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Oil price shocks and economic policy uncertainty impact on stock returns in the United Kingdom

Author: Affan Ibne Sharif
Student number: 523471as
Thesis supervisor: Ruben de Bliek
Second reader: Sipke Dom
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ABSTRACT

In this thesis, I study whether economic policy uncertainty and changes in oil prices have an impact on the UK stock market, proxied by FTSE100. In order to analyse this impact, the paper uses the ordinary least square where in one model, we look at changes in oil price as a whole and in the other, the positive and negative change in two separate variables. The paper finds that both variables have a positive impact on the daily return of the FTSE100, however, the magnitude of a positive price change is roughly double that of a negative price change in oil price. Looking into significance, the effect of EPU is only significant when we look at the positive and negative price change separately while the effect of change in oil price is significant for both. Hence, while the economic policy uncertainty and changes in oil prices have an impact on the UK stock market, the magnitude of positive changes in oil is much larger than that of a negative change and while the effect of economic policy uncertainty is significant when we look at oil price movements separately, the magnitude of this effect is almost zero or negligible.

Keywords: Oil Price, Economic Policy Uncertainty, UK Stock Market

JEL codes: F65, G15 and Q02

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CHAPTER 1 Introduction

Once the country where the industrial revolution began in the 18th century, the UK economy has, in recent years, been reeling under lots of stress, such as Brexit, failed government mini-budget, oil price shock as well as the global Covid pandemic (*Industrialization, Labor, and Life*, n.d.). With a forecasted GDP growth of -0.4% for the financial year 2023, the United Kingdom (UK) is set to be the second-slowest growing economy among the G20 countries, leading only the war-engaged and sanction-ridden Russia (Elliott & editor, 2022). As the financial world becomes ever-connected, London Stock Exchange, the primary UK stock market, has emerged as the sixth biggest stock market in the world ("UK Overtakes India as the World's Sixth-Biggest Equity Market," 2023). Moreover, it has become a popular place for multinational companies like Toyota to list themselves to access capital and ensure greater transparency to global investors (News, 1999). However, the relationship between economic policy uncertainty (EPU) and oil price shocks in the UK market is yet to be thoroughly uncovered, with hardly any previous research into the effects of the recent EPU on the UK market.

In the paper (You et al., 2017), the authors find strong evidence of the impact of EPU and oil price shocks on China's stock markets' return. This literature is closely related to the study due to the similar economic relevance of both economies on the global stage, where they are both one of the top 10 economies of the world in sheer size, with both having well-established industrial bases (*World Economic Outlook (April 2023) - GDP, Current Prices*, n.d.). Moreover, it is also interesting to focus this study on the UK, as despite China being a developing country, the UK, on the other hand, has been an industrialized and developed economy for decades with deep, liquid financial markets, hence allowing us to observe how the effects of the predictors, namely oil price risks and EPU behave differently in a developed economy as compared to a developing one. This paper aims to contribute to the current literature on the known significant effect between the oil price and the stock market of the UK market in previous studies, such as those by (Cunado & Perez de Gracia, 2014; Fayyad & Daly, 2011; Mugaloglu et al., 2021; Park & Ratti, 2008). As argued in a study by (Kang & Ratti, 2013), the relationship between oil price and the stock market is not isolated from EPU; this paper also analyses the lesser-discovered relationship of it on the UK stock markets. EPU can impact the prices of assets through many channels, such as policy uncertainty might delay or change decisions taken by firms or other economic agents and affect financing and production by influencing demand and supply (Gulen & Ion, 2016; Pástor & Veronesi, 2013).

The paper will conduct a quantitative research analysis of the relationship between EPU and oil price shocks on the UK stock markets, where the authors of the previous papers all found significant adverse effects of the oil price shocks on the UK stock market. While the UK is the third largest energy consumer in Europe, the country recorded changes in its oil consumption and production by

roughly -2.3% and -2.4%, respectively, on average per year between 2013 and 2021 (*Statistical Review of World Energy | Energy Economics | Home*, n.d.). This comes as, ever since 2005, the country has turned from a net exporter to a net oil importer (Asghedom, n.d.). While at the same time, the country faced a myriad of challenges, such as Covid-19, Brexit, rapid government changes, and the rising cost of living crisis, making the UK economic policy outlook to be often volatile and leading the UK stock market to lose its position to France as the largest stock market capitalization in Europe and with key UK indexes such as, FTSE100 underperforming compared to its European and American peers, such as the EuroStoxx50 and S&P500 index ("London's Investment Appeal Is Unraveling as Arm Heads to the US," 2023). Hence, it is imperative to look into the relationship between the EPU and oil price on the UK stock market since having good predictability will allow us to forecast the changes in the economic condition of this region and generate a positive return for the investors in these equity markets. Therefore, we formulate the research question of this paper as "How do the economic policy uncertainty and oil price shocks impact the UK market?"

The research aims to contribute to the body of existing knowledge already available on the effects of oil prices on the stock market's return and further include the relationship of EPU's impact by focusing on the UK market and examining the foreseeable effects of changes in both these factors on the stock market's return. The approach to analyzing this impact is to construct a standard OLS regression model, which assumes that changes in EPU and oil price have a linear/symmetric effect on stock market returns in both rising and falling scenarios of the predicting variables. The data for this study consists of the closing prices of the UK stock market's leading stock market index, FTSE100, comprising the largest 100 companies by market capitalization obtained from the Eikon Terminal, and covers the period from January 1, 2013, to March 31, 2023. Here, the impact of the EPU and oil prices is represented by the daily EPU index and the oil returns, measured as the log difference of the daily return on the West Texas Intermediate (WTI) crude oil futures contract. Where the oil price data is computed from West Texas Intermediate's futures (WTI), and EPU is calculated from the EPU index, constructed daily using the digital archives of the Access World News NewsBank service, which includes coverage of about 650 UK newspapers, ranging from significant national papers like the Guardian to small local newspapers across the UK, for articles including the term 'uncertain' or 'uncertainty,' economic or economy as well as policy-relevant terms.

The paper expects to find an impact of the EPU and oil price shocks on the UK stock market, which should be visible from the significant effects of these factors on the stock market return. Given the focus area and the inclusion of EPU as a predictor, the study will present the effect of an existing and a new emerging relationship in a region yet to be extensively researched. However, even after this study, there would be more room for further analysis of the varied impacts of oil price shocks and EPU on

stock returns separately by industries, as it can be an essential component for investment decisions and risk management.

In the remainder of the paper, chapter 2 will provide the theoretical framework of the paper, outlining the history of the UK stock market, oil price and its development and the relevance of economic policy uncertainty along with highlighting some studies already done in this field. Furthermore, the paper discusses the different data used in the study and its relevance, followed by a discussion of the method used in chapter 4. Lastly, the paper addresses the result, discussion, and conclusion of this study in chapters 5 and 6.

CHAPTER 2 Theoretical Framework

2.1 History of UK Stock Market

The stock market acts as an exchange where companies can get listed by offering equity, otherwise known as shares, to investors in exchange for capital. The performance of this stock market is one of the critical indicators of a modern economy; specifically, key country-level stock market indexes such as the S&P500 or FTSE100 provide a good representation of the United States of America (USA) and United Kingdom (UK)'s respective economy as it comprises of the major publicly traded companies of those countries, which contributes significantly to its economy. Hence, its return or performance is a good representative of the country and world economy's outlook. Ever since the establishment of the regulated London Stock Exchange in 1801, first in the UK, the market has gone through multiple turmoil throughout its history such as the railway mania in the 1840s, when rail stocks were traded at ridiculous prices but busted in 1845 after a rise of interest rates and with only a third of proposed rail tracks being built (Symeonidis, 2018). Moreover, just like the UK stock market, the key index, FTSE100 also played significant roles in highlighting the global and UK economy, such as during the Dotcom bubble in the 2000s and the recent financial crisis of 2009 (Elder & Atkins, 2014; Elliott & editor, 2006).

2.2 Oil and its price development

In Baumeister & Kilian (2016), the authors defined oil price shocks as the unanticipated or surprise changes in the price of oil. The oil price we consider in this paper is of the crude oil form, which is refined to produce different types of oil and byproduct, which is then used for purposes like transportation fuel, heating, and electricity generation, asphalt and road oil, and feedstocks for making the chemicals, plastics, and synthetic materials that are in nearly everything we use (*Frequently Asked Questions (FAQs) - U.S. Energy Information Administration (EIA)*, n.d.). In a pioneering work Hamilton (1983), the author incorporated oil price shocks in his literature and concluded that oil price shocks are responsible for the US recession. During the oil crisis of the 1970s, the oil price jumped from $3 a barrel to $12 a barrel in a matter of few years, causing inflation in countries such as the UK to skyrocket to 24% and when the labour government took over in February 1974, the stock market faced a collapse in corporate profit and value (Macalister, 2011). However, in the paper by (Blanchard & Gali, 2007), the authors highlighted that this effect of oil price is more muted but still significant due to the lower share of oil price in the production cost and more flexible labour markets in the 2000s as compared to the 1970s.

In the list of literature, studying the relationship between the oil price and stock returns, some authors concluded that there exists a negative effect of negative oil price shocks on stock prices such as (Cunado & Perez de Gracia, 2014; Filis & Chatziantoniou, 2014; Mensi et al., 2017; Papapetrou,

2001; Park & Ratti, 2008; Sadorsky, 1999; You et al., 2017). On the other hand, some authors also concluded that there exists a positive relationship between oil price changes and stock returns such as (*Evidence on the Nature and Extent of the Relationship between Oil Prices and Equity Values in the UK - ScienceDirect*, n.d.; Gogineni, n.d.; Sadorsky, 2001; Zhu et al., 2016). While some authors failed to find any significant relationship between these two variables such as (Apergis & Miller, 2009; Huang et al., 2006; Sukcharoen et al., 2014). Hence, it is imperative to discover this relationship in a market where relatively no study has been conducted in a much more recent period.

2.3 Relevance of Economic Policy Uncertainty

Economic policy uncertainty can be generally defined as having three components, namely, it is the uncertainty of who will be making the decision, what will be the decision and how it will affect the economy, as a result, it can be considered to be a risk by businesses and individuals, hence delaying spending and investments due to the uncertainty of the economy (*What Is Policy Uncertainty?*, n.d.). Therefore, to measure this policy-related economic uncertainty in a country, an index that obtains the daily count of news articles that contains at least one word from each of their term sets has been created, known as the economic policy uncertainty index (*Economic Policy Uncertainty Index*, n.d.). This interest in policy uncertainty first came to light through the publication of John Kenneth Galbraith's book "The Age of Uncertainty", where he considered significant events covered by the media at that time and highlighted in his academia, uncertainty as a significant issue in the financial world. This index while being relatively stable, underwent large swings during periods of uncertainty such as during the early days of Covid-19 restrictions in the UK. The index increased from the 100-300 levels to the 800-1000 level in the early days of Covid-19 restrictions, highlighted in Figure 1 and our data for this study.

A strand of literature has investigated the relationship between policy uncertainty and stock returns in different markets. It was concluded that the economic policy uncertainty has a negative effect on stock returns in the US, Europe, China and the Gulf Cooperation Council and that this effect is induced by changes in oil prices while this relationship was also found to exist in inconsistent patterns across the seven OECD countries (Chang et al., 2015; *Economic Policy Uncertainty, Oil Price Shocks and GCC Stock Markets*, n.d.). While there was found to exist no significant constant relationship in China (You et al., 2017) Adding to previous findings found that economic policy uncertainty significantly affects stock returns and looking into the effect of policy uncertainty in countries such as the US on international stock market, it was concluded that there exists a time-varying correlation with the stock market of BRICS countries while the contrary was also concluded using a quantile regression approach (Dakhlaoui & Aloui, 2016; Mensi et al., 2014, Arouri, M., & Roubaud, D., 2016). Additionally, in the paper by Antonakakis et al., (2014), the authors concluded that the EPU behaves negatively to aggregate demand oil price shocks. Hence, it is imperative to also investigate this

relationship in the UK market due to the last few years of elevated policy uncertainty driven by Brexit and the pandemic.

CHAPTER 3 Data

Our sample data in this paper comprises of UK's stock market data ranging from January 2013 until March 2023. The year 2013 was selected as our starting point since it was a few years before the Brexit referendum held on 23 June 2016, allowing us to observe how well variables like EPU and oil prices behave before, during, and after uncertainties like Brexit, Covid-19, Mini Budget and so on. The data used was mainly obtained from Eikon, except for the EPU index, obtained from policyuncertainty.com, with firms in the stock market index operating in the financial services, utilities, real estate, industrials, technology, etc. As of January 2023, companies in the FTSE100 had a combined market capitalization of 2.02 trillion pounds with an average market capitalization of 20.2 billion pounds across all the companies included in the index (*FTSE Overview*, n.d.).

Stock Market Performance, defined by measuring the stock market return of the stock market index, namely of FTSE100, the data of which obtained from Eikon, and computed the stock returns using the log difference of stock index price. The performance of this index varies largely, registering daily returns as high as 9.05% on 24 March 2020 to low as -10.87% on 12 March 2020, with the total performance during our time frame generating roughly 29.40%. Moreover, to investigate the impact of oil prices, the proxy for the global oil price has commonly been the West Texas Intermediate (WTI), Brent Crude oil prices, and the United States refiner's acquisition cost for imported crude oil (RAC). The variable Brent, used in this paper, is used to price three-fourths of oil traded worldwide by risk managers and market participants and is considered the benchmark for crude oil prices in Europe (*Brent*, n.d.). It is interesting to note that in our data time frame, the price of Brent crude oil futures has gone as low as 12.96 pounds per barrel on 22 April 2020 during the pandemic but in a matter of 2 years, as the economies around the world reopened and as western countries heavily sanction import of Russian oil, the excessive demand of oil around the world, led to a rapid rise in oil prices, driving prices to as high as 106.19 pounds per barrel in a matter of few days. Lastly, the economic policy uncertainty of the UK is measured using an index created (*Measuring Economic Policy Uncertainty* | The Quarterly Journal of Economics | Oxford Academic*, n.d.), where the authors measure it by obtaining the daily count of articles containing their search term, scaled by dividing the number of articles by the total count of all articles. These articles have coverage of about 650 UK newspapers, ranging from important national papers like the Guardian to small local newspapers across the UK.

While investigating the relationship between the outcomes and predictors, the paper also considers some control variables, namely the interest rate and exchange rate, to consider the external and internal macroeconomics of the UK. The Interest rate index and exchange rate data are obtained from OECD and Eikon, respectively.

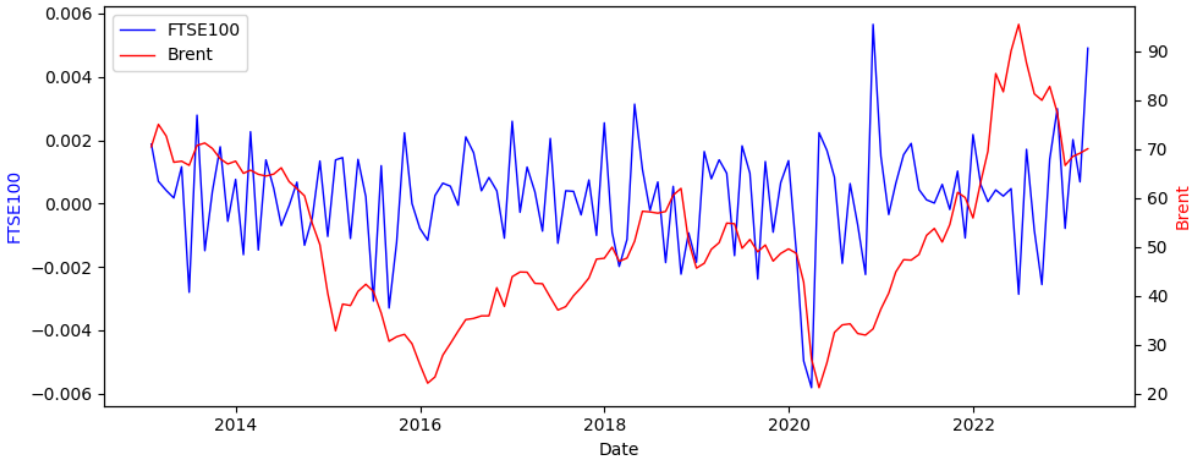

Figure 1: Brent price and natural logarithm return of FTSE100 (monthly data, January 2013 to March 2023). The left and right y-axes denote FTSE100 and Brent, respectively.

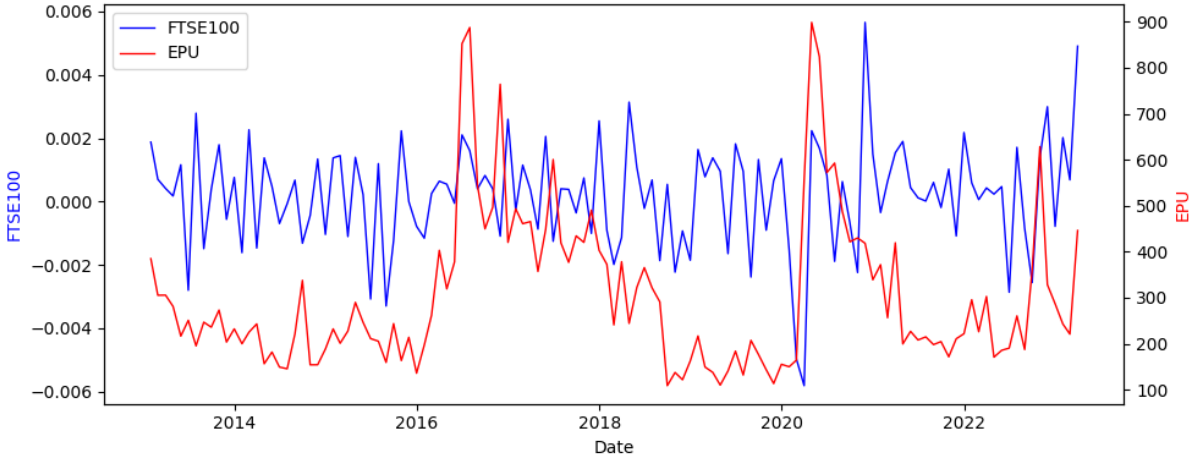

Figure 2: UK's EPU and natural logarithm return of FTSE100 (monthly data, January 2013 to March 2023). The left and right y-axes denote FTSE100 and EPU, respectively.

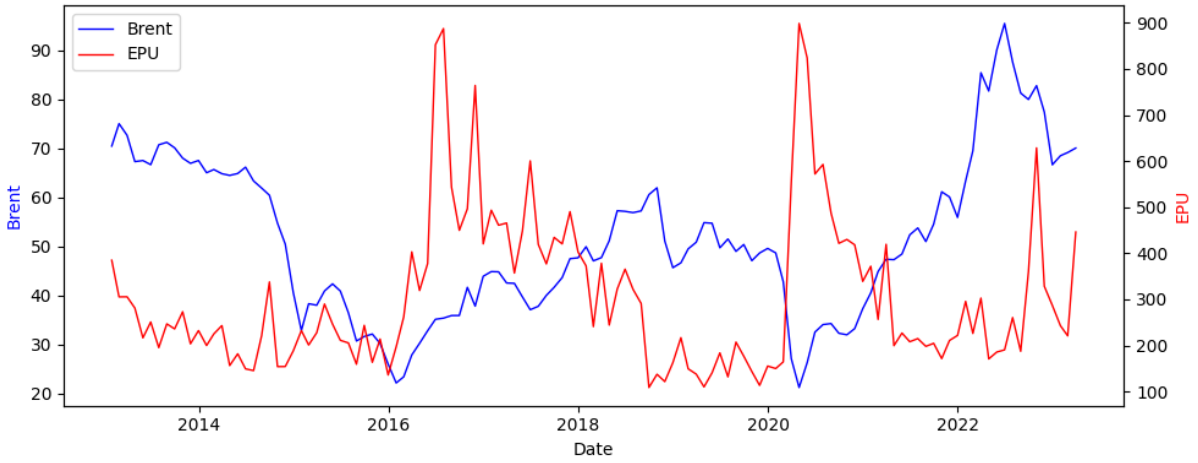

Figure 3: UK's EPU and Brent price (monthly data, January 2013 to March 2023). The left and right y-axes denote Brent and EPU, respectively.

Table 1: Summary Statistics

Variable	Mean	SD	Min	Max
EPU	309.18	226.31	76.13	1517.45
FTSE100	6902.11	548.47	5454.57	7914.93
Brent	51.68	16.72	19.99	93.17
GBP/USD	1.38	0.14	1.15	1.72
IR	0.59	0.75	0.05	4.00

Figures 1, 2 and 3 plot the relationship between monthly time series of the FTSE100 index returns as well as uncertainty indexes of the UK and Brent price. The data for Table 1, IR is available monthly, GBP/USD daily and FTSE100, Brent and GBPUSD is available based on the trading days worldwide. It is interesting to note how the EPU while having a low standard deviation has large swings at times causing the gap between min and max value to be wide.

Table 2: Diagnostic Results

	EPU	FTSE100	Brent	GBP/USD	IR
Level	-4.9506***	-3.5486**	-1.8633	-2.2913	1.3413
	(0.0003)	(0.0345)	(0.6734)	(0.4387)	(1.0000)
First Difference	-20.3117***	-11.2146***	-22.7305***	-49.8670***	-5.6567***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)

P-value in parentheses.

* p<0.1, ** p<0.05, *** p<0.01

Before estimating the effects of the different variables on stock returns, we test whether the variables used are stationary. The Table 2 above display the statistics of the stationarity test of our data using the Augmented Dickey-Fuller (ADF) test, which is based on the IPS (Im, Pesaran, and Shin) approach. An inspection in Table 2 indicates that we cannot reject the null for all variables except stock returns of FTSE100 and EPU. On the other hand, we reject the null of first difference (I(1)) for all the variables, highlighting that the stock returns and EPU follow I(0) process while the rest follow an I(1) process. Hence, the stock returns and EPU in level and the rest in first difference are used in this paper.

CHAPTER 4 Method

We examine the impacts of oil price change and economic policy uncertainty on the main stock index of the UK stock market, namely FTSE100. To analyse this impact, the following baseline standard OLS model is constructed, where the independent variables is expected to have a linear effect on the FTSE100 stock index over the time-period of our data in both the rising and falling scenarios.

$$r_t = \beta_0 + \beta_1 * oil_t + \beta_2 * epu_t + \beta_3 * r_{t-1} + \varepsilon_t$$

where r_t, denotes the real return of the UK stock index in time t, epu_t is the scaled economic policy uncertainty index over time t and oil_t represents the natural logarithm of oil price. For the scaling of the epu_t , we have standardized the epu_t by subtracting the mean of the epu_t from the individual values and then dividing it by its standard deviation, allowing us to centre the variable around 0 and scale it to have a standard deviation of 1.

While constructing the second model, we also included several control factors to consider the macroeconomic scenario of the UK, where the control variables are highlighted as bold in the equation of the model.

$$r_t = \beta_0 + \beta_1 * oil_t + \beta_2 * epu_t + \beta_3 * \mathbf{ir_t} + \beta_4 * \mathbf{er_t} + \beta_5 * r_{t-1} + \varepsilon_t$$

$\mathbf{ir_t}$ and $\mathbf{er_t}$ represent the natural logarithm of interest rate and exchange rate, respectively. r_{t-1} and ε_t represent the 1-period lagged return stock index return and error term respectively over time t.

The first and second equation assumes a symmetrical effect of fall and rise in oil price on stock returns. In order to capture the non-linear effects of oil price changes on stock return according to (Mork, 1989; Moya-Martínez et al., 2014). We have separated the positive changes from negative changes by transforming the oilt to $oilp_t = \max(0, oil_t)$ and $oiln_t = \min(0, oil_t)$. Thus, we have created the third equation as follows:

$$r_t = \beta_0 + \beta_1 * oilp_t + \beta_2 * oiln_t + \beta_3 * epu_t + \beta_4 * \mathbf{ir_t} + \beta_5 * \mathbf{er_t} + \beta_6 * r_{t-1} + \varepsilon_t$$

CHAPTER 5 Results & Discussion

The equations 1, 2 and 3 were estimated using Ordinary Least Squares method. Since the variables oil_t, $oilp_t$, $oiln_t$, ir_t and er_t are measured in natural logarithms, the coefficients of these variables can be interpreted as an elasticity: when X of these variables changes by 1%, the change in daily return of the UK stock market is the coefficient value of X.

Table 3: Regression Results

	(1)	**(2)**	**(3)**
oil_t	0.1249***	0.1303***	
	(0.0077)	(0.0077)	
epu_t	0.0003	0.0003	0.0004**
	(0.0002)	(0.0002)	(0.0002)
r_{t-1}	-0.0142	-0.0193	-0.0264
	(0.0187)	(0.0187)	(0.0187)
const	0.0001	0.0001	0.0008***
	(0.0002)	(0.0002)	(0.0003)
$oilp_t$			0.1684***
			(0.0121)
$oiln_t$			0.0838***
			(0.0138)
er_t		0.1112***	0.1080***
		(0.0313)	(0.0312)
ir_t		0.0166***	0.0162***
		(0.00437)	(0.0037)
Observations	2589	2589	2589
R^2	0.0947	0.1060	0.1117
Adjusted R^2	0.0937	0.1042	0.1096

Standard errors in parentheses.

* p<0.1, ** p<0.05, *** p<0.01

The equation 1 model's R-squared was about 9.47%, which means that 9.47% of the variance in the stock return can be explained by the variables included in the model and when we look at equation 2's model which includes the control variables, the R-squared increases to 10.60% and when we separate the change in oil price variable to separate variable for positive and negative change, the R-squared increases to 11.17%. The results from this table can be interpreted as follows: a 1 percent increase in

the oil price of equation 1 leads to a 0.1249% increase in the daily return of the FTSE100. The corresponding p-value is smaller than 1%, indicating that this effect is significant. The oil price in equation 1 is significant. The coefficient of oil price change is significant across all the models at the 1% level while the EPU is significant only for equation 3 at the 5% level. Hence, according to the results obtained above, I reject my hypothesis: oil price and EPU change do not affect the return of the FTSE100. Moreover, as part of the equation's robustness checks, both the control variables, er_t and ir_t have a positive effect on the FTSE100 and are significant in both circumstances.

The result from the tables shows that there is a significant effect of oil price shock in all the models and for EPU, the effect on the FTSE100 is only significant in equation 3. Moreover, the magnitude of the effect of oil price change increases as the control variables are added in equation 2 and it can be observed to be different for positive and negative changes in equation 3. This finding is similar to previous studies that studied similar effects on the Chinese stock market, such as (You et al., 2017). My results indicate that the effect of a negative oil price shock is significantly larger than a positive oil price shock on the return of the FTSE100. This shows that if the oil price decreases it has an almost double effect on the daily return of the leading UK stock market indicator, FTSE100 as compared to a rise in the oil price. Moreover, the EPU has a statistically significant effect on the daily return of the FTSE100 in equation 3 with the coefficient of this effect being 0.0004. This indicates that even if the selected 650 newspapers mention more about the search term, the effect of it while significant, is almost zero on the return.

CHAPTER 6 Conclusion

In this thesis, I have looked at the impact of the oil price shock and economic policy uncertainty on the leading UK Stock Market index, FTSE100. Previous research in different markets has shown that these variables do have an effect on the stock market and different studies also studied that even though still significant, the magnitude of the effect of these variables has decreased over time as companies have become more international, oil prices constitute a lower proportion of the costs and labour markets have become more flexible. While previous studies are mostly focused on the Chinese and US markets, until this study, no research had been conducted to study the effect of these variables on the UK stock market. Therefore, the question that was studied in this dissertation was: "How do the economic policy uncertainty and oil price shocks impact the UK market?".

To answer this research question, we have analysed the daily performance from the start of 2013 till March of 2023, where data was mostly from the Eikon, OECD and www.policyuncertainty.com. Where in the paper, we just analysed the changes in the oil price as a whole and the other, we analysed the impact of the positive and negative price change separately using Ordinary Least Squares method. All three of the equations have found that the effect of the oil price change on the daily return of the FTSE100 is significant while the effect of EPU on the FTSE100 was significant only in the third equation when the oil price changes were broken down into two separate variables.

This study therefore concludes that although the effect of oil price is significant, the effect of negative change is roughly double that of a positive change in oil price and while the effect of the EPU on the daily return is statistically significant, the magnitude of that effect is almost close to zero even after been standardized. Combined with findings from previous studies in different markets, this suggests that while the effect of oil price shocks has become weaker over time, it has still a significant impact along with EPU.

While this study provides some important leads, it has some room for improvement, such as rather than using the FTSE100 as a proxy, future studies could dive deeper into the impact of these variables in the daily return of different industries such as energy-intensive industries such as steel, airlines and logistics might be more heavily impacted by oil price shocks as compared to industries such as technology. Moreover, the study is also limited by only focusing on FTSE100 as this index constitutes the largest UK companies. However, due to their sheer size, the companies might be international-focused and be less impacted by EPU. Hence it creates room for future research on how these effects would play out for companies of different sizes in different markets.

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