and negative news are statistically different. The alternative hypothesis H7a is rejected for GBP/NZD, GBP/EURO, GBP/USD and EURO/USD. Looking at the summary statistics, and as H7b was rejected, we reject the hypothesis H8b for GBP/CAD, GBP/AUD, GBP/JPY. For these exchange rates, the daily returns of positive news are higher than the daily returns of negative news.

Table 8. Nonparametric Wilcoxon tests of exchange rates daily returns and GARCH(1.1) volatility (31/12/2014- 23/06/2016)

	H7b $\|R_P\| = \|R_{Ne}\|$	H3b $\|R_E\| = \|R_N\|$	H5b σ_P=σ_{Ne}	H1b σ_N=σ_E
	Negative/Positve news	*Event/Non-Event*	*Negative/Positve news*	*Event/Non-Event*
GBP/CAD				
T-statistic	-1.822662558	-0.81964234	0.98290311	2.29607736
P-value (one-tailed)	0.036800486**	0.206494601	0.16454456	0.011157732**
GBP/NZD				
T-statistic	-0.913270642	0.089195402	1.093775501	-2.310095405
P-value (one-tailed)	0.18293114	0.464487505	0.139499901	0.010708293**
GBP/AUD				
T-statistic	-1.377959427	0.529012206	0.858093835	3.726024394
P-value (one-tailed)	0.087058457*	0.298575775	0.196805738	0.000113406***
GBP/JPY				
T-statistic	-2.551396928	0.337480474	0.307295193	5.215865906
P-value (one-tailed)	0.006917258***	0.36798765	0.37940867	1.62953E-07***
GBP/EURO				
T-statistic	-0.220737557	-0.892360357	-0.575383205	1.064243966
P-value (one-tailed)	0.413089057	0.186383763	0.283918124	0.143951492
GBP/USD				
T-statistic	-0.768150516	-0.510001554	0.404985089	4.352791093
P-value (one-tailed)	0.222970044	0.305184547	0.343409123	9.54559E-06***
EURO/USD				
T-statistic	-0.157047509	-0.28006571	-1.314377683	-5.250384802
P-value (one-tailed)	0.437962925	0.389788949	0.096474753*	1.26089E-07***

**** denotes significance at the 0.01 level*
*** denotes significance at the 0.05 level.*
**denotes significance at the 0.10 level.*

4.4.2 Multiple regression

The Table 9 presents the results of the regression of the daily returns for the 31/12/2014-23/06/2016 period. The table provides the results of the parametric statistical test the dummy variables' coefficient: political news (EV), positive news (P), and negative news (Ne). The full results of the regression are provided in Appendix D.

The hypothesis H3b is rejected for the GBP/USD and EURO/USD exchange rates at the 90% and 95% confidence level, respectively. The alternative hypothesis H3a is rejected for all remaining exchange rates. The coefficient of the GBP/USD (-0.00169) and the EURO/USD (-0.00236) are both statistically significant in explaining partially the variation of the returns. The returns of event days are different from the returns of non-event days, and that the publication of political news is

significantly explaining returns variations for these two exchange rates. Refering to Table 1, this finding is in line with Cosset and Doutriax De La Rianderie (1985) results As the coefficients have negatives values, the publication of political news reduces positive returns but exacerbates negative returns, this is similar to the results of Lobo and Tufte (1998) as Table 1 shows. H4b is rejected. Still, the coefficienst have relatively low values, the increase of returns is statistically significant but marginal, this fact is common with the findings of Jamus (2003).

The hypothesis H7b is rejected for GBP/AUD, GBP/JPY, and GBP/USD at the 90% confidence level. For GBP/AUD and GBP/JPY, only the negative news had a significant impact on the returns, and for GBP/USD only positive news. Hence, the returns of positive and negative news are different for these exchange rates. The alternative hypothesis H7a is rejected for the GBP/CAD, GBP/NZD, and GBP/EURO. The EURO/USD evidences a significant impact of positive news at the 90% confidence level and negative news at the 95% confidence level. The hypothesis H7b cannot be rejected as we consider the coefficient of the positive news (0.0027) and negative news (0.0026) equally likely in value, we reject the alternative hypothesis H7a. We cannot state that either positive or negative news provided greater absolute returns when compared to the other.

The hypothesis H8a is rejected for the GBP/AUD and GBP/JPY, the absolute value of the coefficients of negative news are higher than the coefficient of positive news. The positive news provide greater absolute returns than negative news for these exchange rates. For GBP/USD, the coefficient of positive news (0.0025) is greater than the coefficient of negative news (0.0015), therefore, the hypothesis H8b is rejected. Postive news provided greater returns than negative news for GBP/USD.

The Table 10 presents the results of the regression for the daily GARCH(1.1) volatility for the 31/12/2014-23/06/2016 period. The table provides the results of parametric test for the dummy variables' coefficient: political news (EV), positive news (P), and negative news (Ne). The full results of the regression are provided in Appendix D.

The hypothesis H1b is rejected at the 95% confidence level for EURO/USD. For EURO/USD, the publication of political news is statistically significant in explaining the variations of the daily volatility. The coefficient of the event days dummy (-8.88E-05) is negative, the volatility is reduced by the publication of political news for EURO/USD. The hypothesis H2a is rejected. Still, the low value of the coefficient informs that the effect is marginal.

For both GBP/USD and EURO/USD, the hypothesis H5b is rejected at the 90% confidence level. In explaining the variation of the daily GARCH(1.1), the publication of positive news is significant for GBP/USD, and the publication of negative news is significant for EURO/USD. Consequently, for both exchange rates, positive news volatility and negative news volatility are different. The coefficient of the dummy is positive, the volatility of positive news (7.66E-05) is greater for GBP/USD, we reject the hypothesis H6b. The volatility of negative news (7.56E-05) is greater for EURO/USD, the hypothesis H6a is rejected. The coefficients' low values inform us that the impact of positive and negative news is marginal.

The alternative hypothesis H1a is rejected for the remaining exchange rates : GBP/CAD, GBP/NZD, GBP/AUD, GBP/JPY, GBP/EURO, GBP/USD. The regression results did not provide significant coefficients, we cannot test the remaining hypotheses for these exchange rates.

Table 9. Results of the regression of the daily returns (31/12/2014- 23/06/2016)

	$R_t = a_0 + a_1\sigma_t + a_2P + a_3N + a_4EV + \in$		
	Coefficients	*T-statistic*	*P-value*
GBP/CAD			
Positive News (P)	0.00222	1.54754	0.12256
Negative News (Ne)	-0.00010	-0.08286	0.93400
Event Days (EV)	-0.00089	-0.85256	0.39444
GBP/NZD			
Positive News (P)	-0.00078	-0.42104	0.67396
Negative News (Ne)	-0.00231	-1.56768	0.11778
Event Days (EV)	0.00149	1.10955	0.26789
GBP/AUD			
Positive News (P)	-0.00012	-0.07129	0.94321
Negative News (Ne)	-0.00230*	-1.77598	0.07653
Event Days (EV)	0.00184	1.56297	0.11889
GBP/JPY			
Positive News (P)	0.00193	1.11959	0.26359
Negative News (Ne)	-0.00270*	-1.94157	0.05292
Event Days (EV)	0.00125	1.00615	0.31498
GBP/EURO			
Positive News (P)	0.00070	0.47698	0.63365
Negative News (Ne)	0.00048	0.41643	0.67733
Event Days (EV)	-0.00101	-0.95228	0.34156
GBP/USD			
Positive News (P)	0.00255*	1.91935	0.05568
Negative News (Ne)	0.00152	1.43305	0.15266
Event Days (EV)	-0.00169*	-1.74462	0.08185
EURO/USD			
Positive News (P)	0.00277*	1.69741	0.09043
Negative News (Ne)	0.00260**	2.00152	0.04604
Event Days (EV)	-0.00236**	-1.98068	0.04834

Table 10. Results of the regression of the GARCH(1.1) daily volatility (31/12/2014- 23/06/2016)

	$\sigma_t = b_0 + b_1\sigma_{t-1} + b_2P + b_3N + b_4EV + \in$		
	Coefficients	*T-statistic*	*P-value*
GBP/CAD			
Positive News (P)	-2.67018E-05	-0.34451	0.73065
Negative News (Ne)	-5.70609E-05	-0.91575	0.36037
Event Days (EV)	4.5957E-05	0.81494	0.41561
GBP/NZD			
Positive News (P)	1.85967E-05	0.23943	0.81090
Negative News (Ne)	6.54888E-05	1.05750	0.29095
Event Days (EV)	-5.99604E-05	-1.05878	0.29037
GBP/AUD			
Positive News (P)	4.10202E-05	0.65602	0.51221
Negative News (Ne)	4.58808E-05	0.91612	0.36018
Event Days (EV)	-3.20073E-05	-0.70244	0.48283
GBP/JPY			
Positive News (P)	2.17526E-05	0.31407	0.75364
Negative News (Ne)	5.41631E-06	0.09693	0.92283
Event Days (EV)	-5.54433E-05	-1.11369	0.26611
GBP/EURO			
Positive News (P)	3.05688E-05	1.12396	0.26174
Negative News (Ne)	1.26096E-05	0.58069	0.56179
Event Days (EV)	-8.25498E-06	-0.41627	0.67744
GBP/USD			
Positive News (P)	7.66354E-05*	1.71391	0.08736
Negative News (Ne)	4.41596E-05	1.23943	0.21595
Event Days (EV)	-4.81396E-06	-0.14653	0.88358
EURO/USD			
Positive News (P)	3.16291E-05	0.59622	0.55138
Negative News (Ne)	7.56624E-05*	1.78933	0.07435
Event Days (EV)	-8.88555E-05**	-2.31422	0.02119

4.5 Summary and discussion

In this section, we have been able to test our different hypotheses through the regression analysis and the non-parametric test of Wilcoxon, and evidence of the results are provided. Table 11 presents a summary of the results of our research for both the Wilcoxon tests and regressions.

Table 11. Summary of hypotheses tested

Hypotheses	Rejection of hypotheses	
	Wilcoxon test	Regression
H1a	GBP/EURO	GBP/CAD ; GBP/ NZD ;GBP/AUD ;GBP/JPY ; GBP/EURO ; GBP/USD
H1b	GBP/CAD** ; GBP/NZD** ;GBP/AUD*** ;GBP/JPY*** ;GBP/USD*** ; EURO/USD***	EURO/USD**
H2a	GBP/NZD ;EURO/USD	EURO/USD
H2b	GBP/CAD ;GBP/AUD ;GBP/JPY ;GBP/USD	/
H3a	GBP/CAD ;GBP/NZD; GBP/AUD ;GBP/JPY ;GBP/EURO ;GBP/USD ;EURO/USD	GBP/CAD ; GBP/ NZD ;GBP/AUD ;GBP/JPY ; GBP/EURO ;
H3b	/	GBP/USD* ; EURO/USD**
H4a	/	/
H4b	/	GBP/USD ; EURO/USD
H5a	GBP/CAD ;GBP/NZD ;GBP/AUD ;GBP/ JPY ;GBP/EURO ; GBP/USD	/
H5b	EURO/USD*	GBP/USD* ; EURO/USD*
H6a	/	EURO/USD
H6b	EURO/USD	GBP/USD
H7a	GBP/NZD ;GBP/EURO ;GBP/USD ;EURO/USD	GBP/CAD ; GBP/NZD ;GBP/EURO ; EURO/USD
H7b	GBP/CAD** ;GBP/AUD* ;GBP/JPY***	GBP/AUD* ; GBP/JPY* ;GBP/USD* ;
H8a	/	GBP/AUD ; GBP/JPY
H8b	GBP/CAD ;GBP/AUD ;GBP/JPY	GBP/USD ;

As we did test our hypotheses with both parametric and non-parametric tests, our results are robust for both assumptions of normal distribution and non-normal distribution of exchange rate returns. Some of the results of the statistical significance of the political news impact on the exchange rates' returns are in accordance with the hints provided by the summary statistics in Table 6 and Table 7.

First, the impact of political news on returns and volatility has been proved, through parametric and non-parametric tests. Our results find analogs in the historical studies of Cosset and Doutriax De La Rianderie (1985), Chan and Wei (1996) and Beaulieu et al (2005) as shown in Table 1 from the literature review. They found that political news impacted the financial markets by providing information that changed investors' perception. This has been tested by the hypotheses H1a, H1b, H3a, H3b. We also provided similar evidence that positive news and negative news resulted in positive returns and negative returns on average with the summary statistics of Table 6.

The Wilcoxon test provided strong evidence of the rejection of H1b for all exchange rates, but GBP/EURO, and with at least 95% confidence levels, as shown in Table 11. The publication of political news resulted in statistically different daily volatility. The hypothesis H2b have been rejected for the majority, the volatility has proved to be higher for most of the exchange rates studied when political news have been published. The same results have been achieved with the regression for the EURO/USD, with 95% confidence level. For all other exchange rates H1a have been rejected and the hypotheses H2a, H2b could not be tested. The assumption of normal or non-normal distribution have a strong impact on the results here.

The Wilcoxon test also provided evidence of the returns for positive news and negative news samples being statistically different for GBP/CAD, GBP/AUD, and GBP/JPY. The same results have been achieved with the regression for GBP/AUD and GBP/JPY. These ones provided opposite results for the hypotheses H8a, H8B. They both rejected the H8b with the Wilcoxon test and rejected the H8a with the regression. Therefore, in one case the results state that positive news provided higher returns and in the other case that the negative news provided higher returns. Once again, the choice of type of test have an impact on the results.

The GBP/USD, EURO/USD and GBP/EURO exchange rates are the ones which provided the most relevant results for all hypotheses. We argue that the reason for this is that they are the most traded exchange rates in our samples, and consequently, the most disposed to react to new information. The EURO/USD and GBP/USD commonly rejected the following hypotheses: H1b, H3b, H4b, H5b, H6b. The GBP/EURO did not reject any null hypothesis, it is considered as none reactive to political news information. The semi-strong form of market efficiency theory, which states that prices adjust to the new incoming information, holds for the GBP/USD and EURO/USD exchange rates but not for the GBP/EURO. We can interpret that information provided by articles covering the Brexit did not provide relevant information to change market participant expectations for the GBP/EURO, or market participant avoided the analysis of the political risk for this exchange rate, as Frenkel (1981) and Jamus (2003) suggested in their study. The avoidance of the political risk management can be explained by the fact that both the European Union and the United Kingdom are affected by the Brexit case, but there is no information available to know which one is most at risk.

Our evidence of the GBP/EURO being immune to the political news impact on returns and volatility find analogs in the literature. Chan and Wei (1996) findings were very similar, while they found that the blue-chip index was impacted by the political news, the red-chip index did not express statistically significant impact. Chan and Wei (1996) concluded that the red-chip index could be seen as a safe heaven for investors during periods of high political risk.

The hypothesis H8a, when able to be tested, have been rejected for the majority of exchange rates. In most cases the level of positive news impact on returns is greater than the negative news impact, whereas in Chan and Wei (1996) and Beaulieu et al (2005), it was the opposite, negative news had a greater impact. Still, positive news seem to have on average a positive impact on returns and negative news a negative impact on returns, same as Cosset and Doutriaux De La Rianderie (1985), Chan and Wei (1996) and Beaulieu et al (2005). Market participants have been more reactive to positive news than negative news about the Brexit. The sterling currency tends to appreciate more with regard to the information being positive than to depreciate when the information is negative.

5 CONCLUSIONS

5.1 Summary of findings

The first research question aimed at investigating if the returns and volatility were higher during days when political news about the Brexit were published. The thesis results have answered the question through the rejection of hypotheses H1b, H2b, H3b, and H4b. The majority of the exchange rates, but the GBP/EURO, proved to have significantly higher daily volatility of exchange rates returns during event days. The EURO/USD and GBP/USD provided evidence to have higher returns during event days, while the other exchange rates did not. Higher volatility did not always result with higher returns.

The second research question aimed at investigating the asymmetric returns of positive and negative news. The thesis have answered the question through the testing of the hypotheses H5, H6, H7, and H8. Again, GBP/USD and EURO/USD provided strong and statistically sound evidence of volatility being higher for positive news than negative news, while the other exchange rates did not. The GBP/CAD, GBP/JPY and GBP/USD provided evidence to have higher returns from positive news than negative news. The other exchange rates did not provide statistically sound results. Even though the statistical significance has been proved for several exchange rates, we remind that the value of the dummy coefficients were not far from zero. The impact might be considered as marginal, and costly to hedge for investors.

The GBP/EURO exchange rate results are unique, none of the null hypothesis have been rejected, and we cannot state that political news had an impact on the returns nor the volatility. As both the European Union and the United Kingdom are affected by the referendum situation, and as it is difficult to assess which of the two sides will be most impacted in case of Brexit, we believe the immune character of the GBP/EURO is logical. The study provided evidence of both currency being impact when studied separately with the United States dollar.

During the period, the sterling currency behaved differently with euro than with the dollar. The sterling depreciated against the United States dollar while it has marginally appreciated against the euro. This can be the result of the recent monetary policy changes in the United States Federal Reserve, which decided to increase their interest rates, therefore increasing the demand for the currency, resulting in the appreciation of the United States dollar.

5.2 Research contribution

This study has investigated the impact of political risk on the foreign exchange market in the United Kingdom. The study used a basket of seven exchange rates as proxies of the foreign exchange market and the methodology used the political news as a proxy for political risk. Our research focused on a single political event, which is the referendum about the Britain leaving or staying in the European Union. The study answered our research questions with data analysis, and made hypotheses, which have been tested using both multiple linear regressions and Wilcoxon tests. The results provided strong evidence of the political news impact on the returns and volatility of numerous exchange rates. Statistical significance was found with both regression and non-parametric tests.

The clearness of our statement of objective, strongly focused on the political risk impact on financial markets, provided more information in the literature of political risk. Using relevant literature, as a matter of comparison, we evidenced that the findings of historical studies on the semi-strong form of market efficiency still holds with recent data, different political risk, and geographic location. Appropriate research design and methodology of data collection have been used following these references and identified the limitations of them. Finally, all our research questions have been answered, all our hypothesis tested, and interpretation of the results have been made. Hence, we are confident in our contribution to the filling of the research gap on the political risk. The literature of the political risk remains weak, but the research have contributed to its strengthening pattern.

5.3 Limitations and further research

The methodology followed in this study has been inspired from past studies on the subject, we believe that it shows strengths in the analysis of political risk with regard to financial markets. Nonetheless, some limitations in the methodology should be highlighted. First, the identification of political news using a single newspaper might affect the results of the research. For example, if another newspaper did provide the same information a day before, our research would have missed the market reaction in the analysis. Using several newspapers to do the research would have been a major improvement in our research design, unfortunately, not all newspapers provide public archives online with effective search tools as did the *Financial Times*. Also, the time needed for the analysis of relevant articles would have been tremendous. Second, even though we found logical results with positive and negative news providing positive and negative returns on average, the

classification of the articles with regard to their impact is subjective. A more appropriate classification with different dimensions of importance would be useful in further research. Third, the frequency of the data, if increases, would have proven more effective results for the short-run impact of the political news on returns. This would have had significantly more data to analyze and it would have been able to identify differences in returns and volatility at hours scale for example. Unfortunately, the availability of public market data is limited at daily quotes. To find intraday data, it would require Bloomberg or Reuters terminals, which requires funds. Finally, the period length is small (2015-16) due to the shortage of political risk data and the results of our research are tempered by the exchange rates chosen and the type of test used.

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8 APPENDIX A. FINANCIAL TIMES ARTICLES

Headlines in the *Financial Times*, which appeared on days that are classified as event days between 01/01/2015 and 24/06/2016

Date	Headline	Expected effect on the business environment *Positive (+) Negative (-) Neutral (o)*
08/02/2015	City fears loss of access and influence in event of Brexit	-
09/02/2015	If Britain goes: Counting the cost of " Brexit"	O
10/02/2015	If Britain goes: Electorate awaits business view of "Brexit"	o
12/02/2015	If Britain goes: Brexit would jolt the EU's political order	-
04/03/2015	Forget Grexit, time to worry about Brexit	-
09/03/2015	Financial services would be hit hardest by Brexit	-
23/03/2015	Brexit would cost economy £56bn a year, think-tank warns	-
25/03/2015	Ireland braced for Brexit prospect	O
13/04/2015	Gilbraltar warns over prospect of Brexit	O
30/04/2015	Business leaders more worried about Brexit than Grexit	-
06/05/2015	Miliband has ruled out Brexit referendum	+
10/05/2015	Brexit fears spook UK fund houses	-
14/05/2015	Early vote on EU could help UK avoid Brexit	+
17/05/2015	The simple core of the Grexit and Brexit conundrums	+
18/05/2015	Elderly will think of next generations on Brexit	O
19/05/2015	Frans Timmermans, the man standing between Brussels and Brexit	+
20/05/2015	Brexit would dull UK competitive edge says Airbus chief	-
21/05/2015	Risky fatalism on Brexit	-
24/05/2015	Bank of England faces grilling over secrect Brexit plans	O
26/05/2015	Multinationals must end vow of silence over Brexit, says Umunna	O
27/05/2015	Brexit bill heads Queen's speach	O
28/05/2015	Brit with no vote on Brexit	O
29/05/2015	City insider: Mark Boleat's Brexit spat "just internal politics"	+
04/06/2015	Wallenberg scions warns of potential damage from Brexit	-
07/06/2015	Cameron takes on Tory MPs demanding Brexit "come what may"	-
08/06/2015	Pro-Brexit ministers face Cameron ultimatum	+
12/06/2015	S&P warns of UK downgrade amid "Brexit" fears	-
17/06/2015	CEO tiptoe through Brexit vote minefield	O
25/06/2015	Britain would not survive a vote for Brexit	-
28/06/2015	Vanguard chief warns EU more at risk than UK from Brexit	-
02/07/2015	German carmakers raise fears over Brexit	-
12/07/2015	UK companies fear speaking out on Brexit	O
15/07/2015	Brexit presents opportunities to Ireland's financial sector	O
16/07/2015	Britain's biggest union Unite weghs up campaigning for Brexit	-
17/07/2015	Maverick Ukip donor offers £100 000 Brexit prize	-
28/07/2015	Cameron's challenge on Brexit timetable	O
29/07/2015	Irish central bank stes up team to look at Brexit implications	O

30/07/2015	Farage says Ukip will not lead Brexit campaign	-
01/09/2015	Blow to Cameron with order to rewrite Brexit poll question	-
06/09/2015	UK business told to “shut up” over Brexit poll	O
13/09/2015	Jeremy Corbyn victory tilts the balance towards Brexit	-
15/09/2015	Corbyn victory raises questions	o
17/09/2015	Jeremy Corbyn vows to oppose “Brexit” and backs EU tax on City	+
21/09/2015	Corbyn is a variabe in the Brexit debate	O
25/09/2015	Nigel Farage pledges “big positive message” in Brexit push	-
29/09/2015	UK and the EU “Brexit” risks under scrutiny	-
01/10/2015	Lawson’s long journey to Brexit figurehead	o
04/10/2015	David Cameron must stop UK’s drift towards Brexit	-
09/10/2015	Vote leave campaign eyes cross-party Brexit pitch	-
12/10/2015	Pro-EU group ready to take on Brexit lobby	+
19/10/2015	Mark Carney to enter Brexit debate	O
20/10/2015	CBI warns of “huge” uncertainty from brexit	-
22/10/2015	Carney’s Brexit move	O
25/10/2015	David Cameron to step up fight against Brexit	+
28/10/2015	Top US trade official warns on Brexit	-
29/10/2015	Brexit vote risks double rating cut, S&P warns	-
30/10/2015	Brexit and the delusions of new free-trade deals	-
01/11/2015	Hedge fund leader Hintze eyes “generous” Brexit donation	-
04/11/2015	Brexit may suit hedge funds, but others should weigh the risks	O
05/11/2015	Brexit could cut Anglo-Irish trade by a fifth warns institute	-
06/11/2015	UK company board not discussing Brexit risks	O
10/11/2015	Brexit, banks under attack and cyberwar’s hottest front	+
11/11/2015	Brexit gains spur David Cameron to shift tone on Europe	-
12/11/2015	The fatal flaw in the case for Brexit	-
13/11/2015	Brexit would be a shot for booze cruise, says Eurotunnel boss	-
16/11/2015	Entrepeneur who favour Brexit cite red tap and immigration	O
17/11/2015	A vote for Brexit means walking off the world stage	-
18/11/2015	British business must not stay silent in the Brexit debate	O
20/11/2015	Brexit deabte puts Cameron reshuffl on hold	+
25/11/2015	Should the over 65s be allowed to vote on Brexit?	O
26/11/2015	Elderly input ensures valid stake in Brexit vote	O
27/11/2015	Brexit would make UK a supplicant says Lord Hill	-
01/12/2015	Tories shun Brexit contingency plans	+
11/12/2015	S&P reminds UK of Brexit risk to rating	-
13/12/2015	Brexit risk a chance for industry to engage in eurozone recovery	O
14/12/2015	British business worried about potential impact of Brexit	-
15/12/2015	Glorious defeat not enough for David Cameron to stave off Brexit	-
16/12/2015	Merkel downplays hopes for quick Brexit answer	O
17/12/2015	Brexit: 9 EU endgames for Cameron on migration	O
18/12/2015	David Cameron clears way for Brexit poll in summer	+
20/12/2015	Half of Tory party to vote for Brexit, warns MP	-
22/12/2015	EU referendum: The cabinet members for and against a Brexit	O
23/12/2015	Hague’s Brexit stance angers Eurosceptics	O
27/12/2015	Eurozone economists’ survey 2016: Brexit	+
03/01/2016	Economists’ forecasts: Brexit would damage growth	-
04/01/2016	Finance chiefs cautious ahead of Brexit vote	O
05/01/2016	Cameron will allow ministers to campaign for Brexit	+

06/01/2016	Bankers sound alarm bells over Brexit consequences	-
07/01/2016	Brexit fears add to pressure on sterling	-
08/01/2016	Brexit would hit value of farmland investments	-
10/01/2016	Brexit fears leave sterling corporate bonds in limbo	-
11/01/2016	Toyota pledges to stay in UK even if country takes Brexit	+
12/01/2016	Sturgeon warns Brexit vote in June too early	-
15/01/2016	Risks on Brexit move must be assessed by UK	O
17/01/2016	Cabinet minister to lead Brexit group, says Lord Lawson	-
19/01/2016	Cameron to stay at No 10 if voters back Brexit, Grayling says	O
20/01/2016	Law firms prepare for Brexit bonanza	O
21/01/2016	Video: Brexit debate heats up in Davos	O
22/01/2016	Sterling shake-out: Blame it on the Brexit?	O
24/01/2016	Sturgeon warns Cameron against early Brexit vote	-
25/01/2016	Brexit would be a “mistake”, say global pharma leaders	-
26/01/2016	Ireland should be planning ahead in case of brexit	O
27/01/2016	Sterling wilts under “Brexit” pressure	-
28/01/2016	How Brexit will put extra pressure on the pound	-
29/01/2016	Progress but “not enough” on Brexit talks, says Cameron	+
31/01/2016	Cameron hopes on Brexit deal rise after Tusk meeting	+
01/02/2016	New proposals launch two-week Brexit battle in pursuit of “new settlement”	+
02/02/2016	Arguments to sway the Brexit fence-sitters	O
03/02/2016	Cameron pressured to hold 'Brexit' vote later than June	+
04/02/2016	Goldman Sachs eyes 20% sterling drop on Brexit	-
05/02/2016	Top UK businesses unprepared for Brexit	-
07/02/2016	Ukip’s only MP says Brexit campaign must broaden appeal	-
08/02/2016	Reform proposals 'reduce chance of Brexit' - Moody's	+
09/02/2016	British regulators yet to ask banks to assess Brexit impact	O
10/02/2016	EU vote: Lloyd’s of London says Brexit will damage business	-
12/02/2016	Merkel pledges German support to prevent Brexit	+
14/02/2016	Brexit fears fuel the big short in sterling	-
15/02/2016	HSBC could base more staff in Paris in case of 'Brexit'	-
16/02/2016	Tusk warns of ‘extra mile to walk’ for agreement on Brexit plan	-
17/02/2016	Business groups up the ante in Brexit battle	O
18/02/2016	Leaked Brexit summit text: Full annotated document	O
19/02/2016	Standard Life chairman issues warning on Brexit	-
20/02/2016	Michael Gove to oppose David Cameron in the Brexit referendum	-
21/02/2016	Ukip surge boosts Welsh appetite for Brexit	-
22/02/2016	More Tories line up to support Brexit campaign	-
23/02/2016	Brexit risk keeps sterling under pressure	-
24/02/2016	Man Group chief Manny Roman warns of negative impact from Brexit	-
25/02/2016	Brexit: Fraying union	O
26/02/2016	‘Nasty Brexit divorce’ would damage UK fund industry	-
27/02/2016	G20 warns on the perils of Brexit	-
28/02/2016	Brexit: Stuart Rose on why Britain should stay in the EU	+
29/02/2016	Brexit paper by Cabinet Office warns of “decade of uncertainty”	-
01/03/2016	BlackRock warns of economic dangers of Brexit	-
02/03/2016	What Brexit means for the UK economy	-

03/03/2016	Britain's motor industry warns of Brexit impact	-
04/03/2016	Business chief suspended in Brexit row	-
06/03/2016	Longworth resigns as BCC chief over support for Brexit	-
07/03/2016	Germany's Ifo cautions on Brexit risks	-
08/03/2016	Where does the Bank of England stand on Brexit?	-
09/03/2016	Cameron 'won't resign' if UK votes for Brexit	O
10/03/2016	Savills points to slowing UK property market ahead of Brexit vote	-
11/03/2016	Brexit poses threat to UK covered bond mkt	-
13/03/2016	Brexit backer calls halt on scaremongering	O
14/03/2016	Brexit volatility not over yet for sterling: Barclays	-
15/03/2016	Scottish entrepreneur Tom Hunter enters Brexit debate	O
17/03/2016	BoE: Brexit risk 'a significant driver' of pound drop	-
18/03/2016	LSE says Brexit cost for households £850 a year	-
21/03/2016	CBI chief says Brexit would leave economy weaker 15 years on	-
22/03/2016	Sterling slides on negative sentiment with renewed Brexit worries	-
23/03/2016	Brexit fears add to pressure on pound	-
24/03/2016	Brexit likely to be ‘electric shock’, says Amber Rudd	-
27/03/2016	Quarter of investors think Brexit is likely	-
29/03/2016	BoE warns of credit crunch triggered by Brexit uncertainty	-
30/03/2016	Brexit nerves create unusual EU bond patterns: Citi	-
31/03/2016	Gilts prove robust despite Brexit fears	+
04/04/2016	Brexit causing ‘fog of uncertainty’ among financial chiefs	-
05/04/2016	Brexit likely to push up food prices, says NFU	-
06/06/2016	Brexit may cause ‘years of uncertainty’ - Dimon	-
07/04/2016	Sterling insurances rises on Brexit risk	-
08/04/2016	RMT union calls for members to vote for Brexit	-
11/04/2016	Britain warned not to expect easy Brexit negotiations	+
12/04/2016	IMF: Brexit is a 'real possibility'	-
13/04/2016	Brexit could drag down house prices - Moody's	-
14/04/2016	Lloyds warns of short term Brexit uncertainty	-
15/04/2016	Brexit fears weigh on UK construction output	-
17/04/2016	Brexit doubts slow UK business activity	-
18/04/2016	Brexit will cost households ‘£4,300 a year’	-
19/04/2016	Bond guru Jeffrey Gundlach: Brexit not going to happen	+
22/04/2016	Obama in blast against Brexit	+
26/04/2016	Arguments for Brexit do not add up	+
27/04/2016	OECD backs 'Remain'; highlights Brexit dangers	+
04/05/2016	Brexit blamed for surge in uncertainty	-
05/05/2016	UK banks face funding crunch before Brexit vote - Moody's	-
06/05/2016	Canary Wharf developer warns on Brexit	-
08/05/2016	UK would lose two pharma bodies in event of Brexit, lawyers warn	-
09/05/2016	Global banks turn more wary on UK over Brexit economic fallout	-
10/05/2016	Brexit likely to hurt wages, says NIESR think-tank	-
11/05/2016	Brexit campaigners out-fundraise their Remain rivals	-
12/05/2016	Brexit could trigger 'sharp' drop in sterling - BoE	-

13/05/2016	IMF chief warns of damage from Brexit vote	-
16/05/2016	Leading European corporate chiefs warn over Brexit	-
18/05/2016	Pound jumps as polls suggest Brexit threat receding	+
20/05/2016	Brexit Breakdown: a week dominated by Boris Johnson	+
23/05/2016	'Recession and 500,000 job losses': Treasury on Brexit	-
24/05/2016	Sterling surges after Brexit poll	+
26/05/2016	Brexit: Leave beating Remain on fundraising	-
27/05/2016	Brexit campaign told its figures do not add up	+
31/05/2016	Sterling knocked by latest polls showing swing to Brexit	-
02/06/2016	UBS Wealth: Brexit could hammer pound to 1985 levels	-
03/06/2016	Brexit would be a 'terrible deal' for UK economy, warns Jamie Dimon	-
06/06/2016	Betting odds tilt towards Brexit	-
09/06/2016	Brexit odds move back towards Remain	+
10/06/2016	Pound slides as poll shows more support for Brexit	-
12/06/2016	David Cameron warns on pensions and health spending after Brexit	-
13/06/2016	Brexit odds shrink to 68.5% vote for 'Remain'	+
14/06/2016	New poll shows increasing support for Brexit	-
15/06/2016	Osborne warns Brexit means tax rises and spending cuts	-
16/06/2016	Brexit poll puts Leave 45%, Remain 42% - Survation/IG	-
18/06/2016	IMF says Brexit will permanently lower UK incomes	-
20/06/2016	Pound surges as Brexit polls show neck-and-neck race	+
21/06/2016	Remain edges ahead in new Brexit poll	+
22/06/2016	Remain' leads in duo of Brexit polls; Pound rises	+
23/06/2016	Referendum date	-

Link to the archives research:
http://search.ft.com/search?q=&t=all&rpp=100&fa=people%2Corganisations%2Cregions%2Csections%2Ctopics%2Ccategory%2Cbrand&s=%2BlastPublishDateTime&f=title%5B%22Brexit%22%5D&f=lastPublishDateTime%5B2015-01-01T00%3A00%3A00%2C2016-06-23T23%3A59%3A59%5D&curations=ARTICLES%2CBLOGS%2CVIDEOS%2CPODCASTS&highlight=true

Link to the exchange rate data:
http://www.ukforex.co.uk/forex-tools/historical-rate-tools/historical-exchange-rates

9 LIST OF TABLES (appendix)

10APPENDIX B. Full summary statistics

Table B1. Summary statistics GBP/CAD Positive/Negative news

Rt Negative news		*Vol Negative news*	
Mean	-0,000641948	Mean	0,006278548
Standard-Error	0,000658354	Standard-Error	7,63622E-05
Median	-0,000238025	Median	0,006110175
Mode	#N/A	Mode	#N/A
Standard Deviation	0,006450529	Standard Deviation	0,000748193
Sample Variance	4,16093E-05	Sample Variance	5,59793E-07
Kurstosis	0,509280484	Kurstosis	1,133772439
Skewness	-0,482949199	Skewness	1,044021085
Range	0,035754702	Range	0,003660642
Minimum	-0,022384619	Minimum	0,005282573
Maximum	0,013370083	Maximum	0,008943215
SUM	-0,061627015	SUM	0,602740608
Count	96	Count	96

Rt Positive News		*Vol Postive news*	
Mean	0,001681381	Mean	0,006151672
Standard-Error	0,001091514	Standard-Error	0,000104073
Median	0,000914539	Median	0,006102172
Mode	#N/A	Mode	#N/A
Standard Deviation	0,006270271	Standard Deviation	0,000597856
Sample Variance	3,93163E-05	Sample Variance	3,57431E-07
Kurstosis	1,587573048	Kurstosis	-0,334846586
Skewness	0,787791839	Skewness	0,528850728
Range	0,031133749	Range	0,002302994
Minimum	-0,012032998	Minimum	0,005246264
Maximum	0,01910075	Maximum	0,007549258
SUM	0,055485567	SUM	0,203005172
Count	33	Count	33

Table B2. Summary statistics GBP/CAD Event/Non-Event Days

Rt Event Days		*Vol Event Days*	
Mean	-0,000165156	Mean	0,00620553
Standard-Error	0,000498754	Standard-Error	5,39696E-05
Median	-5,26527E-05	Median	0,006022716
Mode	#N/A	Mode	#N/A
Standard Deviation	0,006502956	Standard Deviation	0,000703677
Sample Variance	4,22884E-05	Sample Variance	4,95161E-07
Kurstosis	0,648698774	Kurstosis	1,391016284
Skewness	-0,145346555	Skewness	1,095697717
Range	0,041485369	Range	0,003696951
Minimum	-0,022384619	Minimum	0,005246264
Maximum	0,01910075	Maximum	0,008943215
SUM	-0,02807657	SUM	1,054940046
Count	170	Count	170

Rt Non-Event Days		*Vol Non-Event Days*	
Mean	0,000357054	Mean	0,006053155
Standard-Error	0,000396441	Standard-Error	3,86178E-05
Median	0,000596629	Median	0,005951358
Mode	#N/A	Mode	#N/A
Standard Deviation	0,005839943	Standard Deviation	0,000568876
Sample Variance	3,41049E-05	Sample Variance	3,2362E-07
Kurstosis	0,399852161	Kurstosis	2,55133084
Skewness	0,047462897	Skewness	1,422671027
Range	0,036543902	Range	0,003236103
Minimum	-0,018181881	Minimum	0,005207481
Maximum	0,018362022	Maximum	0,008443584
SUM	0,077480662	SUM	1,313534653
Count	217	Count	217

Table C1. Summary statistics GBP/NZD Positive/Negative news

Rt Negative news		*Vol Negative news*	
Mean	-0,000738929	Mean	0,008133445
Standard-Error	0,000715019	Standard-Error	8,18832E-05
Median	0,000460452	Median	0,007888622
Mode	0	Mode	#N/A
Standard Deviation	0,007005732	Standard Deviation	0,000802288
Sample Variance	4,90803E-05	Sample Variance	6,43666E-07
Kurstosis	1,789486704	Kurstosis	0,306383123
Skewness	-0,993836942	Skewness	0,8270424
Range	0,04078385	Range	0,004107686
Minimum	-0,028197181	Minimum	0,006771883
Maximum	0,012586668	Maximum	0,010879569
SUM	-0,070937211	SUM	0,780810734
Count	96	Count	96

Rt Positive News		*Vol Postive news*	
Mean	0,000817217	Mean	0,00794892
Standard-Error	0,001546645	Standard-Error	0,000147501
Median	0,00028513	Median	0,007785682
Mode	#N/A	Mode	#N/A
Standard Deviation	0,008884801	Standard Deviation	0,000847328
Sample Variance	7,89397E-05	Sample Variance	7,17965E-07
Kurstosis	-0,414462094	Kurstosis	0,513226281
Skewness	0,26271101	Skewness	0,944615336
Range	0,036770165	Range	0,003393582
Minimum	-0,016953687	Minimum	0,006890522
Maximum	0,019816478	Maximum	0,010284104
SUM	0,026968147	SUM	0,262314352
Count	33	Count	33

Table C2. Summary statistics GBP/NZD Event/Non-Event Days

Rt Event Days		*Vol Event Days*	
Mean	0,000121825	Mean	0,00807914
Standard-Error	0,000591303	Standard-Error	6,36006E-05
Median	0,00050227	Median	0,007879623
Mode	0	Mode	#N/A
Standard Deviation	0,007709648	Standard Deviation	0,00082925
Sample Variance	5,94387E-05	Sample Variance	6,87656E-07
Kurstosis	0,590569122	Kurstosis	0,352345227
Skewness	-0,313073634	Skewness	0,856507594
Range	0,048013659	Range	0,004107686
Minimum	-0,028197181	Minimum	0,006771883
Maximum	0,019816478	Maximum	0,010879569
SUM	0,020710322	SUM	1,373453827
Count	170	Count	170

Rt Non-Event Days		*Vol Non-Event Days*	
Mean	5,01796E-05	Mean	0,008289572
Standard-Error	0,000543658	Standard-Error	6,52129E-05
Median	-0,000194137	Median	0,008055093
Mode	#N/A	Mode	#N/A
Standard Deviation	0,008008581	Standard Deviation	0,000960647
Sample Variance	6,41374E-05	Sample Variance	9,22842E-07
Kurstosis	2,297552993	Kurstosis	0,733751701
Skewness	0,80490598	Skewness	1,062578623
Range	0,054536875	Range	0,004627647
Minimum	-0,018272681	Minimum	0,006770968
Maximum	0,036264194	Maximum	0,011398616
SUM	0,010888979	SUM	1,798837016
Count	217	Count	217

Table D1. Summary statistics GBP/AUD Positive/Negative news

Rt Negative news		*Vol Negative news*	
Mean	-0,000737767	Mean	0,007451734
Standard-Error	0,000774087	Standard-Error	6,91846E-05
Median	-0,000556577	Median	0,007347121
Mode	#N/A	Mode	#N/A
Standard Deviation	0,007584474	Standard Deviation	0,000677868
Sample Variance	5,75242E-05	Sample Variance	4,59505E-07
Kurstosis	1,023113477	Kurstosis	0,863385805
Skewness	-0,511711124	Skewness	0,820999808
Range	0,045218573	Range	0,00329775
Minimum	-0,028546757	Minimum	0,006313162
Maximum	0,016671816	Maximum	0,009610912
SUM	-0,07082559	SUM	0,715366493
Count	96	Count	96

Rt Positive News		*Vol Postive news*	
Mean	0,001506316	Mean	0,007355136
Standard-Error	0,001432822	Standard-Error	8,88041E-05
Median	0,000426667	Median	0,007372679
Mode	#N/A	Mode	#N/A
Standard Deviation	0,008230939	Standard Deviation	0,000510141
Sample Variance	6,77483E-05	Sample Variance	2,60244E-07
Kurstosis	0,444789161	Kurstosis	-0,833799861
Skewness	0,736687514	Skewness	-0,104472076
Range	0,035069122	Range	0,001862775
Minimum	-0,012833742	Minimum	0,006289577
Maximum	0,022235379	Maximum	0,008152351
SUM	0,04970843	SUM	0,242719491
Count	33	Count	33

Table D2. Summary statistics GBP/AUD Event/Non-Event Days

Rt Event Days		*Vol Event Days*	
Mean	0,000286643	Mean	0,007375748
Standard-Error	0,000579491	Standard-Error	4,77485E-05
Median	0,000269969	Median	0,007314415
Mode	#N/A	Mode	#N/A
Standard Deviation	0,007555643	Standard Deviation	0,000622564
Sample Variance	5,70877E-05	Sample Variance	3,87586E-07
Kurstosis	0,851813958	Kurstosis	1,255460007
Skewness	-0,19044453	Skewness	0,871299644
Range	0,050782136	Range	0,00339422
Minimum	-0,028546757	Minimum	0,006216692
Maximum	0,022235379	Maximum	0,009610912
SUM	0,04872927	SUM	1,25387712
Count	170	Count	170

Rt Non-Event Days		*Vol Non-Event Days*	
Mean	-9,66918E-05	Mean	0,007145595
Standard-Error	0,00043505	Standard-Error	3,91854E-05
Median	-0,000405043	Median	0,007022174
Mode	#N/A	Mode	#N/A
Standard Deviation	0,00640869	Standard Deviation	0,000577237
Sample Variance	4,10713E-05	Sample Variance	3,33202E-07
Kurstosis	0,988309636	Kurstosis	2,122177295
Skewness	0,351646292	Skewness	1,370550477
Range	0,045379433	Range	0,003088461
Minimum	-0,017914911	Minimum	0,006116012
Maximum	0,027464523	Maximum	0,009204472
SUM	-0,020982125	SUM	1,550594103
Count	217	Count	217

Table E1. Summary statistics GBP/JPY Positive/Negative news

Rt Negative news		*Vol Negative news*	
Mean	-0,001764789	Mean	0,007560283
Standard-Error	0,000825534	Standard-Error	0,000150387
Median	-0,001233713	Median	0,007966348
Mode	#N/A	Mode	#N/A
Standard Deviation	0,008088546	Standard Deviation	0,001473481
Sample Variance	6,54246E-05	Sample Variance	2,17115E-06
Kurstosis	0,985736841	Kurstosis	-1,150364576
Skewness	0,235022472	Skewness	-0,407971264
Range	0,047331485	Range	0,005155889
Minimum	-0,019079205	Minimum	0,005026646
Maximum	0,02825228	Maximum	0,010182535
SUM	-0,169419705	SUM	0,725787177
Count	96	Count	96

Rt Positive News		*Vol Postive news*	
Mean	0,002847618	Mean	0,00748145
Standard-Error	0,001608298	Standard-Error	0,000290389
Median	0,000651713	Median	0,007740981
Mode	#N/A	Mode	#N/A
Standard Deviation	0,009238969	Standard Deviation	0,001668157
Sample Variance	8,53585E-05	Sample Variance	2,78275E-06
Kurstosis	0,460279852	Kurstosis	-1,386285883
Skewness	0,766167865	Skewness	-0,140124557
Range	0,040459828	Range	0,005385069
Minimum	-0,013899012	Minimum	0,004922568
Maximum	0,026560816	Maximum	0,010307637
SUM	0,093971395	SUM	0,246887859
Count	33	Count	33

Table E2. Summary statistics GBP/JPY Event/Non-Event Days

Rt Event Days		*Vol Event Days*	
Mean	-0,000274723	Mean	0,007286343
Standard-Error	0,000628429	Standard-Error	0,000115891
Median	0,000171048	Median	0,007679181
Mode	#N/A	Mode	#N/A
Standard Deviation	0,008193717	Standard Deviation	0,001511029
Sample Variance	6,7137E-05	Sample Variance	2,28321E-06
Kurstosis	1,013107314	Kurstosis	-1,323795675
Skewness	0,261044409	Skewness	-0,083917184
Range	0,047536706	Range	0,00540094
Minimum	-0,019284426	Minimum	0,004906697
Maximum	0,02825228	Maximum	0,010307637
SUM	-0,04670289	SUM	1,238678381
Count	170	Count	170

Rt Non-Event Days		*Vol Non-Event Days*	
Mean	-0,00053561	Mean	0,006536215
Standard-Error	0,000450195	Standard-Error	8,51624E-05
Median	-0,000109099	Median	0,00610133
Mode	#N/A	Mode	#N/A
Standard Deviation	0,00663178	Standard Deviation	0,00125452
Sample Variance	4,39805E-05	Sample Variance	1,57382E-06
Kurstosis	1,83784159	Kurstosis	0,193028557
Skewness	-0,569317146	Skewness	0,904140863
Range	0,046815599	Range	0,005696087
Minimum	-0,025871592	Minimum	0,004975088
Maximum	0,020944007	Maximum	0,010671175
SUM	-0,116227478	SUM	1,418358549
Count	217	Count	217

Table F1. Summary statistics GBP/EURO Positive/Negative news

	Rt Negative News		*Vol Negative news*
Mean	-0,000222935	Mean	0,00622488
Standard-Error	0,000577534	Standard-Error	1,14334E-05
Median	0,000203898	Median	0,006199836
		Mode	#N/A
Standard Deviation	0,005658658	Standard Deviation	0,000112024
Sample Variance	3,20204E-05	Sample Variance	1,25493E-08
Kurstosis	-0,490065697	Kurstosis	3,121182649
Skewness	-0,241504914	Skewness	1,454666413
Range	0,026838695	Range	0,000608295
Minimum	-0,012793368	Minimum	0,006062323
Maximum	0,014045327	Maximum	0,006670617
SUM	-0,021401776	SUM	0,597588514
Count	96	Count	96

	Rt Positive News		*Vol Positive news*
Mean	5,2022E-05	Mean	0,006240877
Standard-Error	0,001103651	Standard-Error	2,53418E-05
Median	0,001527188	Median	0,006207313
		Mode	#N/A
Standard Deviation	0,006339995	Standard Deviation	0,000145578
Sample Variance	4,01955E-05	Sample Variance	2,11929E-08
Kurstosis	0,977629307	Kurstosis	1,266107668
Skewness	0,097536051	Skewness	1,173979514
Range	0,032329316	Range	0,000609201
Minimum	-0,014429291	Minimum	0,006064324
Maximum	0,017900025	Maximum	0,006673525
SUM	0,001716726	SUM	0,205948939
Count	33	Count	33

Table F2. Summary statistics GBP/EURO Event/Non-Event Days

Rt Event Days		*Vol Event Days*	
Mean	-0,000279506	Mean	0,00622896
Standard-Error	0,000446212	Standard-Error	9,19314E-06
Median	0,000321131	Median	0,006200729
		Mode	#N/A
Standard Deviation	0,005817897	Standard Deviation	0,000119864
Sample Variance	3,38479E-05	Sample Variance	1,43674E-08
Kurstosis	-0,354123373	Kurstosis	1,850464976
Skewness	-0,118104319	Skewness	1,257506885
Range	0,032329316	Range	0,000611202
Minimum	-0,014429291	Minimum	0,006062323
Maximum	0,017900025	Maximum	0,006673525
SUM	-0,047515979	SUM	1,058923275
Count	170	Count	170

Rt Non-Event Days		*Vol Non-Event Days*	
Mean	0,000280912	Mean	0,006215412
Standard-Error	0,000441928	Standard-Error	8,80624E-06
Median	0,000479183	Median	0,006185044
Mode	#N/A	Mode	#N/A
Standard Deviation	0,006510012	Standard Deviation	0,000129724
Sample Variance	4,23802E-05	Sample Variance	1,68283E-08
Kurstosis	0,258907038	Kurstosis	6,679377292
Skewness	-0,10992842	Skewness	2,128102894
Range	0,0395888	Range	0,000819768
Minimum	-0,019270218	Minimum	0,006061385
Maximum	0,020318582	Maximum	0,006881153
SUM	0,060957969	SUM	1,348744439
Count	217	Count	217

Table G1. Summary statistics GBP/USD Positive/Negative news

Rt Negative news		*Vol Negative news*	
Mean	-0,000203254	Mean	0,005765154
Standard-Error	0,000631935	Standard-Error	3,87136E-05
Median	-0,0004538	Median	0,005681096
Mode	#N/A	Mode	#N/A
Standard Deviation	0,006191669	Standard Deviation	0,000379315
Sample Variance	3,83368E-05	Sample Variance	1,4388E-07
Kurstosis	3,881449404	Kurstosis	9,907983123
Skewness	0,753111635	Skewness	2,760634088
Range	0,045739543	Range	0,002386232
Minimum	-0,018229897	Minimum	0,005374757
Maximum	0,027509646	Maximum	0,007760989
SUM	-0,019512406	SUM	0,553454758
Count	96	Count	96

Rt Positive News		*Vol Postive news*	
Mean	0,000830073	Mean	0,005737485
Standard-Error	0,001187544	Standard-Error	5,62921E-05
Median	0,000469702	Median	0,005652876
Mode	#N/A	Mode	#N/A
Standard Deviation	0,00682192	Standard Deviation	0,000323374
Sample Variance	4,65386E-05	Sample Variance	1,04571E-07
Kurstosis	1,366900765	Kurstosis	7,944374023
Skewness	0,498058561	Skewness	2,446157566
Range	0,035246008	Range	0,001643576
Minimum	-0,014024757	Minimum	0,005410399
Maximum	0,021221252	Maximum	0,007053975
SUM	0,027392405	SUM	0,189337017
Count	33	Count	33

Table G2. Summary statistics GBP/USD Event/Non-Event Days

Rt Event Days		*Vol Event Days*	
Mean	-0,000365418	Mean	0,005743814
Standard-Error	0,000454023	Standard-Error	2,55286E-05
Median	-0,000974582	Median	0,005664897
Mode	#N/A	Mode	#N/A
Standard Deviation	0,005919732	Standard Deviation	0,000332852
Sample Variance	3,50432E-05	Sample Variance	1,1079E-07
Kurstosis	3,269401629	Kurstosis	11,27345268
Skewness	0,768088716	Skewness	2,833681057
Range	0,045739543	Range	0,002386232
Minimum	-0,018229897	Minimum	0,005374757
Maximum	0,027509646	Maximum	0,007760989
SUM	-0,062121106	SUM	0,976448425
Count	170	Count	170

Rt Non-Event Days		*Vol Non-Event Days*	
Moyenne	-6,36259E-05	Mean	0,005616539
Standard-Error	0,000379511	Standard-Error	1,42569E-05
Médiane	7,73673E-06	Median	0,005565924
Mode	#N/A	Mode	#N/A
Écart-type	0,005590553	Standard Deviation	0,000210018
Sample Variance de l'échantillon	3,12543E-05	Sample Variance	4,41075E-08
Kurstosis (Coefficient d'aplatissement)	0,147931408	Kurstosis	3,784306606
Coefficient d'asymétrie	-0,228867377	Skewness	1,634936147
Range	0,029561355	Range	0,00131698
Minimum	-0,01552403	Minimum	0,005339328
Maximum	0,014037325	Maximum	0,006656308
Somme	-0,013806824	SUM	1,218789037
Nombre d'échantillons	217	Count	217

Table H1. Summary statistics EURO/USD Positive/Negative news

Rt Negative news		*Vol Negative news*	
Mean	0,000320361	Mean	0,006718428
Standard-Error	0,000567904	Standard-Error	5,09426E-05
Median	-0,000274349	Median	0,006555972
Mode	#N/A	Mode	#N/A
Standard Deviation	0,005564296	Standard Deviation	0,000499134
Sample Variance	3,09614E-05	Sample Variance	2,49135E-07
Kurstosis	1,157685046	Kurstosis	6,608497438
Skewness	0,665550068	Skewness	1,93248031
Range	0,030929197	Range	0,003222743
Minimum	-0,011743956	Minimum	0,006086297
Maximum	0,019185241	Maximum	0,00930904
SUM	0,03075467	SUM	0,644969093
Count	96	Count	96

Rt Positive News		*Vol Event Days*	
Mean	0,000551114	Mean	0,007309922
Standard-Error	0,001355133	Standard-Error	0,00010031
Median	0,001945182	Median	0,007160289
Mode	#N/A	Mode	#N/A
Standard Deviation	0,007784648	Standard Deviation	0,000576235
Sample Variance	6,06007E-05	Sample Variance	3,32047E-07
Kurstosis	-0,268505972	Kurstosis	4,313785597
Skewness	0,317468097	Skewness	1,828472316
Range	0,031579168	Range	0,002756045
Minimum	-0,014778156	Minimum	0,006552994
Maximum	0,016801013	Maximum	0,00930904
SUM	0,018186767	SUM	0,241227437
Count	33	Count	33

Table H2. Summary statistics EURO/USD Event/Non-Event Days

Rt Event Days		*Vol Event Days*	
Mean	-0,000278807	Mean	0,006727385
Standard-Error	0,000476123	Standard-Error	3,71169E-05
Median	-0,000321056	Median	0,006644904
Mode	#N/A	Mode	#N/A
Standard Deviation	0,006207886	Standard Deviation	0,000483945
Sample Variance	3,85378E-05	Sample Variance	2,34203E-07
Kurstosis	1,024183181	Kurstosis	5,639186617
Skewness	0,250327603	Skewness	1,795385751
Range	0,039947849	Range	0,003222743
Minimum	-0,020762608	Minimum	0,006086297
Maximum	0,019185241	Maximum	0,00930904
SUM	-0,047397249	SUM	1,143655414
Count	170	Count	170

Rt Non-Event Days		*Vol Non-Event Days*	
Mean	-8,32506E-05	Mean	0,007011633
Standard-Error	0,000510748	Standard-Error	3,9412E-05
Median	-9,31402E-05	Median	0,006860523
Mode	#N/A	Mode	#N/A
Standard Deviation	0,007523795	Standard Deviation	0,000580576
Sample Variance	5,66075E-05	Sample Variance	3,37068E-07
Kurstosis	1,491449624	Kurstosis	1,242267697
Skewness	0,299130861	Skewness	1,131366429
Range	0,051489458	Range	0,003082101
Minimum	-0,021240353	Minimum	0,006147663
Maximum	0,030249105	Maximum	0,009229764
SUM	-0,018065386	SUM	1,521524274
Count	217	Count	217

11APPENDIX C. Full Wilcoxon test

Table I1. Wilcoxon GBP/CAD Negative/Positive news

	Rt Negative news	*Rt Positive News*
Mean	-0,000641948	0,001681381
Variance	4,16093E-05	3,93163E-05
Observations	96	33
Hypothetical mean difference	0	
Df	57	
T-statistic	-1,822662558	
P-value (one-tailed)	0,036800486	
Critical value T	1,672028888	
P-value Two-tailed	0,073600972	
Critical value T	2,002465459	

	Vol Negative news	*Vol Postive news*
Mean	0,006278548	0,006151672
Variance	5,59793E-07	3,57431E-07
Observations	96	33
Hypothetical mean difference	0	
Df	69	
T-statistic	0,98290311	
P-value (one-tailed)	0,16454456	
Critical value T	1,667238549	
P-value Two-tailed	0,32908912	
Critical value T	1,994945415	

Table I2. Wilcoxon GBP/CAD Event/Non-Event Days

	Rt Event Days	*Rt Non-Event Days*
Mean	-0,000165156	0,000357054
Variance	4,22884E-05	3,41049E-05
Observations	170	217
Hypothetical mean difference	0	
Df	343	
T-statistic	-0,81964234	
P-value (one-tailed)	0,206494601	
Critical value T	1,649308199	
P-value Two-tailed	0,412989202	
Critical value T	1,966904281	

	Vol Event Days	*Vol Non-Event Days*
Mean	0,00620553	0,006053155
Variance	4,95161E-07	3,2362E-07
Observations	170	217
Hypothetical mean difference	0	
Df	321	
T-statistic	2,29607736	
P-value (one-tailed)	0,011157732	
Critical value T	1,649614384	
P-value Two-tailed	0,022315465	
Critical value T	1,967381707	

Table J1. Wilcoxon GBP/NZD Negative/Positive news

	Rt Negative news	*Rt Positive News*
Mean	-0,000738929	0,000817217
Variance	4,90803E-05	7,89397E-05
Observations	96	33
Hypothetical mean difference	0	
Df	46	
T-statistic	-0,913270642	
P-value (one-tailed)	0,18293114	
Critical value T	1,678660414	
P-value Two-tailed	0,365862281	
Critical value T	2,012895599	

	Vol Negative news	*Vol Postive news*
Mean	0,008133445	0,00794892
Variance	6,43666E-07	7,17965E-07
Observations	96	33
Hypothetical mean difference	0	
Df	53	
T-statistic	1,093775501	
P-value (one-tailed)	0,139499901	
Critical value T	1,674116237	
P-value Two-tailed	0,278999802	
Critical value T	2,005745995	

Table J2. Wilcoxon GBP/NZD Event/Non-Event Days

	Rt Event Days	*Rt Non-Event Days*
Mean	0,000121825	5,01796E-05
Variance	5,94387E-05	6,41374E-05
Observations	170	217
Hypothetical mean difference	0	
Df	369	
T-statistic	0,089195402	
P-value (one-tailed)	0,464487505	
Critical value T	1,648993533	
P-value Two-tailed	0,92897501	
Critical value T	1,966413684	

	Vol Event Days	*Vol Non-Event Days*
Mean	0,00807914	0,008289572
Variance	6,87656E-07	9,22842E-07
Observations	170	217
Hypothetical mean difference	0	
Df	381	
T-statistic	-2,310095405	
P-value (one-tailed)	0,010708293	
Critical value T	1,648862822	
P-value Two-tailed	0,021416586	
Critical value T	1,966209908	

Table K1. Wilcoxon GBP/AUD Negative/Positive news

	Rt Negative news	*Rt Positive News*
Mean	-0,000737767	0,001506316
Variance	5,75242E-05	6,77483E-05
Observations	96	33
Hypothetical mean difference	0	
Df	52	
T-statistic	-1,377959427	
P-value (one-tailed)	0,087058457	
Critical value T	1,674689154	
P-value Two-tailed	0,174116914	
Critical value T	2,006646805	

	Vol Negative news	*Vol Postive news*
Mean	0,007451734	0,007355136
Variance	4,59505E-07	2,60244E-07
Observations	96	33
Hypothetical mean difference	0	
Df	74	
T-statistic	0,858093835	
P-value (one-tailed)	0,196805738	
Critical value T	1,665706893	
P-value Two-tailed	0,393611476	
Critical value T	1,992543495	

Table K2. Wilcoxon GBP/AUD Event/Non-Event Days

	Rt Event Days	*Rt Non-Event Days*
Mean	0,000286643	-9,66918E-05
Variance	5,70877E-05	4,10713E-05
Observations	170	217
Hypothetical mean difference	0	
Df	331	
T-statistic	0,529012206	
P-value (one-tailed)	0,298575775	
Critical value T	1,649470149	
P-value Two-tailed	0,597151551	
Critical value T	1,9671568	

	Vol Event Days	*Vol Non-Event Days*
Mean	0,007375748	0,007145595
Variance	3,87586E-07	3,33202E-07
Observations	170	217
Hypothetical mean difference	0	
Df	349	
T-statistic	3,726024394	
P-value (one-tailed)	0,000113406	
Critical value T	1,649231411	
P-value Two-tailed	0,000226813	
Critical value T	1,966784557	

Table L1. Wilcoxon GBP/JPY Negative/Positive news

	Rt Negative news	*Rt Positive News*
Mean	-0,001764789	0,002847618
Variance	6,54246E-05	8,53585E-05
Observations	96	33
Hypothetical mean difference	0	
Df	50	
T-statistic	-2,551396928	
P-value (one-tailed)	0,006917258	
Critical value T	1,675905025	
P-value Two-tailed	0,013834515	
Critical value T	2,008559112	

	Vol Negative news	*Vol Postive news*
Mean	0,007560283	0,00748145
Variance	2,17115E-06	2,78275E-06
Observations	96	33
Hypothetical mean difference	0	
Df	50	
T-statistic	0,241064526	
P-value (one-tailed)	0,405245461	
Critical value T	1,675905025	
P-value Two-tailed	0,810490921	
Critical value T	2,008559112	

Table L2. Wilcoxon GBP/JPY Event/Non-Event Days

	Rt Event Days	*Rt Non-Event Days*
Mean	-0,000274723	-0,00053561
Variance	6,7137E-05	4,39805E-05
Observations	170	217
Hypothetical mean difference	0	
Df	321	
T-statistic	0,337480474	
P-value (one-tailed)	0,36798765	
Critical value T	1,649614384	
P-value Two-tailed	0,735975301	
Critical value T	1,967381707	

	Vol Event Days	*Vol Non-Event Days*
Mean	0,007286343	0,006536215
Variance	2,28321E-06	1,57382E-06
Observations	170	217
Hypothetical mean difference	0	
Df	326	
T-statistic	5,215865906	
P-value (one-tailed)	1,62953E-07	
Critical value T	1,649541157	
P-value Two-tailed	3,25907E-07	
Critical value T	1,967267522	

Table M1. Wilcoxon GBP/EURO Negative/Positive news

	Rt Negative News	*Rt Positive News*
Mean	-0,0223%	0,0052%
Variance	3,20204E-05	4,01955E-05
Observations	96	33
Hypothetical mean difference	0	
Df	51	
T-statistic	-0,220737557	
P-value (one-tailed)	0,413089057	
Critical value T	1,67528495	
P-value Two-tailed	0,826178115	
Critical value T	2,00758377	

	Vol Negative news	*Vol Positive news*
Mean	0,00622488	0,006240877
Variance	1,25493E-08	2,11929E-08
Observations	96	33
Hypothetical mean difference	0	
Df	46	
T-statistic	-0,575383205	
P-value (one-tailed)	0,283918124	
Critical value T	1,678660414	
P-value Two-tailed	0,567836249	
Critical value T	2,012895599	

Table M2. Wilcoxon GBP/EURO Event/Non-Event Days

	Rt Event Days	*Rt Non-Event Days*
Mean	-0,000279506	0,000280912
Variance	3,38479E-05	4,23802E-05
Observations	170	217
Hypothetical mean difference	0	
Df	378	
T-statistic	-0,892360357	
P-value (one-tailed)	0,186383763	
Critical value T	1,64889472	
P-value Two-tailed	0,372767526	
Critical value T	1,966259636	

	Vol Event Days	*Vol Non-Event Days*
Mean	0,00622896	0,006215412
Variance	1,43674E-08	1,68283E-08
Observations	170	217
Hypothetical mean difference	0	
Df	375	
T-statistic	1,064243966	
P-value (one-tailed)	0,143951492	
Critical value T	1,648927129	
P-value Two-tailed	0,287902985	
Critical value T	1,966310161	

Table N1. Wilcoxon GBP/USD Negative/Positive news

	Rt Negative news	*Rt Positive News*
Mean	-0,000203254	0,000830073
Variance	3,83368E-05	4,65386E-05
Observations	96	33
Hypothetical mean difference	0	
Df	51	
T-statistic	-0,768150516	
P-value (one-tailed)	0,222970044	
Critical value T	1,67528495	
P-value Two-tailed	0,445940088	
Critical value T	2,00758377	

	Vol Negative news	*Vol Postive news*
Mean	0,005765154	0,005737485
Variance	1,4388E-07	1,04571E-07
Observations	96	33
Hypothetical mean difference	0	
Df	65	
T-statistic	0,404985089	
P-value (one-tailed)	0,343409123	
Critical value T	1,668635976	
P-value Two-tailed	0,686818246	
Critical value T	1,997137908	

Table N2. Wilcoxon GBP/USD Event/Non-Event Days

	Rt Event Days	*Rt Non-Event Days*
Mean	-0,000365418	-6,36259E-05
Variance	3,50432E-05	3,12543E-05
Observations	170	217
Hypothetical mean difference	0	
Df	353	
T-statistic	-0,510001554	
P-value (one-tailed)	0,305184547	
Critical value T	1,649181673	
P-value Two-tailed	0,610369093	
Critical value T	1,966707009	

	Vol Event Days	*Vol Non-Event Days*
Mean	0,005743814	0,005616539
Variance	1,1079E-07	4,41075E-08
Observations	170	217
Hypothetical mean difference	0	
Df	270	
T-statistic	4,352791093	
P-value (one-tailed)	9,54559E-06	
Critical value T	1,650516748	
P-value Two-tailed	1,90912E-05	
Critical value T	1,968789022	

Table O1. Wilcoxon EURO/USD Negative/Positive news

	Rt Negative news	*Rt Positive News*
Mean	0,000320361	0,000551114
Variance	3,09614E-05	6,06007E-05
Observations	96	33
Hypothetical mean difference	0	
Df	44	
T-statistic	-0,157047509	
P-value (one-tailed)	0,437962925	
Critical value T	1,680229977	
P-value Two-tailed	0,87592585	
Critical value T	2,015367574	

	Vol Negative news	*Vol Postive news*
Mean	0,006718428	0,006607259
Variance	2,49135E-07	1,50431E-07
Observations	96	33
Hypothetical mean difference	0	
Df	71	
T-statistic	1,314377683	
P-value (one-tailed)	0,096474753	
Critical value T	1,666599658	
P-value Two-tailed	0,192949507	
Critical value T	1,993943368	

Table O2. Wilcoxon EURO/USD Event/Non-Event Days

	Rt Event Days	*Rt Non-Event Days*
Mean	-0,000278807	-8,32506E-05
Variance	3,85378E-05	5,66075E-05
Observations	170	217
Hypothetical mean difference	0	
Df	384	
T-statistic	-0,28006571	
P-value (one-tailed)	0,389788949	
Critical value T	1,648831425	
P-value Two-tailed	0,779577899	
Critical value T	1,966160961	

	Vol Event Days	*Vol Non-Event Days*
Mean	0,006727385	0,007011633
Variance	2,34203E-07	3,37068E-07
Observations	170	217
Hypothetical mean difference	0	
Df	383	
T-statistic	-5,250384802	
P-value (one-tailed)	1,26089E-07	
Critical value T	1,648841836	
P-value Two-tailed	2,52177E-07	
Critical value T	1,966177191	

12 APPENDIX D. Full Regressions

Table P1. GBP/CAD Returns Regression

Regression statistics	
Multiple R	0,107002621
R Square	0,011449561
R Square	0,001098247
Standard Error	0,006133962
Observations	387

ANOVA

	Df	*SS*	*MS*	*F*	*Significance F*
Regression	4	0,00016647	4,16175E-05	1,106097386	0,353297852
Residual	382	0,014372937	3,76255E-05		
Total	386	0,014539407			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Constant	0,000711723	0,003037251	0,234331259	0,814853363	-0,005260101	0,006683547	-0,005260101	0,006683547
σ	-0,058592447	0,497025436	-0,117886213	0,906219777	-1,035840633	0,918655739	-1,035840633	0,918655739
Positive News	0,002220706	0,001434993	1,547537479	0,122561725	-0,000600769	0,005042168	-0,000600769	0,005042168
Negative News	-9,51892E-05	0,001148726	-0,082864997	0,934002229	-0,002353807	0,002163429	-0,002353807	0,002163429
Event Days	-0,000890606	0,001044622	-0,852563034	0,394435848	-0,002944536	0,001163323	-0,002944536	0,001163323

Table P2. GBP/CAD Volatility Regression

Regression statistics	
Multiple R	0,85507027
R Square	0,73114516
R Square	0,72832993
Standard Error	0,00033113
Observations	387

ANALYSE DE VARIANCE

	Df	*SS*	*MS*	*F*	*Significance F*
Regression	4	0,00011391	2,84776E-05	259,7102773	1,5348E-107
Residual	382	4,18869E-05	1,09651E-07		
Total	386	0,000155797			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Constant	0,00086208	0,00016512	5,220933886	2,93E-07	0,000537422	0,001186737	0,000537422	0,001186737
σ(t-1)	0,85885482	0,02706446	31,73367774	3,9485E-109	0,805640865	0,912068794	0,805640865	0,912068794
Positive News	-2,67018E-05	7,75063E-05	-0,344511196	0,730651461	-0,000179094	0,000125691	-0,000179094	0,000125691
Negative News	-5,70609E-05	6,23103E-05	-0,915753087	0,360374132	-0,000179575	6,54533E-05	-0,000179575	6,54533E-05
Event Days	4,5957E-05	5,63931E-05	0,814940689	0,415614089	-6,49227E-05	0,000156837	-6,49227E-05	0,000156837

Table Q1. GBP/NZD Returns Regression

Regression statistics	
Multiple R	0,087079205
R Square	0,007582788
R Square	-0,002809015
Standard Error	0,00787967
Observations	387

ANALYSE DE VARIANCE

	Df	*SS*	*MS*	*F*	*Significance F*
Regression	4	0,000181223	4,53058E-05	0,729689333	0,572105117
Residual	382	0,023718074	6,20892E-05		
Total	386	0,023899298			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Constant	0,001265669	0,003720808	0,340165264	0,733919047	-0,006050139	0,008581518	-0,006050139	0,008581518
σ	-0,146631216	0,444191563	-0,330108061	0,741499269	-1,019997783	0,726735351	-1,019997783	0,726735351
Positive News	-0,000776148	0,001843409	-0,421039319	0,673963158	-0,004400647	0,002848352	-0,004400647	0,002848352
Negative News	-0,002305236	0,001470474	-1,567683107	0,117783061	-0,005196472	0,000585999	-0,005196472	0,000585999
Event Days	-0,001493235	0,001345803	-1,109548832	0,267891484	-0,004152875	0,001393444	-0,004152875	0,001393444

Table Q2. GBP/NZD Volatility Regression

Regression statistics	
Multiple R	0,931867759
R Square	0,868377521
R Square	0,866999275
Standard Error	0,000331934
Observations	387

ANALYSE DE VARIANCE

	Df	*SS*	*MS*	*F*	*Significance F*
Regression	4	0,00027768	6,942E-05	630,0599559	1,0337E-166
Residual	382	4,20888E-05	1,1018E-07		
Total	386	0,000319769			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Constant	0,000584817	0,000156533	3,736134343	0,000215389	0,000277049	0,000892586	0,000277049	0,000892586
σ(t-1)	0,929903135	0,018695173	49,74027912	5,7962E-169	0,893144807	0,966661463	0,893144807	0,966661463
Positive News	1,85967E-05	7,76696E-05	0,239433332	0,810898001	-0,000134117	0,000171351	-0,000134117	0,000171351
Negative News	6,54888E-05	6,1928E-05	1,057499925	0,290951763	-5,62736E-05	0,000187251	-5,62736E-05	0,000187251
Event Days	-5,99604E-05	5,66315E-05	-1,058780956	0,290368579	-0,000171309	5,13882E-05	-0,000171309	5,13882E-05

Table R1. GBP/AUD Returns Regression

Regression statistics	
Multiple R	0,125556746
R Square	0,015764497
R Square	0,005458366
Standard Error	0,006910246
Observations	387

ANALYSE DE VARIANCE

	Df	*SS*	*MS*	*F*	*Significance F*
Regression	4	0,000292167	7,30418E-05	1,529623164	0,192827441
Residual	382	0,018241072	4,77515E-05		
Total	386	0,018533239			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Constant	0,004061971	0,004262524	0,952949709	0,341218142	-0,004318976	0,012442919	-0,004318976	0,012442919
σ	-0,581989755	0,592901378	-0,981596227	0,326920074	-1,747748595	0,583769084	-1,747748595	0,583769084
Positive News	-0,000115359	0,001618223	-0,071287353	0,943206367	-0,003297099	0,003066381	-0,003297099	0,003066381
Negative News	-0,002303222	0,001296873	-1,775981156	0,076531981	-0,004853126	0,000246681	-0,004853126	0,000246681
Event Days	-0,001840318	0,00117745	-1,562968635	0,118887994	-0,004147777	0,004155412	-0,004147777	0,004155412

Table R2. GBP/AUD Volatility Regression

Regression statistics	
Multiple R	0,899286508
R Square	0,808716223
R Square	0,806713252
Standard Error	0,000267147
Observations	387

ANALYSE DE VARIANCE

	Df	*SS*	*MS*	*F*	*Significance F*
Regression	4	0,000115261	2,88152E-05	403,7582313	9,821E-136
Residual	382	2,72623E-05	7,13674E-08		
Total	386	0,000142523			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Constant	0,000747715	0,000165028	4,530838026	7,86728E-06	0,000423238	0,001072192	0,000423238	0,001072192
σ(t-1)	0,896945711	0,022995838	39,00469786	2,7817E-135	0,851731443	0,942159978	0,851731443	0,942159978
Positive News	4,10202E-05	6,25288E-05	0,656021582	0,512205171	-8,19235E-05	0,000163964	-8,19235E-05	0,000163964
Negative News	4,58808E-05	5,00816E-05	0,916121492	0,360181128	-5,25893E-05	0,000144351	-5,25893E-05	0,000144351
Event Days	-3,20073E-05	4,55657E-05	-0,702443028	0,482830728	-0,000121598	5,75837E-05	-0,000121598	5,75837E-05

Table S1. GBP/JPY Returns Regression

Regression statistics	
Multiple R	0,1714608 65
R Square	0,0293988 28
R Square	0,0192354 65
Standard Error	0,0072789 22
Observations	387

ANALYSE DE VARIANCE

	Df	*SS*	*MS*	*F*	*Significance F*
Regression	4	0,00061303 7	0,0001532 59	2,8926279 6	0,02214809 5
Residual	382	0,02023939 3	5,29827E-05		
Total	386	0,02085243			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Constant	-0,0019559 92	0,00187587 5	-1,0427091 43	0,2977424 53	-0,00564432 7	0,0017323 42	-0,0056443 27	0,0017323 42
σ	0,2173095 7	0,27686158	0,7849033 1	0,4329967 57	-0,32705387	0,7616730 1	-0,3270538 7	0,7616730 1
Positive News	0,0019305 99	0,00172437 4	1,1195941 52	0,2635902 08	-0,00145985 4	0,0053210 53	-0,0014598 54	0,0053210 53
Negative News	-0,0026989 38	0,00139007 8	-1,9415732 55	0,0529237 5	-0,00543210 1	3,42241E-05	-0,0054321 01	3,42241E-05
Event Days	0,0012472 2	0,00123959 7	1,0061501 64	0,3149802 37	-0,00119006 7	0,0036845 08	-0,0011900 67	0,0036845 08

Table S2. GBP/JPY Volatility Regression

Regression statistics	
Multiple R	0,978832826
R Square	0,958113701
R Square	0,957675101
Standard Error	0,000292346
Observations	387

ANALYSE DE VARIANCE

	Df	*SS*	*MS*	*F*	*Significance F*
Regression	4	0,000746797	0,000186699	2184,481816	1,2038E-261
Residual	382	3,26481E-05	8,54661E-08		
Total	386	0,000779445			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Constant	0,000108742	7,58635E-05	1,433385155	0,152565742	-4,04207E-05	0,000257904	-4,04207E-05	0,000257904
σ(t-1)	0,988138341	0,011256856	87,78102646	2,5267E-255	0,966005185	1,010271497	0,966005185	1,010271497
Positive News	2,17526E-05	6,92603E-05	0,314070851	0,753638673	-0,000114426	0,000157932	-0,000114426	0,000157932
Negative News	-5,41631E-06	5,58798E-05	-0,096927856	0,922834552	-0,000104454	0,000115287	-0,000104454	0,000115287
Event Days	-5,54433E-05	4,97835E-05	-1,113687778	0,266113411	-0,000153327	4,24407E-05	-0,000153327	4,24407E-05

Table T1. GBP/EURO Returns Regression

Regression statistics	
Multiple R	0,08124683
R Square	0,00660104
R Square	-0,00380103
Standard Error	0,00622595
Observations	387

ANALYSE DE VARIANCE

	Df	*SS*	*MS*	*F*	*Significance F*
Regression	4	9,8394E-05	2,45985E-05	0,634588997	0,638099519
Residual	382	0,014807424	3,87629E-05		
Total	386	0,014905818			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Constant	-0,017311701	0,014719027	-1,176144359	0,240269631	-0,046252156	0,011628755	-0,046252156	0,011628755
σ	2,835632495	2,370639054	1,196146874	0,232381158	-1,825502628	7,496767611	-1,825502628	7,496767611
Positive News	-0,000695002	0,001457114	-0,476983942	0,633646331	-0,002169948	0,003559988	-0,002169948	0,003559988
Negative News	-0,000483705	0,001161561	-0,416426955	0,677331488	-0,001800148	0,002767558	-0,001800148	0,002767558
Event Days	-0,001009684	0,001060274	-0,952281692	0,341556289	-0,003094384	0,001075025	-0,003094384	0,001075025

Table T2. GBP/EURO Volatility Regression

Regression statistics	
Multiple R	0,503812165
R Square	0,253826697
R Square	0,246013364
Standard Error	0,000116264
Observations	387

ANALYSE DE VARIANCE

	Df	*SS*	*MS*	*F*	*Significance F*
Regression	4	1,75653E-06	4,39132E-07	32,4863534	2,55165E-23
Residual	382	5,16365E-06	1,35174E-08		
Total	386	6,92018E-06			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Constant	0,003081511	0,000276031	11,16367876	3,09224E-25	0,002538782	0,003624238	0,002538782	0,003624238
σ(t-1)	0,503542588	0,044462151	11,32519631	7,81768E-26	0,416121395	0,590963781	0,416121395	0,590963781
Positive News	3,05688E-05	2,71974E-05	1,123961131	0,261735331	-2,29065E-05	8,40441E-05	-2,29065E-05	8,40441E-05
Negative News	1,26096E-05	2,17148E-05	0,580688177	0,561793039	-3,0086E-05	5,53051E-05	-3,0086E-05	5,53051E-05
Event Days	-8,25498E-06	1,98307E-05	-0,416272691	0,677444252	-4,7246E-05	3,0736E-05	-4,7246E-05	3,0736E-05

Table U1. GBP/USD Returns Regression

Regression statistics	
Multiple R	0,105686187
R Square	0,011169527
R Square	0,000815325
Standard Error	0,005676108
Observations	387

ANALYSE DE VARIANCE

	Df	*SS*	*MS*	*F*	*Significance F*
Regression	4	0,000139021	3,47552E-05	1,078743035	0,366675854
Residual	382	0,012307354	3,22182E-05		
Total	386	0,012446375			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Constant	0,001720141	0,006523712	0,263675205	0,792172378	-0,011106742	0,014547022	-0,011106742	0,014547022
σ	-0,304006527	1,156149078	-0,262947515	0,792732794	-2,577219337	1,969206282	-2,577219337	1,969206282
Positive News	0,002549321	0,001328228	1,919351188	0,055684575	-6,22169E-05	0,005160859	-6,22169E-05	0,005160859
Negative News	-0,001520049	0,001060707	-1,433052447	0,152660737	-0,000565507	0,003605605	-0,000565507	0,003605605
Event Days	-0,001692794	0,000970293	-1,744621599	0,081854992	-0,003600577	0,000214909	-0,003600577	0,000214909

Table U2. GBP/USD Volatility Regression

Regression statistics	
Multiple R	0,671185854
R Square	0,450490455
R Square	0,444736424
Standard Error	0,000190953
Observations	387

ANALYSE DE VARIANCE

	Df	*SS*	*MS*	*F*	*Significance F*
Regression	4	1,1419E-05	2,85475E-06	78,2913382	1,88369E-48
Residual	382	1,39289E-05	3,64632E-08		
Total	386	2,5348E-05			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Constant	0,001910253	0,000223227	8,557429035	2,84291E-16	0,001471345	0,002349161	0,001471345	0,002349161
σ(t-1)	0,661342188	0,03959164	16,70408671	2,03551E-47	0,583497355	0,739187004	0,583497355	0,739187004
Positive News	7,66354E-05	4,47138E-05	1,713909051	0,087356635	-1,12806E-05	0,000164551	-1,12806E-05	0,000164551
Negative News	4,41596E-05	3,56289E-05	1,239430473	0,215947037	-2,58938E-05	0,000114213	-2,58938E-05	0,000114213
Event Days	-4,81396E-06	3,28521E-05	-0,146534063	0,883577101	-6,94076E-05	5,97797E-05	-6,94076E-05	5,97797E-05

Table V1. EURO/USD Returns Regression

Regression statistics	
Multiple R	0,119713799
R Square	0,014331394
R Square	0,004010257
Standard Error	0,006954444
Observations	387

ANALYSE DE VARIANCE

	Df	*SS*	*MS*	*F*	*Significance F*
Regression	4	0,000268624	6,71561E-05	1,388547931	0,23722698
Residual	382	0,018475136	4,83642E-05		
Total	386	0,018743761			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Constant	0,003672773	0,004645354	0,790633509	0,429648451	-0,005460892	0,012806437	-0,005460892	0,012806437
σ	-0,535684538	0,659090801	-0,812762886	0,416860266	-1,831584592	0,760215516	-1,831584592	0,760215516
Positive News	0,002773461	0,001633945	1,697406757	0,090434261	-0,000439181	0,005986103	-0,000439181	0,005986103
Negative News	0,002602259	0,001300144	2,001516775	0,046043541	4,59253E-05	0,005158593	4,59253E-05	0,005158593
Event Days	-0,002355713	0,001189348	-1,980676536	0,048344447	-0,0046942	-1,72254E-05	-0,0046942	-1,72254E-05

Table V2. EURO/USD Volatility Regression

Regression statistics	
Multiple R	0,915780342
R Square	0,838653634
R Square	0,836964144
Standard Error	0,000225216
Observations	387

ANALYSE DE VARIANCE

	Df	*SS*	*MS*	*F*	*Significance F*
Regression	4	0,000100713	2,51782E-05	496,394336	7,7504E-150
Residual	382	1,93759E-05	5,07222E-08		
Total	386	0,000120089			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Constant	0,000639155	0,000150447	4,248572267	2,70603E-05	0,000343361	0,000934949	0,000343361	0,000934949
σ(t-1)	0,909591781	0,021362255	42,57939068	4,0911E-147	0,867589455	0,951594108	0,867589455	0,951594108
Positive News	3,16291E-05	5,3049E-05	0,596223376	0,551379141	-7,26756E-05	0,000135934	-7,26756E-05	0,000135934
Negative News	7,56624E-05	4,22854E-05	1,789328358	0,074354043	-7,47881E-06	0,000158804	-7,47881E-06	0,000158804
Event Days	-8,88555E-05	3,83954E-05	-2,314224626	0,021185213	-0,000164348	-1,33628E-05	-0,000164348	-1,33628E-05

13 WORD COUNT

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▪ Abstract	195
▪ Introduction	1, 381
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