The Impact of Eurozone Policy Uncertainty on Stock Returns: Evidence from a Multi-Event Study

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DATE SUBMITTED: 16/07/2024

ABSTRACT

This thesis investigates the impact of policy uncertainty regarding a country's Eurozone policy on stock returns. The utilized multi-event study approach analyzes 17 important Eurozone policy events spurring uncertainty, spanning a period between 2002 and 2020, in terms of their effects on country-level stock market indices. Contrary to the predictions of scientific literature about the effects of policy uncertainty, the results demonstrate that most events yield a positive abnormal return. These findings indicate that markets might generally react positively towards policy uncertainty around the Eurozone, which requires a more sophisticated view of investor reactions to policy uncertainty signals. The conclusions of this paper provide a variety of insights to policymakers and investors about the effects of policy uncertainty due to Eurozone policy shifts on stock market performance, in addition to highlighting the importance of considering country- and time-specific factors in predicting the final observed impact on markets.

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CHAPTER 1: INTRODUCTION

On the night of Sunday the 5th of July 2015, after an unprecedented referendum, it became clear that Greeks had overwhelmingly voted against the bailout conditions proposed by their creditors. For many observers, this referendum was perceived as a vote on whether Greece should remain in the Euro or adopt its own national currency (European Stability Mechanism, n.d.). Nevertheless, the impact on European stock returns appeared to be marginal, with markets not showcasing a significant reaction to the results (Politico, 2015). Three years later, the Eurosceptic 5 Star Movement party, which called for a referendum on Italy's membership of the euro, won a sizable victory in the Italian National Elections. Upon the announcement of the election outcomes, the Milan stock market closed 1.5 percentages down amid fears of the prospect of a government (led by the 5 Star Movement) which would be potentially willing to question Italy's use of the Europe-wide currency (Euronews, 2018). Researchers have repeatedly studied how policy uncertainty affects market indices and, more specifically, option prices; their general finding is that options spanning events which entail policy uncertainty are generally more expensive (Kelly, Pástor, & Veronesi, 2016).

Overall, contemporary academic discourse about the relationship between policy uncertainty and stock returns has seen a meteoric rise due to the increasing number of political events which stand to nurture uncertainty (i.e., regional conflicts, military coups etc.). In their 2016 paper, Kelly, Pástor and Veronesi concluded that political uncertainty is priced into the equity option market (with regards to events such as national elections and/or global summits). The authors found that options spanning these events are priced higher to hedge against the inherent volatility and market disruptions which might adversely affect their underlying. These results were derived by sourcing international macroeconomic data about political events and options prices from OptionMetrics, the OECD, IMF and Datastream. The authors implemented an event study approach where they compared implied volatility and variance risk premiums of options which span political events against those that do not, with the aim of isolating the effect of political uncertainty. Bittlingmayer (1998) had already provided further analysis of the same phenomenon. The author utilized a quite comprehensive dataset which included German stock returns, dividends and economic output during the course of more than 60 years, spanning the most important events in German political history (e.g. World War I, rise of the National Socialist government). Bittlingmayer concluded that

there is a significant relationship between the volatility of stock returns, and major political events which are likely to nurture uncertainty, such as national elections and changes in government. All in all, most of the available literature showcases a similar pattern: events spurring policy uncertainty have a direct impact on the volatility of stock returns.

While most studies focus on the impact of general policy uncertainty on stock returns, other studies have also attempted to investigate the impact of more specific instances of policy uncertainty. Liu, Han and Xu (2021) found a significant positive relationship between uncertainty emanating from geopolitical skirmishes and energy option prices. Prager (1989) concluded that the relationship for stock returns was also positive in the case of novel transportation legislation (this legislation caused uncertainty with regards to its immediate repercussions). Hillier and Loncan (2019) studied how uncertainty related to a political scandal in Brazil impacted stock returns of domestic firms. However, to date, there has been no research about the financial impacts of policy uncertainty relating to a significant monetary event (such as the entry of a country to the Eurozone) on stock returns. This kind of effect would be very interesting to study given that the impact on the volatility of these returns could plausibly be either positive or negative (e.g. because of a market sentiment that the exit would make the currency stronger). Furthermore, an entry or exit from the Eurozone, unlike other events (e.g. political scandal), would constitute a monetary policy event with massive political, as well as economic, consequences which jointly create a heightened environment of uncertainty. Hence, the research question that this thesis aims to answer is: *How does policy uncertainty surrounding the socioeconomic impacts of a potential Eurozone entry and/or exit affect stock* returns*?*

Following the general outline of the methodology used in the paper by Kelly, Pástor and Veronesi, I will make use of a multi-event study approach where developments relating to the potential entry and/or exit of states from the Eurozone will serve as proxies of exogenous sources of policy uncertainty. I will then consolidate data in the national market affected by the event in question with the aim of capturing the impact of the wider sentiment of the investment community. I will source the data for stock index prices from the MSCI online database, ensuring that they adequately cover my estimation window of 30 to 60 days before the event with the goal of accurately calculating normal returns. Moving forward, I will utilize an event window of 9 days to calculate the cumulative abnormal return for each selected stock index with the aim of estimating the total

impact of each event. Lastly, I will perform t-tests to evaluate whether the mean and cumulative abnormal returns are significantly different from zero.

Overall, I hypothesize that policy uncertainty surrounding a country's Eurozone policy is generally associated with increased stock market volatility and risk premiums, thus negatively impacting stock returns. This expectation fits within the general literature on policy uncertainty, often pointing to adverse market reactions during periods of political and economic ambiguity. Nevertheless, due to events which enhance the level of integration within the Eurozone and positively affect long-term economic outcomes, I also expect to discover some contexts in which markets react positively to Eurozone policy uncertainty, hence reflecting investor optimism about future stability and growth potential. Consequently, my overall expectation is that the observed market effect will be negative, with positive market reactions being manifested in a minority of contexts.

After running the analysis, it was found that the derived results were antithetical to the initial hypothesis of this paper. On an overall level, events spurring Eurozone policy uncertainty had a significant and positive effect on index stock returns, rather than negative as had been anticipated. A positive relationship between the occurrence of the selected events and the returns of stock market indices were also found for the cases of individual countries, such as in Denmark (2015), Finland (2016), France (2002), Italy (2002) and Portugal (2002), while a negative market response was found in Lithuania (2015), with a 1.1% decrease in abnormal returns. These results showcase that, while policy uncertainty goes hand in hand with increased levels of risk, markets positively perceive Eurozone policy uncertainty due to its association with future monetary stability and improved trade terms (in case it relates to a Eurozone entry).

The rest of this thesis is organized as follows: Chapter 2 provides an extended review of the theoretical framework, discussing definitions and dimensions of policy uncertainty, as well as the historical context of this phenomenon. Chapter 3 offers a detailed description of the employed data collection methods, as well as the characteristics of the events which were utilized in this multi-event study and in the calculation of stock returns. Chapter 4 elaborates on the methodology of this paper, the characteristics of its multi-event study approach, the choice of the event window, and the process of estimating (cumulative) abnormal returns. Chapter 5 presents the results of the analysis by demonstrating its key findings and their statistical significance. Chapter 6 discusses

the implications of these findings, as well as how they compare with existing literature on the topic. Finally, Chapter 7 concludes the thesis by summarizing the key results, outlining their limitations, and generating recommendations for how future research can overcome them.

CHAPTER 2: THEORETICAL FRAMEWORK

2.1 POLICY UNCERTAINTY AROUND IMPACTS OF EUROZONE POLICY

First things first, it is important to define what is meant by policy uncertainty surrounding the impacts of a potential Eurozone entry and/or exit. This will enable us to more effectively identify events which give rise to such uncertainty in the context of the common European monetary bloc. According to Pastor and Veronesi (2013), policy uncertainty in this context refers to uncertainty about the impacts of the actions of the government with regards to whether they will enter (exit) the euro currency union. This form of uncertainty emerges due to ambiguity about the political costs and benefits that the government in question associates with such a decision, which subsequently spawns ambivalence about their intentions to join (exit) the Eurozone. The authors highlight that policy uncertainty in this context is directly affected by a wide array of political events which generate diverse signals with regards to future government action. Expanding on this definition, Julio and Yook (2012) describe policy uncertainty around a potential entry and/or exit from the Eurozone, as the inability of firms and other stakeholders to engage in a perfect assessment of the policymaker's incentive structures and internalized norms (e.g. their ideological beliefs on the topic). Overall, policy uncertainty surrounding the impacts of a government's actions in relation to the Eurozone belongs to the more general category of policy uncertainty. This refers to uncertainty about the stakeholders who get to make final policy decisions, the policy actions that will be chosen by them and, finally, the social externalities of those actions (Baker, Bloom, & Davis, 2016). By default, the decision to join (exit) the euro currency union mostly falls at the hands of the national governments of sovereign states; as a result, the unit of analysis of policy uncertainty will be countries and their respective governments.

Bertrand Russell (2017) introduced the concept of policy uncertainty in scientific literature; specifically, he attempted to investigate the general implications of political uncertainty on socioeconomic stability. Russell was deeply motivated to study the impacts of political uncertainty, given that he was living in a turbulent period with great upheavals after the end of World War I and the increasing popularity of authoritarian regimes. The author argued that political uncertainty is mainly driven by unstable and oppressive governments, resulting in a reversal of societal progress and individual liberties. Influenced by Russell's undertaking, Knight (1921) aspired to

engage in a more elaborate evaluation of the different modes of policy uncertainty. The author contributed a very crucial distinction between policy uncertainty and policy risk; whereas probabilities of outcomes are known in the case of policy risk, this is not the case whenever bearing policy uncertainty where probabilities are not known. After Knight's revolutionary paper, the term "Knightian Uncertainty" was coined, referring to situations where the probabilities of outcomes are unknown and impossible to reliably measure.

As already mentioned, the predictor variable of this paper is policy uncertainty around the impacts of a government's eurozone policy. Recognizing that this mode of policy uncertainty entails a wide range of policy manifestations, Frankel (1998) narrowed down four relevant dimensions: (1) Monetary Policy Impacts, (2) Trade Impacts, (3) Resilience Against Economic Shocks and (4) Labor Mobility Impacts. Namely, Frankel evaluated what was the impact in the aforementioned areas for a country which gets accepted to the Euro monetary union. When it comes to effects related to monetary policy, the author points out that lower levels of inflation and interest rates are likely to ensue. At the same time, the main downside is that the country's monetary policy would not be independent anymore, because it would now be dictated by the European Central Bank. Furthermore, Gunnella et al. (2021) highlight the great benefits brought about in the area of trade due to the adoption of the Euro, in the form of reduced transaction costs and currency risk. However, the authors caution that nations which are more prone to financial exposure and risks, lose the capability to utilize the tool of currency devaluation in order to enhance their exports. Last but not least, with regards to the topic of labor mobility, Belke and Hebler (2002) call attention to the ability of workers in Eurozone countries to more easily move between borders and fulfill their career (as well as wage) aspirations. In general, when referring to policy uncertainty surrounding the impacts of a government's eurozone policy, one refers to uncertainty about which manifestations (positive or negative) of the aforementioned areas will prevail after the country in question moves closer (or further away) from the Euro.

2.2 STOCK RETURNS AND MARKET INDICES

Moving forward, it is also very important to define what is meant by the concept of stock returns given how often this will appear in the paper. According to lay definitions, the stock (share) price can be defined as the price of one of the equal parts which compose the company's ownership, and which can be bought publicly through means of trading (The Cambridge Dictionary, 2024).

Academic definitions are similar but investigate the concept in more depth: King (1966) defines a company's present stock (share) price as the discounted value of the future income streams emanating from that stock. The author defined stock price volatility as a measure of fluctuations in stock price movements; in other words, when the stock price volatility is high, so too are random fluctuations. Considering that countries are the unit of analysis of this paper, country-level market indices will be used. Thus, their definition must also be given: A country-level market index is, according to Vaihekoski (2020), the kind of market index that has the aim of measuring the general performance of a stock market of a country by aggregating prices for selected stocks that are listed within it. Usually, a broad set of companies and sectors will have a listing on this index, thus creating a more comprehensive view of market trends. More generally, stock markets are but one type of the overarching idea of financial markets. Pagano (1993) identifies the objective of the financial markets as enabling the trading of financial instruments; therefore, it becomes easily understood that markets include a wide range of tools and mechanisms - for instance, stocks, stock indices or the products traded on stock markets. As it has already been noted, this study primarily aims to explore the effect of uncertainty about a country's Eurozone policy on its stock market. Consequently, the unit of analysis will be countries, with country-level stock market indices being used as the dependent variable that approximates stock returns.

In 1922, William Peter Hamilton was the first to utilize the Dow theory in order to generate stock market forecasts. The theory, which he remarkably expanded upon, identified three classes of trends (primary, secondary, and minor) in stock market indices, as well as further investigating the three phases that a primary market movement goes through (namely: accumulation/distribution, public participation, and excess/panic). Overall, believed that stock market indices were vital to diagnose stock markets and to forecast their future trajectory. Being eager to infuse more psychological aspects in the study of stock returns, Selden (1912) had already researched how sociological factors influence stock market fluctuations (e.g. collective behavior, social norms). The author underscored the need to consider a broader range of non-economic factors to gain more comprehensive insights into stock market movement trends.

2.3 RELATIONSHIP BETWEEN POLICY UNCERTAINTY AROUND IMPACTS OF EUROZONE POLICY AND STOCK MARKET INDICES

In general, the relationship between policy uncertainty and stock market returns has been evaluated multiple times by economists in the last few decades. In 1998, Bittlingmayer examined the impact of political uncertainty on stock market volatility and economic output. The study found that important political events, such as crucial elections and geopolitical tensions, represent significant sources of volatility for stock market indices. Bittlingmayer posited that policy uncertainty implied ambivalence about the future of policy outcomes, which in turn increased the risk premium investors demanded and, thus, contributed to the rise of stock market volatility. The author utilized historical data about Germany between 1880 and 1940, including stock price and industrial production indices. Yu and Huang (2021) investigated the extent of association between economic policy uncertainty and the level of stock market volatility in Chinese markets. The authors concluded that observing the variance of the change rate of the Chinese Economic Policy Uncertainty (EPU) index could further aid the practice of forecasting stock index volatility. In line with the mechanisms proposed by Bittlingmayer, Yu and Huang concur that a rise in EPU brings about increases in risk premiums for investors, which in the long run causes increases in stock market volatility. The authors also found that increased levels of uncertainty prompt more severe responses from investors concerning policy-related news, leading to an even more pronounced increase in market volatility. Even though their research was not directly related to stock market results, Kelly, Pastor, and Veronesi tried to determine whether equity market outcomes also reflect policy uncertainty. Specifically, the authors investigated whether the pricing of options spanning events involving political uncertainty, such as national elections or global summits, differed from the pricing of alternatives that do not span such events. The conclusion that Kelly et. al reached was that options that span political events are, on average, more expensive than those that do not. While attempting to lay out the logical mechanisms behind their observations, the authors posited that investors demand a higher compensation for the following risks: increased risk of price drops (price risk), large price drops (tail risk), and increased volatility (variance risk). Another critical paper on the relationship between policy uncertainty and stock returns came, yet again, from Pastor and Veronesi (2012). The authors concluded that weaker economic conditions amplify the risk premium created by conditions of political uncertainty. The mechanism proposed by Pastor and Veronesi recognized that economic policy changes are more likely to occur during recessions. As more novel policies are expected to emerge, this increases the level of uncertainty regarding their exact content and associated socioeconomic consequences.

Scientific literature has also attempted to differentiate between the more complex dynamics in the relationship between policy uncertainty and stock market performance, in terms of additional stock market indicators. Kwabi, Adegbite, Ezeani, Wonu, and Mumbi (2022) decided to further analyze the linkage between policy uncertainty and the stock market, specifically focusing on liquidity, size, and transaction costs. The authors derived the following result: policy uncertainty had a significant negative impact on stock market liquidity and size, and a considerable positive impact on transaction costs. Moreover, Kwabi et al. concluded that the level of efficiency of financial institutions (which they called "institutional quality") reduced the magnitude of the impacts above. Of course, the authors noted that this observation does not apply to developing nations with weaker institutional frameworks. The logical mechanism behind the effects in question, as proposed by the authors, was that policy uncertainty increased information frictions, thereby mitigating investor confidence and market predictability. In their 2023 paper, Fulgence, Kwabi, Boateng, Hu and Paudyal examined the process through which important political events (e.g. national elections) influenced stock price informativeness, which reflects the amount of firm-specific information encompassed in stock returns, hence deriving a tangible impact on market efficiency. As hypothesized, the authors found that policy uncertainty yields a significant negative effect on stock price informativeness, with stock prices being (on average) less informative during national election periods. Fulgence et. al attributed this effect to higher levels of information asymmetry, in addition to decreased information disclosures by firms.

With the goal of diving deeper into a more specific instance of political uncertainty, Hillier and Loncan (2019) set out to study the relationship between policy uncertainty about the socioeconomic repercussions of a political crisis, and stock returns. Specifically, the authors picked Brazil as a context and analyzed how this relationship is influenced by the political connections and exposure to foreign capital of domestic firms. Hillier and Loncan concluded that the negative effects of political uncertainty on stock returns are reinforced by the existence of political connections, as well as by exposure to foreign capital. The authors posited that this effect was observed because investors, amidst a period of policy uncertainty, fear that firms with political connections might lose their value, thereby leading to capital flight and the "dumping" of certain stocks. In a further study that has shed light on a more specific instance of policy uncertainty, Xu, Wang, Liu, and Yin (2021) modeled the uncertainty regarding foreign affairs policy and its relationship with the volatility of energy commodities, including crude oil, heating oil, and natural

gas. After running their analysis, the authors found that foreign affairs policy uncertainty yields a significant positive effect on the volatility of the prices of the above commodities. While attempting to decode the workings of this effect, Xu et al. theorized that ambiguity regarding the government's foreign policy leads to uncertainty about future supply and demand conditions in the energy market (hence leading to higher volatility in commodity markets). Furthermore, Gong, Fu, Huang, and Lin (2022) examined how uncertainty over climate practices interacts with stock market performance. The authors found that increased uncertainty about the firm's climate policy yields, on average, a significant negative effect on stock returns, a significant positive impact on return volatility, and high return correlations (in times of higher political uncertainty). Lastly, Liu, Shu, and Wei (2017) focused on the relationship between policy uncertainty due to a scandal in the Chinese political arena and stock returns. Using the 2012 Bo Xilai political scandal as a natural experiment, the authors found that political uncertainty in the wake of scandals has a highly negative impact on stock returns, especially for those firms more sensitive to government policy changes. In an attempt to unmask the intuition behind this interaction, Liu et al. noted that increased political uncertainty forces companies to raise the discount rate of future cash flows, thereby reducing stock returns.

In general, papers like the ones mentioned above indicate that policy uncertainty about the socio-economic consequences of leaving or entering the Eurozone will generate a negative impact on stock returns. This could be explained based on the relationship between policy uncertainty and greater demanded risk premium, weakened investors' confidence, information asymmetry increase, and capital flight enhancement. It is reasonable to expect that these mechanisms will also operate in the case of policy uncertainty with regards to the impacts of a country's future Eurozone policy given that such a policy would extensively influence its socioeconomic conditions. Hence, we can formulate the following hypothesis

> **H1:** *There is a negative effect between policy uncertainty surrounding the impacts of a country's Eurozone policy and stock returns.*

CHAPTER 3: DATA

3.1 SAMPLE DESCRIPTION

For the purposes of this multi-event study, 17 events will be utilized with the aim of investigating uncertainty surrounding the impacts of a country's eurozone policy on stock returns. These events overlapped with record levels of uncertainty regarding the socioeconomic outcomes of changes in Eurozone policy, which renders them suitable to use for examining how Eurozone policy uncertainty has impacted national stock index returns. The selected events are listed below, spanning the years between 2002 to 2020:

- Referendum day on the question of Euro adoption in Denmark (28/09/2000)
- First day of Euro coins and bank notes being put into circulation in Austria (1/1/2002)
- First day of Euro coins and bank notes being put into circulation in Spain (1/1/2002)
- First day of Euro coins and bank notes being put into circulation in the Netherlands (1/1/2002)
- First day of Euro coins and bank notes being put into circulation in Belgium (1/1/2002)
- First day of Euro coins and bank notes being put into circulation in Ireland (1/1/2002)
- First day of Euro coins and bank notes being put into circulation in France (1/1/2002)
- First day of Euro coins and bank notes being put into circulation in Finland (1/1/2002)
- First day of Euro coins and bank notes being put into circulation in Germany (1/1/2002)
- First day of Euro coins and bank notes being put into circulation in Italy (1/1/2002)
- First day of Euro coins and bank notes being put into circulation in Portugal (1/1/2002)
- First day of Euro coins and bank notes being put into circulation in Greece (1/1/2002)
- First day of Euro coins and bank notes being put into circulation in Slovenia (1/1/2007)
- First day of Euro coins and bank notes being put into circulation in Lithuania (1/1/2015)
- Referendum day in relation to extended opt-out provisions from EU membership in Denmark (03/12/2015)
- First day of parliamentary debate on whether Finland should remain in the Eurozone (28/04/2016)
- Bulgaria joins the European Exchange Rate Mechanism (ERM II) in preparation for future adoption of the Euro (10/07/2020)

To deduce the impact of the events mentioned above on stock returns, country-level market index data were put together. In total, the collected observations for the returns of these indices added up to 2398. They spanned a 30-days estimation window (spanning the period from 60 until 30 days before the event) in addition to an event window of 4 days before and 4 days after the event. The data used to calculate the returns of the country-level indices were taken from the MSCI online database between the 23rd and 26th of May 2024. Furthermore, since this paper aimed to assess whether the abnormal returns during the event windows were statistically significant, it was also essential to obtain data that can be used to calculate normal returns. The market's expected return for all events was approximated by the MSCI Euro index, data for which was collected from the MSCI online database between May 28th and May 31st 2024. It is important to mention that this index also included dividends for its total return calculation.

3.2 VARIABLES

In terms of the variables used in the study, *ret* refers to the daily return of the country-level stock market index in question. The historical prices of the country-level index were used to calculate the *ret* variable through the formula below:

$$ret = \frac{Index\ Price_t - Index\ Price_{t-1}}{Index\ Price_{t-1}}$$

In general, MSCI country-level market indices indicate the state and trajectory of stock markets in the countries under consideration. These country indices represent large, mid-, and sometimes small-cap segments of the equity markets under review in the countries examined. As indicated above, the information regarding each of the 17 events was accessed between May 23rd and May 26th, 2024, from the MSCI online database. To do this, the first step was to filter for the relevant market classification of the country by selecting between "Frontier", "Emerging" and "Developed" markets. Moving forward, data for the country under focus was selected for the period that was relevant to the event of interest (i.e., for the estimation window of 30 to 60 days before the event and for the total event window of 9 days). The consolidated data points (2398 observations) were saved in Excel and then imported into Stata. After analyzing these observations for the various countries and event dates, no significant trend of higher-than-average returns could be observed.

For the next variable that needed to be derived from the available data, *market_ret* aimed to approximate the expected average return of the market. The formula used in deriving it, which was the same as the one above, utilized the MSCI Euro Index prices in the following way:

$$market\_ret = \frac{Index\ Price_t - Index\ Price_{t-1}}{Index\ Price_{t-1}}$$

The MSCI Euro Index seeks to measure the performance of both large and mid-cap segments of the ten most developed Eurozone countries through approximately 85% of the free float-adjusted market capitalization across the monetary bloc, therefore offering quite broad exposure into the equity market of the region. Data for the *market_ret* variable was scraped from the MSCI online database between the 28th and 31st of May 2024. In order to do this, the preferred time frame was chosen (i.e., all dates between the June 1st 2001 and the January 1st 2021), with the resulting observations being exported to Stata.

3.3 SUMMARY STATISTICS

By looking at the summary statistics table for the *ret* variable (Table 1), it becomes apparent that an average return value of 0.002, or 0.2%, is a relatively small, but still positive return for the MSCI country-level stock market index. This tells us that average returns around the selected event dates contributed to modest overall gains. The standard deviation value for *ret* stands at 0.049 (i.e., 4.9%), thereby indicating moderate levels of observed volatility around the mean and, hence, a more stable investment environment (balanced risk scenario). Finally, the extreme minimum value of -0.218 (i.e., 21.8% negative return) and the extreme maximum value of 0.1804 (i.e., 18.04% positive return) highlight that the returns under scope have historically experienced significant drops and gains albeit the modest mean average return.

With regards to the *market_ret* variable (Table 1), one can observe that it displays an average return of 0% throughout the selected events and corresponding time periods. This is notable given that the proxy used to estimate normal returns points to a rather stable market with no upward or downward fluctuations. This observation is reinforced by the rather low level of standard deviation, which stands at around 1.6% and, thereby, heavily implies low levels of overall market volatility. However, the minimum and maximum values which were recorded (-14% and 11.9% for the minimum and maximum respectively) underscore that, even though the average market

return was rather stable around 0%, significant return fluctuations did periodically occur for some events and time periods.

Table 1

This table displays summary statistics of the daily returns for country-level stock market indices (ret) and the expected return of the market (market_ret) for the average return (avg), standard deviation (std.dev.), minimum (min), and maximum (max) of the data. This information spans the period under consideration, ranging from 2002 to 2020, with the aim of estimating the impact of Eurozone policy uncertainty events on stock prices.

variable	avg	std.dev.	min	max
ret	0.002	0.049	-0.218	0.1804
market_ret	0.000	0.016	-0.14	0.119

CHAPTER 4: METHODOLOGY

For the purposes of this paper, I employed a multi-event study in order to deduce the impacts of uncertainty surrounding the impacts of a country's Eurozone policy on stock returns. In general, multi-event studies are widely employed in the realms of the financial and economic disciplines. Their aim is to infer the impact of multiple events on a variable of interest (e.g. option prices, stock returns) by investigating how these influence market efficiency and the reactions of investors in light of novel information. In the initial stage of a multi-event study, the events of interest are identified. The events include, but are not limited to, announcements of earnings, changes in regulation, mergers or (in the case of this paper) significant announcements with a profound impact on a country's monetary policy; overall, all these events are expected to yield a significant effect on the variable of interest. Moving forward, the next important step is to define an event window for each one of the selected events. Essentially, an event window is supposed to encompass the period during which the impact of the selected event (on the variable of interest) is measured. Typically, an event window comprises of several days before and after the event date with the aim of simultaneously capturing the anticipatory and the market reaction effects of the event. In this stage, data is collected about the variable in question (in this paper: country-level stock market index returns) for all the units and periods which are involved. This data collection process is related to the event window period, as well as a control period (estimation window). Usually spanning a longer period than the event window, the estimation window is meant to represent a stage of normalcy for the variable of interest (without any significant event) and to model expected returns. One of the most important steps of the multi-event study procedure is to determine abnormal returns for each event. For the calculation of abnormal returns, the observed returns are juxtaposed with the expected returns which are usually calculated through the following market model:

$$E\,(R_i, t) = a_{\,i} + \beta_{\,i}\,market\_ret, t$$

where $E(R_i,\ t)$ signifies the expected return of stock i at time t and *market_ret* signifies the observed market return at time t. Furthermore, α_i and β_i are the parameters which are estimated through regression analysis during the estimation window. Subsequently, the abnormal returns for each event are calculated through the following equation:

$$A (R_i, t) = ret - E (R_i, t)$$

where *A(R$_i$, t)* represents the abnormal return and *ret* the actual observed return for unit i and period t. The next step is to aggregate the abnormal returns in order to assess the overall impact of the multiple events on the variable of interest, through the calculation of average abnormal returns (AAR) for all events and for each day which comprises their respective event windows:

$$AAR_t = \frac{1}{N} \sum_{i=1}^{N} AR_i, t$$

where N indicates the number of events. Then, with the goal of capturing the total impact over the multiple event windows, one should compute the cumulative abnormal returns (CAR) through the summation of the AARs in these windows:

$$CAR_t = \sum_{t1}^{t2} AAR_t$$

Last but not least, one should test for the statistical significance of the abnormal and cumulative abnormal returns in order to safeguard that the results are not the outcome of random fluctuations (e.g. through a t-test for AAR and CAR evaluating whether these returns are significantly different from zero).

Adapting to the specifics of this paper's main research question and analysis requirements, the first step was to identify the events of interest which, in this case, were significant policy announcements related to the future of a country inside (or outside) the Eurozone. The selection process zeroed in on events which were expected to yield a significant impact on stock returns in the markets of (potential) members of the Eurozone bloc. In order to prepare the data for analysis, event dates were sorted and counted, as well as being merged with data about country-level stock market index returns (for each country-unit and time period). This process involved the creation of duplicate observations and unique identifiers with the aim of matching the number of event dates in the context of each country. Moving forward, I estimated the number of days between

each observation and the event date. While attempting to safeguard the consistency of data during the process of generating event and estimation windows, all data was sorted by country.

With regards to the estimation window (during which normal market conditions were assumed), it spanned a period of 30 to 60 days before the event window. On the other hand, event windows encompassed a period of 4 days before and 4 days after the event in question. The aim of these period selections was to simultaneously mirror the anticipatory and reactionary influences of the events in question, in addition to ensuring a robust point of comparison for expected returns. Abnormal returns were then estimated by predicting stock returns using the market model regression results from the estimation window. For each event, the estimated stock return was subtracted from the actual stock return for the event period to calculate abnormal returns. The estimated abnormal returns were then added up to get the cumulative abnormal returns, whose statistical significance was subsequently tested.

CHAPTER 5: RESULTS

This study employed the multi-event study approach in analyzing the impact of policy uncertainty surrounding a country's Eurozone policy on stock returns. In the context of this research method, multiple events were analyzed with the aim of making inferences about their total impact on the variable of interest, i.e., country-level stock market indices. The OLS regression model was utilized in this context to estimate expected returns and identify abnormal returns for all the events. The most important output from such a regression analysis in a multi-event study is the abnormal return, which indicates the difference between the observed stock return and the expected return forecast generated by the market model. In other words, the abnormal returns give information about the market's reaction to the events under consideration. For instance, if the output of the regression analysis shows a positive abnormal return, this means that the stock market responded to the event positively, thereby leading to increased stock returns when compared to market expectations. On the contrary, a negative abnormal return implies an adverse market reaction where stock returns fall below the market benchmark. With regards to the cumulative abnormal return, it pools the abnormal returns over the event window into a single number, hence providing a more direct measure of the total impact of the event on country-level stock index returns. The statistical significance of the abnormal and cumulative abnormal returns is then tested to ensure that the results do not occur due to random fluctuations but, rather, because they reflect genuine market reactions.

In the context of this study, the interpretation of the derived results would essentially provide a description of how uncertainty about the consequences of a significant shift in a county's Eurozone policy impacts equity market indices. In the case of substantial abnormal returns being observed, one could infer that this kind of policy uncertainty is exerting a tangible impact on investor behavior and, therefore, stock market outcomes. Specifically, a negative (positive) abnormal return that is statistically and economically significant would serve as evidence that policy uncertainty related to a possible entry or exit from the Eurozone of a country reduces (increases) stock returns, most probably through higher (lower) risk premiums, lower (higher) investor confidence, and more (less) information asymmetry. However, in case no significant abnormal returns are detected, this implies that, most probably, the market is not reacting to uncertainty about potential socioeconomic changes due to Eurozone policy shifts, quite likely due to some countervailing factors that would

dampen the related volatility in stock returns. All in all, the abnormal and cumulative returns must be tested for sign, magnitude, and statistical significance. The results of this study aim to shed light on how the events representing a significant change in Eurozone policy shape stock market volatility and investor sentiment over different national contexts and periods.

After conducting the analysis, the results in the table below were generated:

Table 2

This table shows the estimated cumulative abnormal returns in percentage form, as well as their associated p-values for each considered event over the 2002–2020 time period. Cumulative abnormal returns measure the market reaction to Eurozone policy uncertainty events over an event window of 9 days: 4 days before and 4 days after the event in question. The mean estimates are presented with standard errors corrected for heteroscedasticity and autocorrelation.

	(1)
country_id	cumulative_abnormal_return
AT-2002	0.019
	(0.207)
BE-2002	-0.014
	(0.157)
BG-2020	-0.019
	(0.144)
DE-2002	0.007
	(0.128)
DK-2000	-0.021
	(0.249)

DK-2015	0.055**
	(0.269)
ES-2002	0.008
	(0.105)
FI-2002	-0.008
	(0.358)
FI-2016	0.026*
	(0.144)
FR-2002	0.009**
	(0.064)
GR-2002	0.019
	(0.219)
IE-2002	-0.009
	(0.176)
IT-2002	0.011**
	(0.106)
LT-2015	-0.011*
	(0.215)
NL-2002	-0.017
	(0.101)

PT-2002	0.036**
	(0.135)
SI-2007	0.012
	(0.465)
Overall	0.006*
	(0.005)
Observations	17
R-squared	0.451

<div align="center">Robust standard errors in parentheses</div>

<div align="center">*** p<0.01, ** p<0.05, * p<0.1</div>

Before investigating the above results in more detail, it is necessary to address the model's overall performance with regards to its statistical fit. In the context of regression analysis, this corresponds to the interpretation of the R-squared. For the model used in this study, the R-squared equals 0.451. Therefore, the chosen events of interest explain 45.1% of the variance in cumulative abnormal returns. This indicates a moderate explanatory power with the ability to attribute nearly half of the variability in the country-level stock index returns (within the event windows) to the events being examined.

Subsequently, the significant findings of this research should be presented. To begin with, the 2015 Danish referendum on opt-out conditions from the Euro (DK-2015) was accompanied by a positive abnormal stock return of 5.5%, which was statistically significant at the 5% confidence level. Similarly, the 2016 initiation of parliamentary debate regarding whether Finland should exit the Euro (FI-2016) was accompanied by abnormal stock returns of 2.6% (significant at the 10% level). Moreover, the first day of introducing Euro banknotes and coins in France (FR-2002) appeared to elicit statistically significant abnormal stock returns of 0.9% (significant at the 5% level), thus indicating the presence of an intense market response to the enactment of changes in French monetary policy. For the same event in Italy (i.e., 2002 initiation of circulation of the Euro),

cumulative abnormal returns amounted to 1.1% and were also significant at the 5% level. Similarly, the introduction of the Euro in Portugal in 2002 was combined with positive and significant cumulative abnormal returns of 3.6%, which were statistically significant at the 5% level. By contrast, the initiation of Euro circulation in 2015 in Lithuania yielded a negative abnormal return of -1.1%, which was significant at the 10% level, thus reflecting an adverse response of the national market. Arguably, the most critical finding is that cumulative abnormal returns across countries are found to be significant, with events spurring uncertainty about the impacts of imminent Eurozone policy bringing about a 0.6% increase in returns (significant at the 10% level).

Overall, significant positive cumulative abnormal returns were observed across countries but also in specific contexts through events taking place in Denmark (2015), Finland (2016), France (2002), Italy (2002), and Portugal (2002). Stock markets appear to welcome all these events, thereby leading to higher-than-expected stock returns. On the other hand, significant negative cumulative abnormal returns were observed in Lithuania (adverse market reaction). The remaining events brought about insignificant cumulative abnormal returns in their corresponding national markets and time periods. These results could be important for understanding how uncertainty about the impacts of critical shifts in a country's Eurozone policy is affecting stock market performance. Indeed, these diverse market reactions point to the complexity and context-specific nature of the impact of critical monetary events on stock returns. This realization underlines the importance of understanding the mechanisms through which critical monetary events affect investors' behavior and market dynamics in a national context and a specific time period.

All in all, it has been demonstrated that the initial hypothesis of this paper should be rejected (i.e., hypothesized negative relationship between policy uncertainty regarding Eurozone policy effects and stock returns in a country's market). Indeed, cumulative abnormal returns across countries increased by 0.6%, with the effect being statistically significant at the 10% level. Similarly, significant abnormal returns of positive direction were detected in Denmark (2015), Finland (2016), France (2002), Italy (2002), and Portugal (2002), thereby showcasing that markets in those countries reacted positively to policy uncertainty about the potential impacts of an entry to, or exit from, the Eurozone. On the other hand, the negative abnormal returns that were observed in Lithuania in 2015 confirm the original hypothesis, which posited that uncertainty about the effects

of a country's changing Eurozone policy drives a decline in stock returns. In general, since the original hypothesis was not fulfilled in any other circumstance except the Lithuanian 2015 Eurozone entry, it is safe to reject it. Furthermore, one can also conclude that different market contexts are influenced to different levels from Eurozone policy uncertainty, thereby underscoring the diversity of investor reactions to events spurring such uncertainty.

Taking into account the possibility that some market responses might have been priced in before the event dates, a robustness check was employed by conducting the analysis with a wider event window. In order to capture the immediate anticipatory and reactionary market responses, this study initially employed a 9-days event window (i.e., 4 days before and 4 days after the event in question). However, the employed robustness check made use of a 21-days event window (i.e., 10 days before and 10 days after the event). The extension in the length of the event window enhanced the comprehensiveness of the analysis by considering a more extensive range of market reactions. Risk premiums and fundamental news can be priced in stock markets over a longer period, meaning that a larger event window could be better positioned to capture both the anticipatory effects before the event, as well as the prolonged market reactions which subsequently follow. This equipped the analysis with a more complete representation of market behavior in and around these events spurring uncertainty, with the aim of alleviating concerns that market reactions may have been priced in early.

The table with the results of the additional robustness check is provided in Appendix B. The market model and methodology used for calculating abnormal returns and cumulative abnormal returns in the initial analysis, is also applied in this context. The results and conclusions which were derived in the initial analysis remain robust when a 21-days event window is taken. Namely, significant cumulative abnormal returns were found to be positive in the vast majority of events (i.e., Germany-2002, Denmark-2000, Denmark-2015, Finland-2016, France-2002, Italy-2002, Netherlands-2002 and Portugal-2002), with only one example of a country displaying a significant negative cumulative abnormal return (i.e., Finland-2016). Overall, this means that even in the case where fundamental news about the stock prices have not been priced in the equity market in question, a significant positive cumulative abnormal return is still observed for most events and time periods of interest.

In addition to the calculation of abnormal returns, this study proceeded to investigate realized volatility as the measure of risk response to policy uncertainty. Realized volatilities were computed for the event and estimation windows to check if the risk channel is operating. In this case, the "risk channel" refers to how policy uncertainty affects volatility and risk perceptions in financial markets. Realized volatility can be defined as the standard deviation of daily returns during the periods of interest. This measure provided a better understanding of whether there had been any dramatic changes in market volatility due to policy uncertainty events and an increase in investors' risk perceptions.

The table below summarizes the realized volatility values during the event and estimation windows for each country-event combination:

Table 3

The table below presents the realized volatility in each country and for each event date, in the event window and estimation window, respectively. Realized volatility can be defined as the standard deviation of daily returns within the respective windows.

country_id	(1) Realized volatility (event window)	(2) Realized volatility (estimation window)
AT-2002	0.050	0.050
BE-2002	0.041	0.041
BG-2020	0.025	0.032
DE-2002	0.048	0.032

DK-2000	0.037	0.027
DK-2015	0.038	0.026
ES-2002	0.036	0.041
FI-2002	0.045	0.016
FI-2016	0.043	0.028
FR-2002	0.035	0.036
GR-2002	0.049	0.039
IE-2002	0.037	0.028
IT-2002	0.042	0.038
LT-2015	0.034	0.028

NL-2002	0.034	0.028
PT-2002	0.049	0.044
SI-2007	0.040	0.038

The table details the average realized volatility during the event and estimation windows, showcasing that the overall average volatility difference between them equals 0.011. This suggests that events associated with Eurozone policy uncertainty generally induce increased market volatility, suggesting that Eurozone-related policy uncertainty seems to be indeed affecting risk perceptions in financial markets.

The following regression analysis was carried out on the differences between realized volatilities in the event and estimation windows in order to explore whether the differences between them are significant:

Table 4

Regression analysis results for the volatility differences between the event and estimation window.

coefficient	std error	t-value	p-value
0.011	0.003	3.67	0.001

The positive coefficient which is significant at the 1% level shows that realized volatility during the event window is significantly higher than in the estimation window, thereby supporting the prediction of increased market risk because of Eurozone-related policy uncertainty. The conclusion that volatility significantly increases during the event window supports the risk-based argument that Eurozone-related policy uncertainty enhances market volatility. Whereas the abnormal returns

analysis argues that markets react positively to Eurozone policy uncertainty, it was shown that this comes at increased risk as reflected in higher realized volatility. These two responses (positive abnormal returns and increased volatility) suggest that investors are hoping for long-term benefits from Eurozone-related policy changes, despite the shorter-term risks involved.

CHAPTER 6: DISCUSSION

This research aspired to reveal the impact of uncertainty about the effects of Eurozone-related policy decisions on stock returns. As a result, it is essential for the derived findings to be considered and contrasted with earlier scientific literature on the topic. My derived relationship appeared to deviate from the consensus that previous studies had reached - most opined that there was a negative relationship between all forms of policy uncertainty and stock returns. For example, Bittlingmayer (1998) and Pastor and Veronesi (2012) both state that policy uncertainty increases risk premiums and, hence, stock market volatility. Nevertheless, this paper found statistically significant positive cumulative abnormal returns in different countries; in Denmark (2015), Finland (2016), France (2002), Italy (2002), Portugal (2002) but also on an overall level. This is a result which clearly contrasts previous studies investigating the relationship between political uncertainty and stock market performance such as the ones from Kelly, Pástor, and Veronesi (2016) or Yu and Huang (2021), which tend to indicate that the stock market generally reacts negatively to increasing levels of policy uncertainty. Various ways of interpreting the findings of this paper can be envisaged with the aim of explaining their divergence from the predictions provided by contemporary literature on the topic. The positive abnormal returns observed in Finland, France, Italy, and Portugal suggest that markets welcome the prospect of a country joining the Eurozone. This is consistent with the findings of Frankel (1998) about the gains that a country can acquire by entering the Eurozone, in the form of more stability in monetary policy and more favorable trade conditions. In contrast, the initial hypothesis which predicted negative market responses in the face of Eurozone policy uncertainty is consistent with the significant negative stock returns identified in Lithuania (2015). This specific deviation from the general pattern of results can be attributed to the specifics of the Lithuanian market, as well as the investor sentiment that was prevailing within it during the selected time period.

The results of this study add to the growing body of empirical evidence which depicts a nuanced and context-specific picture of how policy uncertainty affects stock market outcomes. While past research (for the most part) argues that general policy uncertainty should exert a negative influence on stock returns, this study emphasizes that the subcategory of policy uncertainty around Eurozone outcomes might behave in the opposite manner and exert a positive influence (especially in the case of Eurozone entry). The findings of this paper highlight the need for further research that will

delve even deeper into the mechanisms driving the wedge between expectations and actual results for this subcategory of policy uncertainty. Several explanations exist to comprehend the reasons behind the mismatch between the original hypothesis and the findings of this paper. Apart from possible perceptions of Eurozone entry events as huge contributors to monetary stability and trade growth, it needs to be noted that different methodological choices could have affected the results which were generated (e.g. different event window selection, different method to estimate abnormal returns). Furthermore, the aforementioned mismatch could be due to cross-country heterogeneity in terms of financial market development and institutional quality. As noted by Kwabi et al. (2022), high effectiveness levels of financial institutions could be (partially) neutralizing the negative impact of policy uncertainty on stock returns, thereby explaining why abnormal returns associated with more developed markets were generally more likely to be positive.

CHAPTER 7: CONCLUSION

The paper aimed to ascertain the effect of policy uncertainty over the impacts of a country's Eurozone policy on stock returns. More specifically, this paper tried to find out how events that related to an entry or exit of a country from the Eurozone would affect the respective national stock market performance. This particular type of policy uncertainty and its socioeconomic effects had not been adequately researched within the scientific literature. Hence, the main research question which was evaluated: *How does policy uncertainty surrounding the socioeconomic impacts of a potential Eurozone entry and/or exit affect stock returns?*

The paper applied a multi-event study approach to derive an answer to the research question. An event window of 4 days before and 4 days after the event in question was utilized, with the purpose of encapsulating its anticipatory and reactionary mechanisms. The data which was compiled encompassed 17 events that took place between 2002 and 2020. The data about country-level stock market index returns was obtained from the MSCI online database, with expected returns being calculated by utilizing the market model. Various of the events encompassed positive abnormal cumulative returns (opposite to the initial hypothesis of this paper). For instance, the 2015 Danish referendum resulted in a significant positive increase of abnormal returns by 5.5%. Most importantly, cumulative abnormal returns across countries showcased a modest but significant increase of 0.6%, indicating that markets, on average, responded positively to uncertainty surrounding Eurozone policy events. These findings enhance the overall understanding of how policy uncertainty might relate to stock market performance. Whereas the initial hypothesis predicted a negative impact of Eurozone policy uncertainty on stock returns, different results ensued.

Statistically significant positive cumulative abnormal returns were detected as a response to events that generated Eurozone policy uncertainty at both the aggregate and country-specific levels. This seems to imply that markets react favorably to news related to a country's entry to the Euro. However, this effect was found to be negative in the case of Lithuania in 2015, which accentuates that the overall positive relationship which was predominantly observed could be subject to deviations in specific contexts and time periods. The general findings emphasize the need to understand event-specific economic and political characteristics, as well as the potential gains that are anticipated by markets from countries entering or exiting the Eurozone.

The findings of this paper have implications for a wide variety of stakeholders. By developing a more nuanced understanding of how markets react to policy uncertainty signals, policy makers can put forward proposals which are more likely to be welcomed by the wider public and the investment community. With regards to investors, these findings can allow them to better interpret the way through which political events have a differential impact on stock returns in country- and time-specific contexts, as well as better adapt to the idiosyncratic nature of policy changes. Overall, the conclusions of this paper can enable stakeholders to more optimally react to policy signals and maximize returns in their portfolios.

This paper makes significant contributions to the existent literature with regards to a very important subcategory of policy uncertainty. However, it should be mentioned that several limitations to its findings persist. First, due to the bulk of Eurozone policy shifts between 2002 and 2020, the 17 selected events may inadvertently exclude some critical policy changes which means that important information that would be helpful in helping to understand the trends that were observed, might not be considered. Furthermore, the multi-event study approach, although more robust, assumes that market reactions to the selected events are independent of one another. Consequently, this approach may fail to accurately capture the potentially cumulative and interacting effects of closely occurring events. Additionally, the country-level stock market indices may have obscured the nuanced responses of individual firms and sectors which are not included within them and which might have been affected differently by the Eurozone policy uncertainty. Finally, the choice of estimation window for deriving normal returns (30-60 days prior to the event) is unlikely to be helpful in capturing market sentiment under conditions of pre-existing volatility. These shortcomings suggest that future research efforts should aim to include a richer set of events, place a greater focus on sectors that are not so well represented by the utilized indices, and adopt alternative methods for calculating expected returns to more precisely reflect the stock market response to Eurozone-related policy uncertainty.

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After enlarging the event window to 21 days, instead of 9, here are the results which the analysis generated:

Table 5

The following table presents the estimated cumulative abnormal returns in percentage form, along with their associated p-values, for each considered event over the 2002–2020 time period. Cumulative abnormal returns estimate the market reaction to Eurozone policy uncertainty events through an extended event window of 21 days: 10 days before and 10 days after the event in question. The mean estimates are reported with standard errors corrected for both heteroscedasticity and autocorrelation.

country_id	(1) cumulative_abnormal_return
AT-2002	-0.027
	(0.207)
BE-2002	-0.020
	(0.157)
BG-2020	-0.111
	(0.144)
DE-2002	0.012**
	(0.128)
DK-2000	0.015*
	(0.249)

DK-2015	0.102**
	(0.166)
ES-2002	-0.061
	(0.105)
FI-2002	-0.061
	(0.358)
FI-2016	-0.007**
	(0.144)
FR-2002	0.015**
	(0.064)
GR-2002	-0.010
	(0.219)
IE-2002	-0.052
	(0.175)
IT-2002	0.016***
	(0.160)
LT-2015	-0.053
	(0.254)
NL-2002	0.010**
	(0.101)
PT-2002	0.023***

	(0.196)
SI-2007	0.044
	(0.464)
Overall	-0.010
	(0.012)
Observations	17
R-squared	0.399

Robust standard errors in parentheses

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