Correlation between the ECB Pandemic Policy and the STOXX Europe 600 Sector Performance Sensitivity

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Abstract

In 2022 European equity markets lost some of their value, led by high-growth sectors, which generally have a significantly higher growth rate. The prevailing academic opinion is that the European Central Bank's monetary policy during the COVID-19 pandemic is a key reason and the financial and the technology sectors are defined to be particularly sensitive to interest rates. In this context, a performance sensitivity analysis for the STOXX Euro 600 sectors on European Central Bank interest rates from 2020 to 2022 will be investigated based on the assumption of a significant interest rate sensitivity. The objective is achieved with a Pearson correlation and linear regression. The results confirm a correlation for the selected sectors, indicating a potential general sensitivity for the entire investigation period. On this basis, further research on sectors and variables such as inflation and a comparison with Fed interest rates and the S&P 500 is recommended.

Introduction

In 2022, the European Central Bank (ECB) increased interest rates after two years of Covid 19 pandemic to prevent risk to price stability. The prevailing academic view is that this a rising interest rate environment weighs on high-growth equities such as the technology and the financial sector and that these are particularly affected by interest rate increases (Lange 2022). This is based on the theory that bond yields are more attractive than equities when interest rates rise, impacting the global equity market. Future cash inflows also lose value for faster-growing companies as the discounted present value declines. If these earnings are discounted to the present, the values are significantly lower at higher discount rates. The basis for calculation, the interest rate, melted away even though the companies' fundamentals had not changed. The effects of the discounted cash flow method are particularly strong for technology stocks (Heyden 2021) and traditional

companies, such as utilities or consumer goods, rather less so. In addition, it becomes more expensive for companies to finance themselves with debt (Motley Fool 2021). High inflation led to higher bond yields, whereupon equity markets around the world lost some of their value, led by technology stocks. This dynamic was primarily driven by the rise in bond yields, which are like the average dividend yields in equity indices. In this environment, banks are among the winners, as higher interest rates again create more scope for interest margins (Sullivan 2022). This results in the objective to investigate the hypothesis that the higher the interest rates at the end of the pandemic, the stronger the mean reversion process for the highly capitalized sectors of the STOXX Europe 600. This paper analyses the sensitivity of the sector performance of the STOXX Europe 600 and the ECB interest rate policy during the pandemic from 2020 to 2022. In the first step, the impact on the performance of the highly capitalized technology sector and the financial sector is examined. Key findings are that the STOXX Europe 600 Technology Index outperformed the STOXX Europe 600 during the pandemic and underperformed in 2022 with central bank interest rate change. However, there is no linear correlation between ECB interest rates and the sensitivity of the sector performance of the STOXX Europe 600 in 2021, and a slight sensitivity of the basic resources, retail, and utilities sectors can be seen in 2021 and 2022. Chapter four examines a potential correlation between interest rate increases and the sensitivity of the sector performance of the STOXX Europe 600. To account for the potential interest rate sensitivity, the distribution of performance data is examined. Finally, the question of whether there is a mean reversion process for the STOXX Europe 600 sector is answered through a regression analysis for performance and interest rate data. The paper concludes with the findings compared with the literature review.

1   Literature review

In a first step the current state of science is summarized. There are numerous recent studies on equities and interest rates in relation to the Covid 19 pandemic for Europe, and some of the most important are reviewed in more detail in this chapter. Kanapickiene et al. (2020) analyze the impact of COVID-19 on European financial markets and economic sentiment. The authors examined the performance of stock indices, exchange rates, and government bonds, and experienced sharp declines in March 2020 due to the pandemic. In addition, they examined the impact of the pandemic on economic sentiment in Europe and concluded that it is strongly impacted by the evolution of infection numbers and the measures taken to contain the pandemic. The authors emphasize the need to conduct further research to better understand the impact of the pandemic on the economy and to inform policy decision makers at national and international levels. A paper by Kyriazis (2021) examines the connection between European stock indices (total and on a sector basis), gold, and oil during the COVID-19 pandemic. The author analyses correlations, cointegrations, and Granger causality relationships between the different asset classes and examines how the impact of the pandemic affected the interactions. The results show a stronger correlation was between the different asset classes during the pandemic, especially between gold and the stock indices. In addition, the study shows that the pandemic affected the cointegration and causality relationships between asset classes, especially in the context of oil prices. Assel et al. (2022) defines

the research question whether sustainable stock indices performed more stably and better than conventional indices during the COVID-19 pandemic. The focus is on the European region. The results show that all selected indices, whether sustainable or conventional, responded with abnormal returns considering the selected events. Significant market movements were found up to ten days after the pandemic event.

The studies show that the broad STOXX Europe 600 index provides a good data base for studies on stock market performance and monetary policy in Europe.

Oxford Analytica (2023), in another paper, refers to considerations by some Central and Eastern European countries to raise interest rates due to high inflation and possible implications for indices such as the STOXX Europe 600, arguing that raising interest rates could slow economic growth and increase pressure on governments in the context of rising prices. Instead, lowering interest rates in some countries in the region could be an option to support growth and mitigate the impact of inflation.

The paper by Alfieri et al. (2022) examines the impact of European Central Bank (ECB) communications on financial markets before and during the COVID-19 pandemic. The authors use a variety of methods, including event study and content analysis, to examine the effect of communications on equity and bond markets. They find that ECB communications overall have a significant impact on financial markets, particularly the stock market. Prior to the pandemic, ECB communications had a greater impact on financial markets than during the pandemic. The authors suggest that market participants were less receptive to ECB communications during the pandemic due to uncertainty about the economic impact of COVID-19.

The studies show that the broad STOXX Europe 600 index provides a good data basis for studies on stock market development and money market policy in Europe. With the ECB's interest rate changes in 2022, the prevailing academic view for Europe is that this environment will weigh on high-growth equities such as the technology sector and the financial sector that these will be particularly affected by interest rate hikes (Lange 2022). In this environment, banks are also among the winners in Europe, as higher interest rates again create more room for interest margins (Sullivan 2022). This leads to the objective of testing the hypothesis that the higher interest rates are at the end of the pandemic, the stronger the mean-reversion process is for the highly capitalized sectors of the STOXX Europe 600. This paper analyses the sensitivity of the sector performance of the STOXX Europe 600 sectors and the ECB interest rate policy during the pandemic from 2020 to 2022 with the interest rate changes. To account for the possible interest rate sensitivity, the distribution of performance data is examined. Finally, the question whether there is a mean reversion process for the STOXX Europe 600 Technology is answered by a regression analysis for performance and interest rate data.

2　　Data and methods

For this paper, the equity market performance data of the STOXX Europe 600 on sector basis is analyzed in combination with the ECB Deposit Facility Rate, during the pandemic from 2020 to 2021 and with increased interest rates in 2022. The STOXX Europe 600 is

an equity index representing the performance of the 600 largest listed companies in Europe and is calculated by the index provider STOXX Limited, a subsidiary of Deutsche Börse Group. The calculation of the STOXX Europe 600 is based on a weighted average method and is performed in the following steps (Quontigo 2023):

1. Component selection: 600 largest companies from Europe are selected and included in the index based on their market capitalization and liquidity.

2. Calculation of market capitalization: The market capitalization is determined for each selected company by multiplying the current share price of the company by the total number of shares issued. This calculation is performed for each company in the index.

3. Component weighting: The weighting of each company in the index is determined based on its market capitalization. Companies with a higher market capitalization have a greater weight in the index and a greater influence on the index movement, with a cap of 10 percent.

4. Calculation of the index value: the market capitalizations of all companies included in the index are summed up. This sum is divided by a divisor to determine the index value. The divisor is set that the index has an underlying value at a certain point in time, usually 100 points. The divisor is adjusted regularly to ensure that changes in the composition of the index or other adjustments are correctly considered.

The STOXX Europe 600 Index is reviewed regularly to ensure that it reflects current market trends and company changes. This review and adjustment are usually carried out on a quarterly basis (Quontigo 2023). The technology and financial sectors are of particular interest due to their index weightings from 2020 to 2022 as well as the potential sensitivity to interest rate changes during the selected period based on the outcome of the literature review. Table 1 summarizes the observation values for Europe. There are 258 observations values for 2020 and 2021 for the index, all sub-sectors and interest rates and 257 values for 2022 shown in table 1.

Table 1: Examination values Europe

Variable	Name	Observations 2020	Observations 2021	Observations 2022
Y_1	STOXX Europe 600	258	258	257
Y_2	STOXX Europe 600 Automobiles & Parts	258	258	257
Y_3	STOXX Europe 600 Banks	258	258	257
Y_4	STOXX Europe 600 Basic Resources	258	258	257
Y_5	STOXX Europe 600 Chemicals	258	258	257
Y_6	STOXX Europe 600 Construction & Materials	258	258	257
Y_7	STOXX Europe 600 Financial Services	258	258	257
Y_8	STOXX Europe 600 Food & Beverage	258	258	257
Y_9	STOXX Europe 600 Health Care	258	258	257
Y_{10}	STOXX Europe 600 Industrial Goods & Services	258	258	257
Y_{11}	STOXX Europe 600 Insurance	258	258	257
Y_{12}	STOXX Europe 600 Media	258	258	257
Y_{13}	STOXX Europe 600 Oil & Gas	258	258	257
Y_{14}	STOXX Europe 600 Personal & Household Goods	258	258	257
Y_{15}	STOXX Europe 600 Real Estate	258	258	257
Y_{16}	STOXX Europe 600 Retail	258	258	257
Y_{17}	STOXX Europe 600 Technology	258	258	257
Y_{18}	STOXX Europe 600 Telecommunications	258	258	257
Y_{19}	STOXX Europe 600 Travel & Leisure	258	258	257
Y_{20}	STOXX Europe 600 Utilities	258	258	257
X	ECB Interest Rate	258	258	257

Source: Own representation based on Qontigo & ECB data

The entire paper is calculated with Excel and all graphics are created by the author. The first part of the research is based on descriptive statistical methods used to evaluate a potential correlation between the central bank's pandemic policy and the stock market sector performance. The objective of this paper is fulfilled using Pearson correlation. The usage of correlation for the analysis is relevant as it allows for the examination of the relationship between the sector performance and interest rates and therefore an indication for the contribution to the entire market. By calculating the correlation coefficient, one can assess the extent to which performance for both regions is related. If there is a strong correlation, it would support the prevailing academic opinion that rising interest rates negatively impact high-growth sectors and that there is a sensitivity for financial stocks. Based on this, the working hypothesis will be evaluated. Furthermore, examining the correlation at the sector level can provide additional valuable insights for investors. Interest rates are defined as independent variables that influence the dependent variable stock market performance. The correlation analysis assesses both the strength and direction of the relationship between the variables on a scale ranging from -1 to +1. A correlation coefficient of +1 indicates a perfect positive correlation, -1 indicates a perfect negative correlation and 0 indicates no correlation. Additionally, the potential interest rate sensitivity is calculated with a simple linear regression analysis. It is applied to test whether there is a relationship between two of the interval-scaled

variables performance and interest rates. The significance is determined with the t-test. A result with a p-value below 0.05 is significant. The performance data of the index is analyzed during the pandemic from 2020 to 2022. It is applied to test whether there is a significant correlation between the stock performance in Europe and interest rates during the investigation period.

3 Homoscedasticity of data

In the context of regression analysis and the estimation of statistical models for this paper, heteroskedasticity from an econometrics point of view is of importance. This refers to the situation in which the variance of the confounding variables or residuals in a regression model are not constant, but change depending on the independent variables (Baltes-Götz 2018). Heteroskedasticity can affect the efficiency and consistency of the estimates of a regression model and therefore be problematic. presence of heteroscedasticity may bias the standard errors of the coefficient estimates, leading to spurious inferences. T-tests and F-tests may be inaccurate, and confidence intervals may be too wide or too narrow. Linear regression model with constant variance and homoscedastic assumptions, have the best properties in terms of statistical tests as the estimates of the regression coefficients are efficient (Regorz 2021).

For this paper, the analysis with a residuals diagram is used. Standardized predicted values are plotted on the x-axis and the studentized residuals are plotted on the y-axis for the STOXX Europe 600 first and afterwards for the S&P 500. Figure 1 shows the STOXX Europe 600 plot for 2020. The residuals scatter unsystematically around their zero point and demonstrating homoscedasticity. The small variation of the variances between the different x-values can be explained with low interest rate values during the year 2020. The single outlier is not irritating. The data set has been generated with completely homogeneous variances, but due to random influences there is always some variation of the variances between the different x-values.
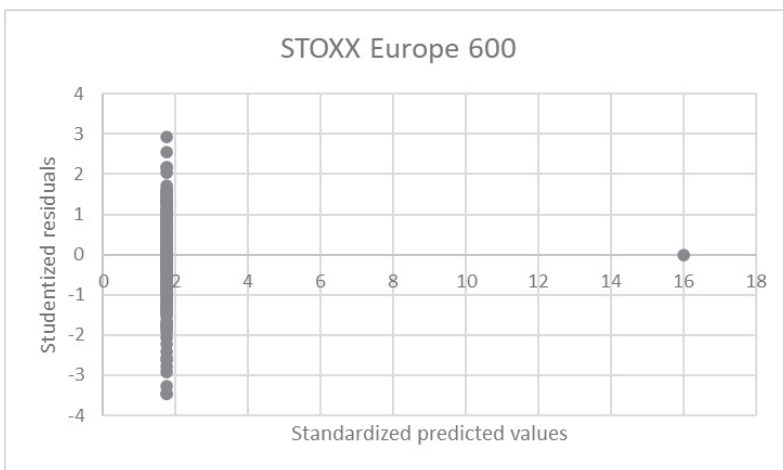
Figure 1: STOXX Europe 600 distribution for 2020
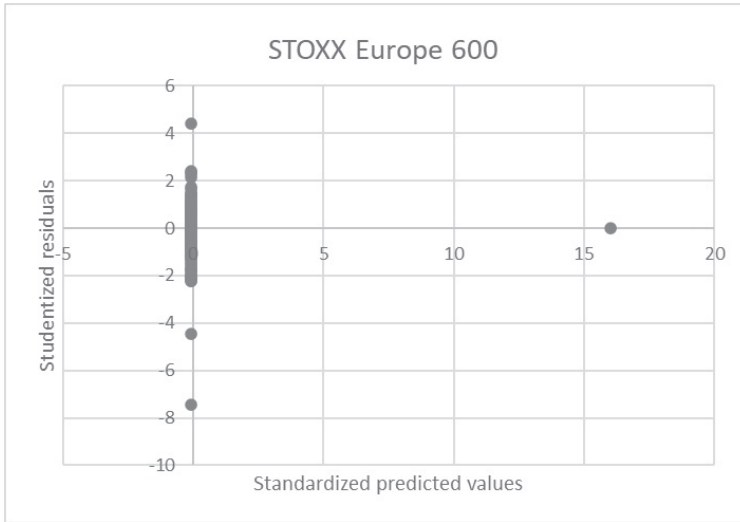
Source: Own representation based on Qontigo & ECB data

The STOXX Europe 600 plot for the year 2021 is shown in figure 2. The plot shows a similar picture than for 2020 with residuals scatter unsystematically around their zero point, demonstrating homoscedasticity. The variation of the variances between the different x-values is similar to 2020 because of the low interest rate values during the year 2021.

Figure 2: STOXX Europe 600 distribution for 2021

Source: Own representation based on Qontigo & ECB data

Figure 3 shows the STOXX Europe 600 plot for the year 2022. The plot shows a s residuals scatter less unsystematically around their zero point for the STOXX Europe 600, demonstrating homoscedasticity 2022. The variation of the variances between the different x-values is higher because of the higher interest rate values during the year 2022.

**Figure 3**: STOXX Europe 600 distribution for 2022
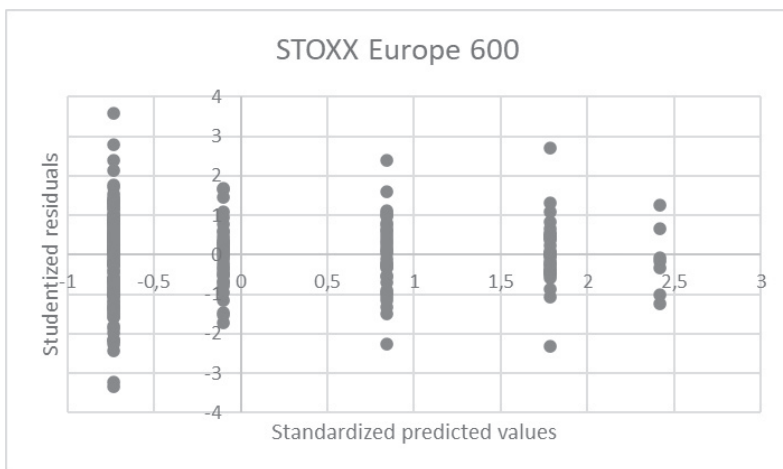
The data analysis for the STOXX Europe 600 for the years 2020, 2021 and 2022 does not indicate possible heteroskedasticity. This also includes a statement about the population sample to estimate whether the variances are homogeneous in the population. An examination of the scatter plots demonstrates that the residuals for all years and indices scatter unsystematically around their zero point and therefore demonstrates homoscedasticity.

4   European interest rates and stock markets development from 2020 to 2022

The following figure 4 illustrates the historical ECB Deposit Facility Rate for a 5 Year period. The data shows that the ECB monetary environment shifted from negative interest rates to zero interest rates and to the positive interest rates during the period of investigation. Based on this, the performance of the STOXX Europe 600 is analysed for the period 2020 to 2022 in the following chapters of this paper.

Figure 4: 5 Years ECB interest rate
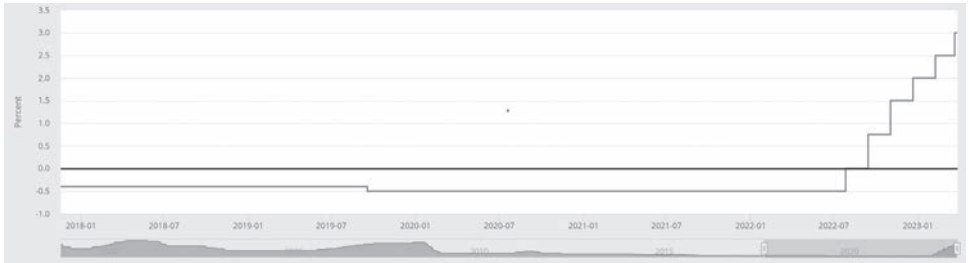
Official STOXX Europe 600 performance data shows that the performance is higher during the pandemic and lower in 2022 with increased ECB interest rates (TradingView 2022). In the next step, the STOXX Europe 600 sector performance is analyzed graphically to illustrate a potential contribution of the high-growth sectors to the overall index performance from 2020 to 2022. Figure 5 highlights the historical STOXX Europe 600 performance from January 2020 to December 2022.

Figure 5: STOXX Europe 600 performance from Jan 2020 to December 2022

Figure 6 highlights the historical STOXX Europe 600 sector performance from January 2020 to December 2022.

Figure 6: STOXX Europe 600 performance from January 2020 to December 2022
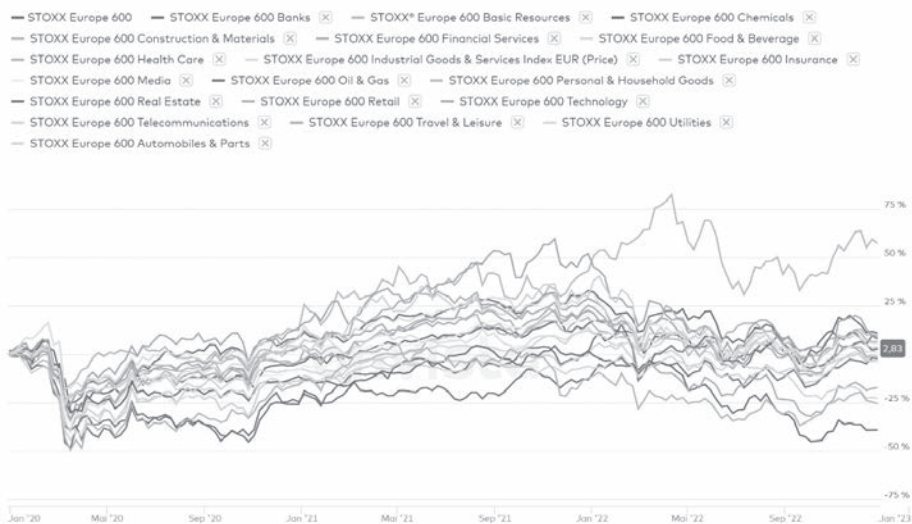
Source: Own representation based on Onvista

Figure 5 and 6 show that the performance of the index and the underlying sectors is higher during the pandemic and lower in 2022 with higher interest rates which supports the assumptions for this paper.

In the next step the STOXX Europe 600 sector performance is analyzed in absolute performance to identify contribution of the high-growth technology and the financial sector. Table 2 illustrates the significant performance contribution of the technology sector during the pandemic in 2020 and 2021. Furthermore, the data shows a significant underperformance of the sectors in 2022. In addition, the data shows a significant negative contribution of the financial sector in 2020 and a positive in 2021.

Table 2: STOXX Europe 600 sector performance from 2020 to 2022

	2020	2021	2022
STOXX Europe 600 Automobiles & Parts (SXAP)	3,7	25,1	-20,1
STOXX Europe 600 Banks (SX7P)	-24,5	34,0	-3,2
STOXX Europe 600 Basic Resources (SXPP)	8,2	20,3	4,3
STOXX Europe 600 Chemicals (SX4P)	8,2	22,7	-16,5
STOXX Europe 600 Construction & Materials (SXOP)	-3,9	31,1	-21,1
STOXX Europe 600 Financial Services (SXFP)	3,9	24,3	-25,2
STOXX Europe 600 Food & Beverage (SX3P)	-7,6	21,6	-14,3
STOXX Europe 600 Health Care (SXDP)	-3,4	23,1	-7,9
STOXX Europe 600 Industrial Goods & Services (SXNP)	4,6	26,7	-20,1
STOXX Europe 600 Insurance (SXIP)	-13,5	15,4	-1,0
STOXX Europe 600 Media (SXMP)	-7,7	31,7	-12,3
STOXX Europe 600 Oil & Gas (SXEP)	-25,8	17,1	24,4
STOXX Europe 600 Personal & Household Goods (SXQP)	3,5	18,1	-12,9
STOXX Europe 600 Real Estate (SX86P)	-11,5	14,8	-40,1
STOXX Europe 600 Retail (SXRP)	9,4	12,4	-32,6
STOXX Europe 600 Technology (SX8P)	13,9	33,7	-28,4
STOXX Europe 600 Telecommunications (SXKP)	-16,1	11,8	-17,7
STOXX Europe 600 Travel & Leisure (SXTP)	-15,5	3,7	-15,1
STOXX Europe 600 Utilities (SX6P)	7,9	5,4	-11,1
STOXX Europe 600 (SXXP)	-4,0	22,3	-12,9

Source: Qontigo

Based on the sector performance data the following hypothesis is defined:

H1: There is a significant correlation for ECB interest rate policy and high-growth sectors and financial sector performance of European equities during the COVID-19 pandemic from 2020 to 2021. For further research Pearson correlation and linear regression is used to evaluate a potential correlation between the ECB pandemic policy and the STOXX Europe 600 sector performance.

Correlation and Regression Analysis
H1 will be answered with the help of a Pearson correlation and linear regression for the index and ECB interest rate data. Data points and periods are the same as for the distribution and boxplot analysis. In the first step, a simple regression analysis for the pandemic observation is conducted with 258 data points. In the next step the performance sensitivity for all 19 sectors of the STOXX Europe 600 is conducted based on regression analysis and Pearson correlation for the same periods to identify a potential impact of the ECB policy on the performance sensitivity of the other STOXX Europe 600 sectors.

Table 3 shows the correlation between STOXX Europe 600 sub-sectors and interest rates in 2020

Table 3: Correlation between STOXX Europe 600 sub-sectors and interest rates in 2020

	r	P-value
STOXX Europe 600 Automobiles & Parts (SXAP)	0,03	0,44
STOXX Europe 600 Banks (SX7P)	0,04	0,48
STOXX Europe 600 Basic Resources (SXPP)	0,02	0,78
STOXX Europe 600 Chemicals (SX4P)	0,02	0,80
STOXX Europe 600 Construction & Materials (SXOP)	0,02	0,79
STOXX Europe 600 Financial Services (SXFP)	0,03	0,62
STOXX Europe 600 Food & Beverage (SX3P)	0,02	0,81
STOXX Europe 600 Health Care (SXDP)	0,02	0,80
STOXX Europe 600 Industrial Goods & Services (SXNP)	0,03	0,65
STOXX Europe 600 Insurance (SXIP)	0,02	0,72
STOXX Europe 600 Media (SXMP)	-0,01	0,92
STOXX Europe 600 Oil & Gas (SXEP)	0,02	0,73
STOXX Europe 600 Personal & Household Goods (SXQP)	0,03	0,65
STOXX Europe 600 Real Estate (SX86P)	0,02	0,72
STOXX Europe 600 Retail (SXRP)	0,04	0,57
STOXX Europe 600 Technology (SX8P)	0,06	0,36
STOXX Europe 600 Telecommunications (SXKP)	0,03	0,61
STOXX Europe 600 Travel & Leisure (SXTP)	0,03	0,67
STOXX Europe 600 Utilities (SX6P)	0,02	0,71
STOXX Europe 600 (SXXP)	0,03	0,60

Source: Own representation based on Qontigo & ECB data

The correlation in table 3 ranges between r = -.01 to r = .04. The p-values range from .36 to .92.

None of those correlations are significant, with all p-values being above .05. Table 3 Pearson values demonstrate that there is no significant correlation between interest rates and the performance of the STOXX Europe 600 sub-sectors in 2020. Therefore, the outperformance of the high-growth sectors cannot be explained with the low interest rate environment. This rejects H1, that there is a significant correlation between ECB interest rate policy and high-growth sectors and financial sector performance of European equities during the COVID-19 pandemic from 2020 to 2021.

Table 4 highlights the relationship between STOXX Europe 600 sub-sectors and interest rates for 2020.

Table 4: Relationship between STOXX Europe 600 sub-sectors and interest rates in 2020

	Coefficients	P-value	F	R Square	Multiple R
STOXX Europe 600 Automobiles & Parts (SXAP)	1,1E+14	0,66	0,19	0,00	0,03
STOXX Europe 600 Banks (SX7P)	1,8E+14	0,48	0,51	0,00	0,04
STOXX Europe 600 Basic Resources (SXPP)	5,9E+13	0,78	0,08	0,00	0,02
STOXX Europe 600 Chemicals (SX4P)	4,0E+13	0,80	0,06	0,00	0,02
STOXX Europe 600 Construction & Materials (SXOP)	5,1E+13	0,79	0,07	0,00	0,02
STOXX Europe 600 Financial Services (SXFP)	8,5E+13	0,62	0,24	0,00	0,03
STOXX Europe 600 Food & Beverage (SX3P)	3,2E+13	0,81	0,06	0,00	0,02
STOXX Europe 600 Health Care (SXDP)	3,3E+13	0,80	0,06	0,00	0,02
STOXX Europe 600 Industrial Goods & Services (SXNP)	8,0E+13	0,65	0,21	0,00	0,03
STOXX Europe 600 Insurance (SXIP)	8,3E+13	0,72	0,13	0,00	0,02
STOXX Europe 600 Media (SXMP)	-1,6E+13	0,92	0,01	0,00	0,01
STOXX Europe 600 Oil & Gas (SXEP)	8,7E+13	0,73	0,12	0,00	0,02
STOXX Europe 600 Personal & Household Goods (SXQP)	5,9E+13	0,65	0,20	0,00	0,03
STOXX Europe 600 Real Estate (SX86P)	6,0E+13	0,72	0,13	0,00	0,02
STOXX Europe 600 Retail (SXRP)	7,5E+13	0,57	0,32	0,00	0,04
STOXX Europe 600 Technology (SX8P)	1,6E+14	0,36	0,86	0,00	0,06
STOXX Europe 600 Telecommunications (SXKP)	8,0E+11	0,60	0,28	0,00	0,03
STOXX Europe 600 Travel & Leisure (SXTP)	1,1E+14	0,67	0,18	0,00	0,03
STOXX Europe 600 Utilities (SX6P)	6,1E+13	0,71	0,14	0,00	0,02
STOXX Europe 600 (SXXP)	8,0E+13	0,60	0,28	0,00	0,03

Source: Own representation based on Qontigo & ECB data

Table 4 shows a p-value range between .36 to .92. None of those relationships are significant, with all p-values being above .05. The coefficients range from 1,1E+14 to 8,7E+13. This can be explained by the low variance for the interest rate values during the year 2020. In summary, it can be said that there is no significant relationship between STOXX Europe 600 sub-sectors performance and interest rates for 2020. This rejects H1, that there is a high correlation between ECB interest rates and high-growth and financial sector sectors of the STOXX Europe 600 for 2020.

Table 5 shows the correlation between STOXX Europe 600 sub-sectors and interest rates in 2021. Correlation values range between r = -.10 to r = .14. The p-values range from .03 to .81. The value for the basic resources sector is significant, with a p-value of .03. None of the other correlations are significant, with all p-values being above .05. In table 5, Pearson values demonstrate that there is one significant correlation between interest rates and the performance of basic resources in 2021. Therefore, the outperformance

of the high-growth sectors cannot be explained by the low interest rate environment. This rejects H1, that there is a significant correlation between ECB interest rate policy and high-growth and financial sector sectors performance of European equities during the COVID-19 pandemic from 2020 to 2021.

Table 5: Correlation between STOXX Europe 600 sub-sectors and interest rates in 2021

	r	P-value
STOXX Europe 600 Automobiles & Parts (SXAP)	-0,05	0,39
STOXX Europe 600 Banks (SX7P)	-0,07	0,28
STOXX Europe 600 Basic Resources (SXPP)	0,14	0,03*
STOXX Europe 600 Chemicals (SX4P)	0,07	0,27
STOXX Europe 600 Construction & Materials (SXOP)	0,08	0,21
STOXX Europe 600 Financial Services (SXFP)	0,04	0,51
STOXX Europe 600 Food & Beverage (SX3P)	0,02	0,69
STOXX Europe 600 Health Care (SXDP)	0,05	0,42
STOXX Europe 600 Industrial Goods & Services (SXNP)	0,03	0,60
STOXX Europe 600 Insurance (SXIP)	-0,04	0,48
STOXX Europe 600 Media (SXMP)	-0,03	0,63
STOXX Europe 600 Oil & Gas (SXEP)	-0,05	0,44
STOXX Europe 600 Personal & Household Goods (SXQP)	-0,03	0,58
STOXX Europe 600 Real Estate (SX86P)	-0,09	0,14
STOXX Europe 600 Retail (SXRP)	-0,10	0,11
STOXX Europe 600 Technology (SX8P)	0,06	0,81
STOXX Europe 600 Telecommunications (SXKP)	0,07	0,28
STOXX Europe 600 Travel & Leisure (SXTP)	0,00	0,04
STOXX Europe 600 Utilities (SX6P)	0,13	0,73
STOXX Europe 600 (SXXP)	0,02	0,33

Note: * significance with value P<0.05

Source: Own representation based on Qontigo & ECB data

Table 6 shows the relationship between STOXX Europe 600 sub-sectors and interest rates for 2021.

Table 6: Relationship between STOXX Europe 600 sub-sectors and interest rates in 2021

	Coefficients	P-value	F	R Square	Multiple R
STOXX Europe 600 Automobiles & Parts (SXAP)	1,8E+14	0,39	0,73	0,00	0,05
STOXX Europe 600 Banks (SX7P)	-1,3E+14	0,28	1,16	0,00	0,07
STOXX Europe 600 Basic Resources (SXPP)	3,2E+14	0,03*	4,97	0,02	0,14
STOXX Europe 600 Chemicals (SX4P)	8,5E+13	0,27	1,24	0,00	0,07
STOXX Europe 600 Construction & Materials (SXOP)	1,1E+14	0,21	1,60	0,01	0,08
STOXX Europe 600 Financial Services (SXFP)	5,7E+13	0,51	0,44	0,00	0,04
STOXX Europe 600 Food & Beverage (SX3P)	2,5E+13	0,69	0,16	0,00	0,02
STOXX Europe 600 Health Care (SXDP)	5,7E+13	0,42	0,66	0,00	0,05
STOXX Europe 600 Industrial Goods & Services (SXNP)	4,5E+13	0,60	0,28	0,00	0,03
STOXX Europe 600 Insurance (SXIP)	-6,3E+13	0,47	0,51	0,00	0,04
STOXX Europe 600 Media (SXMP)	-3,8E+13	0,63	0,23	0,00	0,03
STOXX Europe 600 Oil & Gas (SXEP)	-9,2E+13	0,44	0,60	0,00	0,05
STOXX Europe 600 Personal & Household Goods (SXQP)	-4,2E+13	0,58	0,31	0,00	0,03
STOXX Europe 600 Real Estate (SX86P)	-1,2E+14	0,14	2,17	0,01	0,09
STOXX Europe 600 Retail (SXRP)	-1,7E+14	0,11	2,59	0,01	0,10
STOXX Europe 600 Technology (SX8P)	2,9E+13	0,81	0,06	0,00	0,03
STOXX Europe 600 Telecommunications (SXKP)	2,2E+11	0,28	1,19	0,00	0,07
STOXX Europe 600 Travel & Leisure (SXTP)	-3,9E+12	0,98	0,00	0,00	0,00
STOXX Europe 600 Utilities (SX6P)	1,8E+14	0,04*	4,39	0,02	0,13
STOXX Europe 600 (SXXP)	2,2E+13	0,73	0,12	0,00	0,02

Source: Own representation based on Qontigo & ECB data

Table 6 shows a p-value range between .03 to .98. The value for the basic resources sector is significant, with a p-value of .03. Furthermore, the value for the utilities sector is significant, with a p-value of .04. None of the other relationships are significant, with all p-values being above .05. The coefficients range from -9,2E+13 to 8,5E+13. The high values can be explained by the low variance for the interest rate values during the year 2021. To summarize, it can be said that there is no significant relationship between STOXX Europe 600 high-growth sub-sectors and financial sector performance and interest rates for 2021. This rejects H1, that there is a significant correlation between ECB interest rate policy and high-growth sectors performance of European equities during the COVID-19 pandemic from 2020 to 2021.

Table 7 shows the correlation between STOXX Europe 600 sub-sectors and interest rates in 2022.

Table 7: Correlation between STOXX Europe 600 sub-sectors and interest rates in 2022

	r	P-value
STOXX Europe 600 Automobiles & Parts (SXAP)	0,03	0,60
STOXX Europe 600 Banks (SX7P)	0,06	0,30
STOXX Europe 600 Basic Resources (SXPP)	0,06	0,34
STOXX Europe 600 Chemicals (SX4P)	0,05	0,47
STOXX Europe 600 Construction & Materials (SXOP)	0,06	0,37
STOXX Europe 600 Financial Services (SXFP)	0,05	0,40
STOXX Europe 600 Food & Beverage (SX3P)	0,01	0,89
STOXX Europe 600 Health Care (SXDP)	0,01	0,85
STOXX Europe 600 Industrial Goods & Services (SXNP)	0,07	0,28
STOXX Europe 600 Insurance (SXIP)	0,06	0,33
STOXX Europe 600 Media (SXMP)	0,04	0,52
STOXX Europe 600 Oil & Gas (SXEP)	0,01	0,86
STOXX Europe 600 Personal & Household Goods (SXQP)	0,06	0,34
STOXX Europe 600 Real Estate (SX86P)	0,04	0,53
STOXX Europe 600 Retail (SXRP)	0,10	0,09
STOXX Europe 600 Technology (SX8P)	0,08	0,22
STOXX Europe 600 Telecommunications (SXKP)	-0,06	0,30
STOXX Europe 600 Travel & Leisure (SXTP)	0,04	0,52
STOXX Europe 600 Utilities (SX6P)	0,02	0,76
STOXX Europe 600 (SXXP)	0,06	0,73

Note: * significance with value P<0.05

Source: Own representation based on Qontigo & ECB data

The correlation in table 7 ranges between r = -.06 to r = .10. The p-values range from .09 to .89. None of those correlations are significant, with all p-values being above .05. In table 7, Pearson values demonstrate that there is no significant correlation between interest rates and the performance of the STOXX Europe 600 sub-sectors in 2022. Therefore, the performance of the STOXX Europe 600 sub-sectors cannot be explained by the low interest rate environment.

Table 8 highlights the relationship between STOXX Europe 600 sub-sectors and interest rates for 2022. The p-value ranges between .09 to .89. None of the relationships are significant, with all p-values being above .05. The coefficients range from .00 to .18. The values are lower compared to 2020 and 2021 examinations. This can be explained by the high variance for the interest rate values during the year 2022.

Table 8: Relationship between STOXX Europe 600 sub-sectors and interest rates in 2022

	Coefficients	P-value	F	R Square	Multiple R
STOXX Europe 600 Automobiles & Parts (SXAP)	0,08	0,60	0,28	0,00	0,03
STOXX Europe 600 Banks (SX7P)	0,12	0,36	0,85	0,00	0,06
STOXX Europe 600 Basic Resources (SXPP)	0,13	0,34	0,90	0,00	0,06
STOXX Europe 600 Chemicals (SX4P)	0,08	0,47	0,52	0,00	0,05
STOXX Europe 600 Construction & Materials (SXOP)	0,10	0,37	0,82	0,00	0,06
STOXX Europe 600 Financial Services (SXFP)	0,10	0,40	0,70	0,00	0,05
STOXX Europe 600 Food & Beverage (SX3P)	0,01	0,89	0,02	0,00	0,01
STOXX Europe 600 Health Care (SXDP)	0,01	0,85	0,03	0,00	0,01
STOXX Europe 600 Industrial Goods & Services (SXNP)	0,07	0,28	1,19	0,00	0,07
STOXX Europe 600 Insurance (SXIP)	0,00	0,47	0,53	0,00	0,05
STOXX Europe 600 Media (SXMP)	0,06	0,52	0,42	0,00	0,04
STOXX Europe 600 Oil & Gas (SXEP)	0,02	0,86	0,03	0,00	0,01
STOXX Europe 600 Personal & Household Goods (SXQP)	0,09	0,34	0,90	0,00	0,06
STOXX Europe 600 Real Estate (SX86P)	0,09	0,53	0,40	0,00	0,04
STOXX Europe 600 Retail (SXRP)	0,23	0,09	2,81	0,01	0,10
STOXX Europe 600 Technology (SX8P)	0,18	0,22	1,53	0,01	0,08
STOXX Europe 600 Telecommunications (SXKP)	0,00	0,34	1,07	0,00	0,06
STOXX Europe 600 Travel & Leisure (SXTP)	0,09	0,52	0,41	0,00	0,04
STOXX Europe 600 Utilities (SX6P)	0,03	0,76	0,10	0,00	0,02
STOXX Europe 600 (SXXP)	0,08	0,34	0,92	0,00	0,06

Source: Own representation based on Qontigo & ECB data

To summarize, the performance of the STOXX Europe 600 sub-sectors in 2022 cannot be explained by the low interest rate environment. This rejects the assumption that there is a mean reversion process for European equities with the shift of ECB interest rate policy after the pandemic in 2022.

5   Conclusion

This paper shows the different sensitivity of STOXX Europe 600 sectors during the Covid19 pandemic from 2020 to 2022 with the ECB interest rates. The technology sector contributed significantly to the positive performance in the low interest rate environment and led the negative contribution in 2022 with raising interest rates.

Interestingly, there is an outperformance of the STOXX Europe 600 Technology over the STOXX Europe 600 during the pandemic and an underperformance in 2022 with increased interest rates. But the regression analysis of this paper shows that that there is no linear correlation between ECB interest rates and the performance of the technology sector and proves that that there is no mean reversion process in 2022.

Therefore, the aim of this paper results in the important conclusion that the hypothesis that the higher the interests at the end of the pandemic the higher the mean reversion process for the highly capitalized STOXX Europe 600 sectors is wrong. Since traditional companies, such as utilities or consumer goods and banks, are less affected by the mechanism of discounted cash flow this paper expresses further dedicated research on these sectors.

One limitation of this study is the focus on interest rate changes as the key variable influencing stock market performance during the COVID-19 pandemic. While this variable is significant, other relevant variables, such as political events, economic indicators, and global trade relationships, could have been included to provide a more comprehensive analysis. The exclusion of these variables limits the findings and prevents a comprehensive understanding of the complexities of stock market performance.

Overall, this paper provides an overview of the complex interplay between interest rates and stocks and shows the relevance of an investigation into the relationship during a period of extraordinary economic circumstances from 2020 to 2022. The results contribute to a better understanding of the relationships between interest rate policy changes, COVID-19 pandemic and European stock market performance. Although no significant effects on sector performance were found, this suggests that other factors may play a larger role. Further research is needed to identify these factors in more detail and understand their impact on equity markets. The findings of this study can be used by investors to make more informed decisions regarding their investment strategies and business plans.

The paper also recommends conducting research based on S&P 500 sector sensitivity data to analyze a potential correlation with Fed interest rates in comparison to the ECB.

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