The Nexus of Inflation, Inflation Uncertainty and Stock Indexes

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Financial Economics

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CHAPTER 1. INTRODUCTION

Inflation is a topic that economists in central banks and the finance industry have wrestled with for decades. The importance of the topic in policy decisions for governments, central banks and investors remains unyielding. This has specially been the case over the past two or three quarters in the United States and the Euro Zone where inflation has been exorbitant and opinions on when inflation will calm to pre-third quarter 2021 numbers remains differentiated (Eurostat, 2022).

With the increase in inflation rates around the world, markets have suffered plenty of volatility. The recent movements in markets leads to the question of what the effects that inflation and volatility in inflation have on the performance of stock markets. This has been a topic in finance literature for a significant amount of time yet has resulted in mixed results (Hemamala & A.L.M, 2016). According to Warren Buffett (1977), over the long term, the stock market appears to be a good hedge against inflation, but over the short and medium term, sustained high inflation can have a significantly adverse effect on the stock market. The reason according to Buffett is that during periods of high inflation, stocks and bonds behave similarly.

Furthermore, based on historical data, the stock market performs better when inflation is down or is below 3% than it does when inflation rates are above 3%. This is shown in the table below. Inflation in the U.S was reported at almost three times the average U.S rate of inflation post 1927 at 7.9%. this would clearly signal that tougher times are coming for stocks given what has happened throughout history (Carlson, Inflation Matters More For the Stock Market Than Interest Rates, 2021).

Inflation Is Not Great For the Stock Market

Annual returns for the S&P 500: 1928-2020

Rising Inflation	Falling Inflation	Inflation >3%	Inflation <3%
6.7%	16.5%	6.3%	15.7%

TABLE: BEN CARLSON • SOURCE: NYU

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As stated, the relationship between stock market returns and inflation has long been researched. Since the first official paper on this topic was presented by Fisher (1933), many researchers have attempted to prove or disprove his theory. Fisher's (1933) hypothesis theorized that the expected rate of return on a particular asset, in this case the stock market, should be compromised of an expected real return plus a compensation for the expected rate of inflation. Thus, stock returns would rise along with inflation and thus acting as a hedge against inflation risk. On the other hand, Fama's proxy hypothesis states that there is a negative relationship between inflation and stocks due to: "the positive causal link between real output and stock returns and a negative causal link between real output and inflation." (Tripathi & Kumar, 2015). After years of research, no consensus has been reached on the effects of inflation on stock market returns (Toniok, 2017).

While on the other hand, the relationship between inflation uncertainty and stock markets has been scarcely researched. Theory has not yet figured out a clear method to measure inflation uncertainty. While with regards to inflation uncertainty much of existing literature has used a GARCH process of conditional variance to measure uncertainty (Murithi, 2012). This was first applied in 1989 with little success as little evidence was found of a negative relationship. There have been other papers that have found significantly negative relationship between inflation uncertainty and the stock market, but questions have been raised about the methods used in these papers and whether they are appropriate to measure inflation uncertainty (Azar S. A., 2013). Based on the conflicting arguments and stylized facts outlined, this thesis will attempt to answer the question of what the effects of inflation and inflation uncertainty are on the stock market. The attempt to answer the abovementioned question will be aided by the following hypotheses:

HYPO I: Inflation has a negative effect on stock market returns

HYPO II: inflation uncertainty has a negative effect on stock market returns

The goal of this paper was to analyze and answer the question of what the effects of inflation and inflation uncertainty are on the stock market for 6 countries including, the United States, Germany, United Kingdom, France, The Netherlands and China. To answer this question data was collected over a 16-year timeframe for each of the 6 selected countries. A unit root test was conducted to test for stationarity as stationarity of data is required if meaningfull infereces are to be drawn form

analysis of time series data. To establish the correlation of the variables used in the paper, a Pearson bivariate correlation analysis will be conducted. Lastly, a regression analysis was conducted to determine what the relationshop is between the choses independent variables and the dependent variable is. The Pearson correlation in this paper found a weak correlation between all three of the indepndent variables and stock market returns in the case of all of the 6 countries. All of the correlations were found to be between -0.228 and 0.107. From the findings of this paper , it is shown that the relationship between inflation and stock market returns is negative. Thus, in the 6 economic markets that were chosen, the local stock market does not react positively to increases in inflation. As for inflation uncertainty, no statistical inference can be made as the results were all statistically insignificant.

Additionally, to assist in the findings of this paper, a different measure for inflation volatility will be used to lend further substance to the paper. The GARCH model is used to measure inflation volatility. This will be regressed on stock market returns. Based on the regression results, volatility in inflation leads to lower returns in the stock market for all of the 6 countries included in this paper. The results were only statistically significant only for China.

Lastly, a sector specific research will be done to asertain what the effects of inflation is on certain sectors in certain countries. 5 sectors were chosen. 2 in the United states, 3 in the United Kingdom. The 5 sectors are as follows: U.S. Financial Services, U.S. Information Technology, U.K. Financial Services, U.K. Non-cyclical goods and U.K. Non-cyclical services. Inflation has a different effect on each sector. According to fidelity (2022), Technology stocks have historically underperformed when inflation has been high. For finanicial services, inflation has historically had a negative impact on sector stock performance (Batayneh, Al Salamat, & Momani, 2021). As for non-cyclical sectors, they are not as effected by economic cycles as they are often basic goods that are needed even in times of crisis (Oner, 2010). Based on these facts, the following hypotheses are presented:

HYPO III: Inflation has a negative effect on the financial services sector

HYPO IV: Inflation has a negative effect on Tech stocks

HYPO V: Inflation does not have a significant effect on non-cyclical stocks

Based on the findings reported, all of the three hypotheses reported above were supported. Based on findings, it was demonstrated that inflation results in lower stock market returns for companies in the financial services sector in the United States and United Kingdom**.** The results for information technology showed that inflation has a negative result on stocks included in this sector. As for the thwo non-cyclical sectors, no statistically significant effect was found. thus, inflation did not have a statistically significant effect on these sectors.

The remainder of this paper is structured as follows. Section 2 will contain a review of existing literature on the topic that will be addressed. Section 3 will describe the dataset that will be used for the analysis of the topic. Section 4 will describe the model on which the thesis will be based and possible drawbacks of that model. Section 5 will discuss the findings of the paper plus contain a discussion. Section 6 concludes and will give recommendation for future research.

CHAPTER 2. LITERATURE REVIEW

This section will contain a review of existing literature on each of the variables that are essential to the discussion in the paper. Additionally, the relationship between the three variables will be discussed.

2.1 INFLATION

Inflation is a word that is thrown around constantly around society, but what is inflation? According to Ceyda Oner (2010) "Inflation measures how much more expensive a set of goods and services has become over a certain period, usually a year" (p. 1). Within economics, inflation is one of the most recognizable topics (Oner, 2010). According to the IMF and Oner (2010) the importance of inflation is not overstated as inflation has the power to plunge economies into large periods of economic instability and sway elections in one way or another as politicians propose plans to voters to combat high inflation. In 1974, when inflation was at 12,5%, U.S. President Gerald Ford went as far as naming inflation public enemy no. 1 (Oner, 2010). Using the same nickname given to Al Capone for inflation is shows the effects that inflation has. Inflation is measured through a basket of goods for which the costs to purchase are calculated over a certain period of time. The cost of this basket is expressed relative to a base year and is called the **Consumer Price Index**. The percentage change in the CPI is referred to as **Consumer Price Inflation**, hereinafter referred to as **CPI**. CPI is the most widely used measure for inflation globally (Oner, 2010). CPI can cause a decrease in purchasing power and an erosion of standard of living for households. This is arguably the biggest cost of inflation (Anderson, 2006). Through decades of research a consensus has developed among economists that a low and stable level of inflation is desirable for a good economy. A low and stable level of inflation is more desired than deflation as deflation is likely to lead to cause consumers to shift purchases to the future which would lead to lower economic output.

Three of the most common causes of inflation are, disproportionate increases in supply of money relative to economic growth, pressures on the demand and supply side of the economy and expectations (Toniok, 2017). According to different economists including the Chairman of the Federal reserve, economies are dealing with the perfect storm. Large stimulus plans pushed by governments and Central Banks have resulted in a sharp increase in money supply in the economy, the supply chains are struggling to keep up with steep increase in demand by consumers and lastly,

expectations of higher prices have coincided with increases in wage demands by workers. This has led to the perfect storm for some of the highest inflation numbers seen since the 1970's and 1980's (Leonhardt, 2021).

2.2 INFLATION UNCERTAINTY

Inflation uncertainty can simply be defined as the notion that the future inflation rate is unknown. Inflation uncertainty is the reason why the yield curve for bonds is usually upward sloping as investors expect a premium for the risk that inflation may outpace the yield on a particular bond (Dictionary, 2009). Inflation uncertainty and its potential effects have been topics in research since the 1977 where Milton Friedman suggested that higher inflation causes higher inflation uncertainty (Caporale, Onorante, & Paesani, 2009). There have been different ideas based off of Friedman's hypothesis in 1977. Ball (1992) researched inflation uncertainty in with regards to monetary policy. Pourgerami and Maskus (1987) brought forth the idea that in periods of high inflation, agents would invest more in modelling inflation and thus uncertainty would be reduced. Looking at the relationship between inflation uncertainty and economic activity, different authors have suggested that inflation uncertainty causes a reduction in investment activity due to the hindering that uncertainty causes in long-term contracts or, as Pindyck (1991) suggested, the increase that uncertainty causes option value of delaying an irreversible investment (Caporale, Onorante, & Paesani, 2009). Dotsey and Sarte (2000) suggested the opposite of Pindyck as they stated that higher uncertainty results in increased investment activity due to its impact on savings.

Empirically, research has been done for years on the relationship between inflation and inflation uncertainty – mostly using the GARCH econometric framework – with mixed results. Research looking at the link between inflation uncertainty and real economic activity has also yielded mixed results (Caporale, Onorante, & Paesani, 2009).

Based on decades of research, a few empirical measures for inflation volatility/ uncertainty have been developed. All are based on different concepts and assumptions. These measures include:

- **Survey based measures**: This measure is based on survey data. A data source for survey data is Consensus Economics Inc. Consensus Economics polls professional forecasters that are well informed about the current state of the economy. (Grimme, Henzel, & Wieland, 2012).

- **Forecast based measures**: This approach is based on various forecast models. VAR models are often used in this case due to their ability to generate multi-step predictions (Grimme, Henzel, & Wieland, 2012).
- **Model based measures**: These include Conditional forecast error variance or ARCH models which have been used in the past to measure inflation uncertainty in the US, and Stochastic volatility models which have been used previously in financial econometrics to measure error variance as latent stochastic process (Grimme, Henzel, & Wieland, 2012). Stochastic volatility measures have seldom been used to measure inflation uncertainty.

The specific model to be used in this paper will be described in detail in section 3: Methodology.

2.3 INFLATION, INFLATION UNCERTAINTY & STOCK INDEXES

Through the decades of research on inflation and its effects on stock index returns, no consensus has been reached on whether the relationship is positive or negative. Evidence has been given for both outcomes under different circumstances.

The debate began in 1933, when Fisher publicized his hypothesis that the expected rate of return on a particular asset, in this case the stock market, should be compromised of an expected real return plus a compensation for the expected rate of inflation. Thus, stock returns would rise along with inflation and thus acting as a hedge against inflation risk. Challenging this view, Fama's proxy hypothesis states that there is a negative relationship between inflation and stocks due to: "the positive causal link between real output and stock returns and a negative causal link between real output and inflation." (Tripathi & Kumar, 2015). As stated, authors have found evidence supporting both sides of the argument. Based on the Gordon growth model (1962), the assumption is that a moderate rate of inflation would lead to an increase in expected dividends from investors and eventually to an increase in stock prices (Bui, 2019).

There are countless studies that have been done globally that support the relationship between inflation and stock market returns. Overall there has been mixed results as will be shown in the following paragraphs.

In the case of Vietnam, Bui (2019) looked at the nexus between inflation and stock market returns in the case of a developing market. He investigated the long run relationship between the two

variables. Based on the ARDL model, Bui found a unidirectional relationship between inflation and stock market returns that was significantly negative.

For Pakistan and the Karachi stock exchange (KSE 100), Aurangzeb, Ahmed & Mubarik (2012) investigated the multidimensional relationship between inflation and stock market returns. Using lending rates in Pakistan and currency exchange rates as control variables, they found that inflation and stock market returns in Pakistan have a positive relationship with each other. But, they did caution that persistent inflation will lead to higher future expectations about high inflation, and this would result in a negative impact on the Pakistani stock market (Aurangzeb, Ahmed, & Mubarik, 2012). A similar but later dated paper from Pakistan with a shorter time frame supported the statement from Aurangzeb, Ahmed & Mubarik when they found a negative correlation between inflation and stock markets between 1999 and 2011 (Qamri, Ul Haq, & Akram, 2015).

Similarly contradicting results were published in 2014 for the case of Ghana, where a negative relationship was found in the short run, but the opposite was found in the long term, supporting the case that the stock market would be a good hedge for inflation in the long run (Adusei, 2014). Using the Employing unit root tests, ARDL approach to co-integration and Granger Causality in the Error Correction Model for analysis, Adusei came to the abovementioned results. Looking at the direction of the relationship between variables, evidence is found in support of unidirectional causality running from inflation to stock market returns. This means that inflation influences stock market returns and not vice versa (Adusei, 2014).

Constantinos & Emmanouil (2012) researched the existence of assymetric dynamics in the field of research concerned with inflation and stock market returns. They detected a posistive relationship between inflation and stock market returns in the long run for Greece. Furthermore, they stated that the results demonstrate that an anti-inflationary intervention would have less of an impact on stock market returns than it would have on inflation, thus supporting the statement that the stock market is a good hedge for inflation risk.

In the case for the UK stock market, negative results were found in the short term. This means that over the short term, the stock market is not a good hedge for inflation risk. While over the medium term, the authors found that there were conflicting results. Looking at different inflationary regimes, the authors also found different results. Based on their findings, the relationship between

inflation and stock market returns does depend to a certain extent on inflationary regime (Li, Narayan, & Zheng, 2010).

In their 2014 & 2015 papers on the correlation between inflation and stock market returns in the BRICS markets, Tripathi & Kumar found short run positive causal relationship only in the case of Brazil. The other markets had positive correlations with the exception of India and South Africa but were all insignificant. Granger causality results reveal unidirectional causality from stock return to changes in inflation in Russia, India and South Africa. This is contrary to abovementioned research in other countries. Additionally, a bidirectional causality was found in China, showing that inflation effects stock market returns and vice versa. In the long run, significantly positive association between inflation and stock returns were found in the case of India and China, and negative association was found in the case of Russia and Brazil (Tripathi & Kumar, 2014; Tripathi & Kumar, 2015). Based on the long run findings the relationship between inflation and equity returns do not seem to be significantly integrated (Tripathi & Kumar, Relationship between Inflation and Stock Returns – Evidence from BRICS markets using Panel Co integration Test, 2014). Thus over the long run, stock market returs seem to not be an appropriate hedge against inflation for BRICS markets.

In the case of Kenya, two different papers in the past Decade found that based on information from the Nairobi Stock exchange and CPI data from Kenya, that there is a significantly negative relationship between inflation and Stock returns (Murithi, 2012; Toniok, 2017). Based on the findings of both papers, only a significantly small portion of stock market returns can in Kenya could be explained by inflation. Both finding support Fama's hypothysis implying a negative relationship between inflation and stock market returns.

Based on data from the LQ45 in Indonesia, a positive relationship was found between inflation and stock market performance. This is a contrast to previous research in Indonesia that showed that higher inflation has a negative effect on stock market performance (Fahlevi, 2019).

A similar positive and unidirectional relationship between inflation and stock returns was found in the case of South Africa. This is important as the direction of the relationship between inflation and stock returns has also been under scrutiny by researchers over the past few decades, with mixed results (Eita, 2012). The results of this paper were brought into question when another study

of South Africa yielded different results. This paper using similar data from the Johannesburg Stock Exchange but for a shorter time frame found a negative relationship between inflation and stock market performance (Phiri, 2016). The only similarity between the two papers was the direction of the relationship that was found.

In Nigeria, no significant correlation or unidirectional relationship was found in the short or long term in the Nigeria stock exchange. Thus, in Nigeria, inflation and stock market performance seems to not have any visible relationship with each other (Ogunmuyiwa, 2015; Iorember, Sokpo, & Terzungwe, 2017).

Azar (2014) found that inflation uncertainty had a statistically negative impact on stock market returns for the S&P500. This relationship was even more pronunced when inflation and inflation uncertainty were both included in the equation. Besides this paper by Azar, the relationship between inflation uncertainty and stock markets has been scarsly researched. Academic literature has tried to come up with different ways of measuring inflation uncertainty. No single meausre of inflation uncertainty has been proven to be the clear and best way (Grimme, Henzel, & Wieland, 2012). One of the main measures of inflation uncertainty has been the GARCH or EGARCH (Iorember, Sokpo, & Terzungwe, 2017; Murithi, 2012).This method was first applied by Buono (1989). Buono found little evidence of a negative relationship between inflation uncertainty and stock returns. On the contrary Alexakis et al (1996), Lee (1999), Hu & Willet and Bhar (2010) have all found significant negative relationship between these two variables, although there have been questions raised on the methods and variables used in these papers (Azar, 2013).

CHAPTER 3. DATA

For the purpose of analysis in this paper, different datasets will be consolidated. There will be a total of 6 countries analysed. Those countries are: United States, United Kingdom, Germany, France, The Netherlands and China. This paper will use data from the European Central Bank, the Federal Reserve, Bank of England, The People's Bank of China, OECD, inflation.eu, Compustat Global and Yahoo Finance. All of the data to be collected are secondary data. Monthly data will be collected from January 2006 to December 2021. Thus a data set containing 16-years worth of monthly data.

Inflation data will be collected from Federal Reserve in the case of the United states and Inflation.eu in the case of the remaining 5 countries (China, Germany,Netherlands, France and the UK). Inflation uncertainty data will be collected from OECD and subsequently calculated using the root mean squared error from the forcast data collected. Stock market return data will be collected from Yahoo finance for the AEX Index in the Netherlands. For China (Shanghai Composite Index), Germany (DAX Index), France (CAC 40), UK (FTSE 100 Index) and the United States (S&P 500 Index) data will be collected from Compustat Global. Monthly returns will be calculated using this data.

Central Bank interest rate data will be collected from individual Central Banks. For the United states, the fed funds rate will be used and information will be collected from the Federal reserve bank of St. Louis website. For France, Germany and the Netherlands, interest rate data will be gathered from the ECB. For the United Kingdom, data will be collected from the Bank of England. Lastly, Chinese Central Bank interest rate data will be collected from the People's Bank of China.

Table 1 Data discription of stock indexes

Country	Stock Exchange	Index
United states	New York Stock Exchange	S&P 500
China	The Shanghai Stock Exchange	Shanghai Composite Index

Germany	The Frankfurt Stock Exchange	DAX Index
UK	London Stock Exchange	FTSE 100 Index
France	Euronext Paris	CAC 40 Index
Netherlands	Euronext Amsterdam	AEX Index

CHAPTER 4 METHODOLOGY

A discription of the methods used to analyze the relationship between inflation and stock market will be given. These methods include the discriptive statistics, the package used to analyze the regression formula.

4.1 DATA ANALYSIS

The collected data will be sorted and classified for ease of analysis. descriptive and inferential statistics will be used to analyse the data. The statistical data package to be used for analysis is STATA. Based on the data inputted, correlational, descriptive and regression analyses will be conducted.

4.2 UNIT ROOT TEST

A unit root test will be conducted on the time series data to be used in this paper. According to Tripathi & Kumar (2015), time series data used for research is stationary as long as the mean, variance and auto-variance of the time series data is independent of time. Furthermore, stationarity of data is required if meaningfull infereces are to be drawn form analysis of time series data. Stationarity also helps with the reliability and enhancement of the models used in the paper. For this paper, the Augmented Dickey Fuller (ADF) unit root test will be used to test for stationarity of the time series data.

4.3 BI-VARIATE CORRELATION

To establish the correlation of the variables used in the paper, a bivariate correlation analysis will be conducted. This will be used to establish the magnitude and direction of the short term relationship between inflation, inflation uncertainty and stock market performance. This will be done for all of the 6 countries involved (United States, China, France, United Kingdom, Germany, Netherlands).

4.4 REGRESSION ANALYSIS

The collected data will be further analyzed with the use of a multivariate regression analysis. The multivariate regresion analysis is used to determine the relationship between inflation, inflation uncertainty and stock market returns. The multivariate regression will be as follows:

$$\text{SMR} = \beta 0 \ + \beta_1 INF + \beta_2 \, INFU + \beta_3 INT + \varepsilon$$

SMR = Stock Market Returns for each of the 6 Countries

$\beta 0$ = Constant term

INF = A variable equal to the Consumer Price Index in each of the 6 countries

INFU = A proxy variable equal to the root mean squared error calculated by averaging the individual squared forecast errors in each period t

INT = Interest Rate set by Central Bank in each country

ε = Error term

To the knowledge of the author, the measure choosen to calculate inflation uncertainty has not been used in past research regarding stock market returns and inflation uncertainty. The measurement of this variable was adopted from Grimme, Henzel & Wieland (2012). Given that inflation uncertainty is an unobserved measure, many different measures have been proposed over time (Grimme, Henzel, & Wieland, 2012). The particular survey based measure was chosen because, it polls professional forecasters who should be well informed about the current state of the economy. The name and affiliation of the forecasters are provided thus giving them an incentive to provide accurate forecasts. According to Dovern & Wisser (2011), professional forecasters were found to be largely unbiased. Furthermore, survey based measures have the advantage of running monthly or quarterly and thus any abrupt movements in uncertainty are not washed out by low frequency data (Grimme, Henzel, & Wieland, 2012). To measure uncertainty, the root mean squeared error was proposed by Grimme, Henzel, & Wieland (2012) and will be adopted in this paper.

To control for ommited variable bias, the author will use fixed effects. To eliminate the possibility of omitted variable bias, differencing will be introduced into the model. This will be done through the fixed effects estimator. This will be done by demeaning the independent and dependent variables using the within transformation.

Additionally, two extra tests will be conducted to lend further substance to this paper. The first test will be calculating inflation volatility using the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model and measuring its effect on stock market returns. Finally, a

sample of 5 different sectors were chosen in two of the six countries to measure the effect that inflation has on the stock returns of companies in these specific sectors. The 5 sectors are as follows: U.S. Financial Services, U.S. Information Technology, U.K. Financial Services, U.K. Non-cyclical goods and U.K. Non-cyclical services.

4.5 SIGNIFICANSE TEST

To test the significance of the results to be obtained, F-statistic and T-statistic will be used at the 95% significance level. The F- statistic will be used to indicate the statistical significance of the regression equation and the T-statistic will be used to indicate the statistical significance of the coefficients (Toniok, 2017).

CHAPTER 5. FINDINGS & DISCUSSION

The following chapter will summarize the analysis that was conducted and results of the analysis. The second part of this chapter will contain a discussion on the findings of this paper and what those findings mean. Findings for each of the 6 countries will be presented separately.

5.1 ADF

First, the 4 variables for that were to be used in the model were all tested for stationarity. Data for each of the 6 countries were tested separately. The four variables – Stock market returns, Inflation, Inflation uncertainty and Interest rate – were all found to be stationary after performing the Augmented Dickey Fuller test.

5.2 DESCRIPTIVE STATISTICS

Descriptive statistics presents the mean, maximum, minimum, Standard deviation and variance. Descriptive statistics helps readers get an overview of the dataset that was assembled and used to conduct analysis. There is a total of 192 data point for each variable for each country. In the 4 tables included below this section, an in-depth overview of descriptive statistics is given for each of the 6 countries included in this study. The country with the highest mean stock market returns was China at 0.88 percent per month, while the country with the lowest was the United Kingdom at 0.22 percent per month. China was also the country with the highest standard deviation in their returns with 7.643, while the lowest standard deviation was recorded again by the United Kingdom. These two countries were the ones that recorded the highest and the lowest volatility in returns respectively. When it comes to inflation, it was China the recorded the highest average at 2.54 percent per month while the United Kingdom was second with 2.15. The country that recorded the lowest average inflation was France at 1.213 with Germany having the second lowest average at 1.489. with regards to mean inflation. The U.S. recorded the lowest mean inflation uncertainty at 0.299. The Netherlands recorded the highest standard deviation for inflation uncertainty at 0.222, while Germany recorded the lowest at 0.031. Finally, the highest interest rate was recorded in China, at 7.47 percent and the lowest was in France, Germany and the Netherlands at 0 percent. The highest mean interest rate was recorded in China at 5.31 while the lowest was recorded in France, Germany and The Netherlands.

Table 2. Stock Market Returns

	US	Germany	UK	France	Netherlands	China
Mean	0.737	0.619	0.220	0.346	0.306	0.880
Median	1.254	1.214	0.795	0.740	0.731	0.878
Standard Deviation	4.391	5.454	3.927	5.191	4.912	7.643
Sample Variance	19.281	29.743	15.420	26.943	24.126	58.408
Minimum	-16.786	-20.258	-13.808	-18.831	-20.250	-23.754
Maximum	16.587	17.048	12.352	19.580	13.188	27.022
Count	192	192	192	192	192	192

Table 3. Inflation

	US	Germany	UK	France	Netherlands	China
Mean	2.085	1.489	2.156	1.213	1.660	2.540
Median	2	1.4	2.3	1.2	1.6	2.15
Standard Deviation	1.504	0.964	1.002	0.882	0.893	1.952
Sample Variance	2.263	0.928	1.004	0.777	0.797	3.810
Minimum	-2.1	-0.5	0.2	-0.7	-0.2	-1.8
Maximum	7	5.3	4.8	3.6	5.7	8.8
Count	192	192	192	192	192	192

Table 4. Inflation Uncertainty

	US	Germany	UK	France	Netherlands	China
Mean	0.299	0.301	0.321	0.320	0.505	0.503
Median	0.274	0.292	0.295	0.295	0.434	0.501
Standard Deviation	0.060	0.031	0.065	0.076	0.222	0.071
Sample Variance	0.004	0.001	0.004	0.006	0.049	0.005
Minimum	0.240	0.272	0.235	0.260	0.400	0.017
Maximum	0.584	0.457	0.618	0.621	2.079	0.766
Count	192	192	192	192	192	192

Table 5. Interest Rates

	US	Germany	UK	France	Netherlands	China
Mean	1.276	0.976	1.299	0.976	0.976	5.310
Median	0.250	0.250	0.500	0.250	0.250	5.310
Standard Deviation	1.598	1.328	1.787	1.328	1.328	1.054
Sample Variance	2.553	1.765	3.193	1.765	1.765	1.111
Minimum	0.250	0.000	0.100	0.000	0.000	3.800
Maximum	5.250	4.250	5.750	4.250	4.250	7.470
Count	192	192	192	192	192	192

5.3 CORRELATION ANALYSIS

Pearsons correlation was used to measure the level of association between Stock market returns and the three independent variables: Inflation, Inflation Uncertainty and Interest rates. For the case of the United states, a weak and negative, but statistically significant correlation was found at the 0.05 and 0.025 level. A significantly weak relationship was found between inflation uncertainty & interest and stock market returns, but this relationship was found to be statistically insignificant. As can be seen from the table below, the independent variables have are correlated to a degree, but the correlation is not strong enough to cause multicollinearity.

Table 6. U.S.

	Returns	*Inflation*	*Inflation uncertainty*	*Interest rate*
Returns	1.000			
Inflation	-0.164	1.000		
Inflation uncertainty	-0.045	0.467	1.000	
Interest rate	-0.091	0.328	0.540	1.000

For Germany, all of the independent variables had a weak negative correlation, but only the correlation for inflation and stock market returns was statistically significant. This was true at the 0.05 and the 0.025 level. This means that inflation in Germany effects stock market returns in a somewhat significant way.

Table 7. Germany

	Return	*Inflation*	*Inflation uncertainty*	*Interest rate*
Return	1.000			
Inflation	-0.142	1.000		
Inflation uncertainty	-0.008	0.275	1.000	
Interest rate	-0.090	0.366	-0.290	1.000

For the U.K., both inflation and interest rates were found to be negatively correlated with stock market returns. Both were found to be statisticlally significant at the 0.05 level. Inflation uncertainty was found to have a substantially weak positive correlation with stock market returns. This correlation was statistically insignificant. This shows that both inflation and interest rates have a statistically significant impact on the stock market in the United Kingdom.

Table 8. United Kingdom

	Return	*Inflation*	*Inflation Uncertainty*	*Interest rate*
Return	1.000			
Inflation	-0.125	1.000		
Inflation Uncertainty	0.017	0.323	1.000	
Interest rate	-0.118	0.292	0.452	1.000

France was the only one of the 6 countries where all 3 of the independent variables were found to be statistically significant, although each at a different level. Both interest rates and inflation were found to have a negative relationship with stock market returns. The correlation for inflation and stock market returns was not strong but was found to be statistically significant at the 0.01 level. Interest rates and stock market returns also had weak correlation but was still found to be significant at the 0.05 level. Inflation uncertainty and stock market returns were found to have a weak positive relationship at the 0.10 level. This shows that all three independent variables are correlated with stock market returns in the case of France.

Table 9. France

	Return	*Inflation*	*Inflation uncertainty*	*Interest rate*
Return	1.000			
Inflation	-0.188	1.000		
Inflation uncertainty	0.107	0.007	1.000	
Interest rate	-0.158	0.495	-0.357	1.000

For the Netherlands, inflation was found to have a weak negative relationship with stock market returns. This relationship is signficant at the 0.05 level. Interest rate and stock market returns have a negative relationship as well. But, this relationship is significant at the 0.01 level. Similar to france, inflation uncertainty was found to be positively correlated but statistically insignificant. Contrary to France, in the case of the Netherlands, it is interest rates that have a stronger correlation with stock market returns.

Table 10. Netherlands

	Return	*Inflation*	*inflation uncertainty*	*Interest rate*
Return	1.000			
Inflation	-0.163	1.000		
inflation uncertainty	0.055	0.439	1.000	
Interest rate	-0.185	0.143	-0.293	1.000

Finally, Inflation in China was found to have a negative correlation with stock market returns. This correlation is weak bu statistically significant at the 0.01 level. Both inflation uncertainty and interest rates were found to have a negative but statistically insignificant relationship with stock market returns. Thus, for the case of China, only inflation has a statistically significant correlation with stock market returns, out of the three independent variables included in this paper.

Table 11. China

	Return	*Inflation*	*inflation uncertainty*	*Interest rate*
Return	1.000			
Inflation	-0.228	1.000		
inflation uncertainty	-0.015	-0.006	1.000	
Interest rate	-0.044	0.582	-0.356	1.000

5.4 REGRESSION ANALYSIS

After performing the initial test illustrated above, stock market returns was regressed on three independent variables: Inflation, Inflation uncertainty and interest rates. In the table below, the model summary statistics are reported for all of the 6 coutries included in this paper. After the model summary statistics are reported, ANOVA analysis will be presented for each country separately and lastly, model coefficients will be given for each country separately.

Table 12. Model Summary for All countries

Regression Statistics	U.S.	Germany	U.K.	France	Netherlands	China
Multiple R	0.180	0.149	0.182	0.219	0.245	0.255
R Square	0.032	0.022	0.033	0.048	0.060	0.065
Adjusted R Square	0.017	0.007	0.018	0.033	0.045	0.050
Standard Error	4.354	5.436	3.892	5.104	4.799	7.448
Observations	192	192	192	192	192	192

The table above gives the regression statistics for each of the 6 countries included in the paper. Based on the statistics shown in the table above, the R square for each of the countries was significantly low. The lowest was, Germany at 0.022 which means that only 2.2% of the deviations in stock market returns for Germany can be explained by inflation, inflation uncertainty and interest rates. The two highest countries were China and the Netherlands at 6.5% and 6% respectively. For the U.S., the R square was 0.032, For the U.K. 0.033 and 0.048 for France. This means that over 90% of deviations in stock market returns can be explained by other variables that have not been included in this paper. This is the case for all of the countries included in this paper. Furthermore, the Multiple R showed that there was a feeble link between the three independent

variables included in the regression and the dependent variable. This was the case for all countries included, where the Multiple R ranged between 0.149 and 0.255.

5.5 REGRESSION COEFFICIENTS

For this paper, the T-test was used to determine the statistical significance of the indepndent variables used in this paper to predict stock market returns for the U.S., Germany. U.K., France, The Netherlands and China. The P-value is used as an indicator of the level of significance between a independent variable and the dependent variable. As previously stated, this paper uses a 95% confidence level, thus any P-value reported under 0.05 is reported as statistically significant and any P-value above 0.05 is reported as statistically insignificant. The results for each country is reported in the table below.

Table 13. regression Coefficients

Model	US	Germany	UK	France	Netherlands	China
Constant	4.22037E-16	-1.30583E-16	1.13276E-16	-4.07622E-16	2.18438E-16	1.30971E-14
St. Error	*(0.314)*	*(0.392)*	*(0.281)*	*(0.368)*	*(0.346)*	*(0.538)*
Inflation	-0.513*	-0.759	-0.485	-0.991*	-1.040*	-1.245**
St. Error	*(0.238)*	*(0.485)*	*(0.302)*	*(0.495)*	*(0.456)*	*(0.352)*
Inflation uncertainty	5.769	3.159	7.100	6.417	2.232	4.140
St. Error	*(6.749)*	*(14.577)*	*(4.982)*	*(5.352)*	*(1.903)*	*(8.470)*
Interest rates	-0.209	-0.146	-0.296	-0.160	-0.476	1.124
St. Error	*(0.235)*	*(0.354)*	*(0.179)*	*(0.352)*	*(0.288)*	*(0.698)*

* coefficient is significant at the 0.05 level.
** coefficient is significant at the 0.01 level.

For the U.S., it is clear that only inflation is a statistically significant determinant of stock market returns and that both inflation uncertainty and interst rates are insignificant in determining stock market returns. Based on the results reported for the U.S., a one unit rise in inflation would cause stock market returns to decrease by 0.513%, a one unit change in inflation uncertainty would cause stock market returns to increase by 5.769% and a one unit increase in interest rates would cause stock market returns to decrease by 0.209%. For Germany, non of the independent variables are statistically significant. All of the P-values are above 0.05, thus violating the significance threshold. This means that a one unit increase inflation will result in a 0.759% decrease in returns for the DAX, a one unit increase in inflation uncertainty will result in a 3.159% increase in stock market returns and a one unit increase in interest rates will result in a -0.146% return on the stock

market. Similar to the case of Germany, all of the variables of the U.K. are statistically insignificnat as they are above 0.05. Based on the reported regression model for the U.K., a one unit increase in inflation would cause a -0.485% return in the FTSE 100. A one unit increase in inflation uncertainy would result in a 7.1% return in the stock market and a one unit increase in interest rates would result in a -0.296% stock market return. For France, inflation is a statistically significant determinant of stock market returns, but inflation uncertaintry and interest rates are not as they a far above the 0.05 threshold. Based on the reported coefficients for the French model, a one unit increase in inflation would lead to a 0.991% decrease in stock market returns. A one unit increase in inflation uncertainty would lead to a 6.417% return in the CAC 40 and a one unit increase in interest rates would lead to a decrease of 0.160% in returns for the CAC 40. For the Netherlands, inflation is a statistically significant determinant of stock market returns. Interest rates are statistically significant at the 90% confidence level, but as this paper uses a 95% confidence level, it is considered statistically insignificant. Inflation uncertainty is also statistically insignificant.Based on the results for The Netherlands, a one unit increase in inflation would results in a drecrease of 1.040% for the AEX Index. A one unit increase in inflation uncertainty would result in a 2.232% return for the AEX Index and a one unit increase in interest rates would result in a – 0.476% return for the AEX index. For China, inflation is statistically significant at the 0.05 and 0.01 level. Both inflation uncertainty and interest rates are statistically insignificant in determining stock market returns. Based on the regression results for China, a one unit increase in inflation would result in a -1.2455 return for the Shanghai Composite Index. A one unit increase in inflation uncertainty would result in a 4.14% stock market return and a one unit increase in interest rates would result in a 1.124% return.

Table 14. Regression results GARCH Inflation volatility

Model	US	Germany	UK	France	Netherlands	China
Constant	1.248	0.807	0.545	1.085	1.322	2.464
St. Error	*(0.504)*	*(0.665)*	*(0.463)*	*(0.718)*	*(0.747)*	*(0.800)*
GARCH Inflation Vol.	-0.437	-0.251	-0.415	-0.978	-1.353	-1.080**
St. Error	*(0.336)*	*(0.716)*	*(0.468)*	*(0.811)*	*(0.877)*	*(0.401)*

* coefficient is significant at the 0.05 level.
** coefficient is significant at the 0.01 level.

In the table above, regression results for GARCH inflation volatility are reported. Based on the regression results, volatility in inflation leads to lower returns in the stock market for all of the 6 countries included in this paper. Only the regression coefficient for China is statistically

significant. Based on the chinese results, a one unit increase in volatility, would lead to a 1.080% decrease in returns for the Chinese stock market. Even with only one of the six countries included having a statictically significant coefficient, it can be seen that volatility and stock market returns are negatively correlated.

Table 15. Regression sector stock market performance

Model	U.S. Fin. Serv.	U.S. Inf. Tech.	U.K Fin. Serv.	U.K. Non Cycl. Goods	U.K Non Cycl. Serv.
Constant	1.931	2.493	2.104	0.424	0.692
St. Error	*(0.769)*	*(0.660)*	*(0.925)*	*(0.735)*	*(0.961)*
Inflation	-0.755**	-0.664**	-0.968**	0.011	-0.279
St. Error	*(0.300)*	*(0.257)*	*(0.389)*	*(0.309)*	*(0.404)*

* coefficient is significant at the 0.05 level.
** coefficient is significant at the 0.01 level.

Lastly, table 15 shows the effct that inflation can have on different sectors in different countries. based on the results, inflation results in lower stock market returns for companies in the financial services sector in the United States and United Kingdom. Based on the results a one unit increase in inflation is associated with a 0.755% lower return for stocks in the financial services sector in the United States. As for the United Kingdom, a one unit increase in inflation would result in 0.968% decrease in returns for the financial services sector. As for the information technology, the results show that inflation leads to lower returns for this sector as well. Accroding to the findings, a one unit increase inflation, leads to a decrease of 0.664% in returns for information technology stocks. As for the stock of companies in the Non-cyclical goods and services sector, the results showed almost no movement in the stocks when there is a change inflation. The results were not statistically significant.

The overall aim of this paper was to look at the relationship between inflation, inflation uncertainty and stock market returns for different countries. For some of the countries, this would be a reassesment and for other countries, based on the knowledge of the author, it would be a novelty. A total of 6 countries were choosen and 16 years of monthly data was collected. Inflation was to be measure by monthly year-over-year CPI for each of the 6 countries for a total of 192 months. Inflation uncertainty was to be meausures using the root mean squared error based on forcasted

and realized inflation. Interest rates was the control variable used. Interest rates were measured by Central Bank interest rates. Additionally, each of the independent variables relationship with the dependent variable were analyzed in terms of direction and strength.

Based on the analysis conducted, it was found that each of the independent variables had a fairly weak Pearson correlation with the dependent variable. All of the correlations were found to be between -0.228 and 0.107. This means that the independent variables were all weakly correlated with the independent variable in the case of all of the 6 countries. This can be seen from tables 8 through 13. This is similar to Tripathi & Kumar (2015) in their paper on inflation and stock market returns for the BRICS countries. For all 6 countries, it was found that the relationship between inflation and stock market returns were statistically significant at the 0.05 level. In all 6 countries, the relationship between inflation uncertainty and stock market returns were found to be statistically insignificant. As for interest rates, only in the case of the U.K., France and The Netherlands, was a statistically significant relationship found. This is further evidence of heterogeneity across the economies that were analyzed. Based on the Pearson correlation, the direction of the relationships were equal with the exception of inflation uncertainty, but each of the 6 economies did vary in the level of significant that inflation, inflation uncertainty and interest rates have on stock market returns.

The model summary published in table 14 shows that the R^2 of the 6 regression models ranged between 0.022 to 0.065, which states that the regression models and the three independent variables included in these models explained between 2.2% to 6.5% of the variation in stock market returns for the respective markets. The highest R^2 was recorded in China at 6.5%, followed by The Netherlands at 6%, followed by France (4.8%), U.K(3.3%), U.S.(3.2%) and lastly Germany at 2.2%. These results are similar to those of Azar (2013) & Azar(2014) and Qamri, Ul Haq, & Akram (2015), who also found similarly low R^2 in their papers regarding inflation, inflation uncertainty and stock market returns in the case of the U.S. and Pakistan. This shows that there are substantially more factors effecting stock market returns in these countries that those incorporated in the model that is used for this paper.

The results of the regression models are in accordance with the findings of Fama's proxy hypothesis which states that there is a negative relationship between inflation and stocks due to: "the positive causal link between real output and stock returns and a negative causal link between

real output and inflation." (Tripathi & Kumar, 2015). In the case of all of the 6 countries, a negative relationshop was found between inflation and stock market returns. For the US and china, the results regarding inflation and stock market returns are in accordance to previous findings of research on macroeconomic determinants of stock market performance. Both Demir (2019) and Garza-Garcia & Yue (2010) showed that the macroeconomic variable inflation had a negative relationship with stock market returns. Demir (2019) also showed that interest rates in the US had e nagative relationshop with stock market returns, similar to the results in this paper. For Germany and The U.K., this relationship was found to be negative but statisticallly insignificant. The results for Germany and the U.K. can be due to various reasons Heterogeneity of markets is normal in economic and finance, thus differnces in results would not be out of the ordinary. The results for these two countries are similar to that of Nigeria where no significant relationship was found between inflation and stock market returns (Ogunmuyiwa, 2015; Iorember, Sokpo, & Terzungwe, 2017). The results of the relationship between inflation and stock market returns puts this paper on the side of academic literature that has provided evidence of a negative relationship between inflation and stock market returns. Thus, the stock market would not be a good hedge against inflation risk.

As for inflation uncertainty, all of the regression results stated a positive yet statistically insignificant relationship. Thus, based on the results, no statistical inference can be made. When only inflation uncertainty was regressed against stock market returns, the relationship was still found to be statistically insignificant. As stated before, this paper uses a novel measure for inflation uncertainty that has not been used in research regarding inflation uncertainty and its effect on stock market returns, to the knowledge of the author. The results from this paper do not provide any clarity on the relationship between inflation uncertainty and stock market return. The measure used for inflation uncertainty seems to not be appropriate to measure this relationship. Based on previous research, contradictory results were found when individual measures to test inflation uncertainty (Grimme, Henzel, & Wieland, 2012). As stated in the literature review, academic literature has not yet figured out a way of measuring inflation uncertainty.

The additional studies carried out show that inflation volatility leads to lower stock market returns in the case of all of the countries included even though the regression coefficient was only statistically significant in the case on China. The findings are similar to previous studies that have

shown a negative association between inflation volatility and stock market returns (Alexakis, Apergis, & Xanthakis, 1996; Batayneh, Al Salamat, & Momani, 2021). Furthermore, it was demonstrated that inflation results in lower stock market returns for companies in the financial services sector in the United States and United Kingdom. These findings are agreement with the findings of Batayneh, Al Salamat & Momani (2021) which state that inflation has a negative effect on bank profitability, the overall banking industry and financial assets. Thus, inflation would lead to worse performance of companies that are included in the financial services industry and thus lead to lower stocks returns. The results for information technology showed that inflation has a negative result on stocks included in this sector. According to Vittorio de Pedys (2022), it is not inflation that causes decreases in stock market returns for high growth stocks in the information technology sector, but the anticipation of increases in interest rates in the persuit of lowering inflation which will cause valuations to go down.

CHAPTER 6. CONCLUSION & RECOMMENDATIONS

The following chapter will shortly summarize the research conducted, give a conclusion on the findings that have been presented and give recommendation on possible policy measures that can be taken and recommendations for future research.

The goal of this paper was to analyze and answer the question of what the effects of inflation and inflation uncertainty are on the stock market. To answer this question a group of 6 countries was selected and data was collected over a 16-year timeframe. To measure Inflation, monthly year-over-year CPI was used. To measure inflation uncertainty, the author used a novel measure was used that was proposed by Grimme, Henzel & Wieland (2012) as a measure for inflation uncertainty. No consensus has been reached in academic literature on how to measure inflation uncertainty, thus this novel measure was an attempt to find an appropriate measure for inflation uncertainty. As a control variable, Central Bank interest rates was used.

The Pearson correlation in this paper found a weak correlation between all three of the indepndent variables and stock market returns in the case of all of the 6 countries. All of the correlations were found to be between -0.228 and 0.107. As stated in the discussion, for all 6 countries, it was found that the relationship between inflation and stock market returns were statistically significant at the 0.05 level. In all 6 countries, the relationship between inflation uncertainty and stock market returns were found to be statistically insignificant. As for interest rates, only in the case of the U.K., France and The Netherlands, was a statistically significant relationship found.

The model summary published in table 14 shows that the R^2 of the 6 regression models ranged between 0.022 to 0.065. This is not an uncommon occurance as similar results were found in Azar (2013) & Azar(2014) and Qamri, Ul Haq, & Akram (2015). Furthermore, the analysis of variance demonstrated that only the models for France, The Netherlands and China were statistically significant in explaining the effects of inflation, inflation uncertainty and interest rates on stock market returns.

As for the results of the regression model, they are in accordance with Fama's proxy hypothesis which states that there is a negative relationship between inflation and stocks. In the case of all of the 6 countries including those where the model was determined to be unfit in forecasting the effects of the three independent variables including inflation on the stock market, a negative

relationshop was found, although this relationship was statistically insignificant for Germany and the United Kingdom. As for inflation uncertainty, all of the regression results stated a positive yet statistically insignificant relationship. Thus, based on the results, no statistical inference can be made.

Additionally, it was demonstrated that that inflation volatility leads to lower stock market returns. The findings are similar to previous studies that have shown a negative association between inflation volatility and stock market returns. Furthermore, it was demonstrated that inflation results in lower stock market returns for companies in the financial services sector in the United States and United Kingdom. The results for information technology also showed that inflation has a negative result on stocks included in this sector

From the findings of this paper , it is clear that the relationship between inflation and stock market returns is negative and. Thus, in these economic markets, the local stock market does not react positively to increases in inflation. Thus for the US, Germany, UK, France, The Netherlands and China, when there is an increase in inflation, the stock market would decrease between 0.485% and 1.245%. This is evidence that in these markets, the stock market is not a good hedge for inflation risk. As for inflation uncertainty, no statistical inference can be made as the results were all statistically insignificant. Similarly, interest rates were also found to be statistically insignificant in the regression model and thus no inference can be made about this variable either. The models in this paper can explain variations in stock market returns, but only to a certain extent. Based on a R^2 lower than 0.65 for all of the models it is clear that there is a lot more variables that effect stock market returns. Based on these results, over 93% of stock market returns can be explain through other variables not included in the models in this paper.

Based on the results that were statistically significant, this paper would recommend to investors, decisionmakers and policy makers that investing money in the stock market to hedge againts inflation risk, is not a good idea as increasing inflaion leads to a decrease in stock market returns. This would certainly be applicable in the current economic situation faced by many countries, where inflation has been steadily increasing since the third quarter of 2021. In this case, it would not be recommendable to invest in the stock market. To policy makers, the recommendation is to attempt to contain inflation at a stable a low level, thus limiting possible losses in the stock market.

As for future research, it would be recommended to use a different method to measure inflation uncertainty, as the current measure of using the root mean squared error has not yielded any statistically significant results. The GARCH model did yield a statistically significant result. This this model does seem to be applicable. For this paper, a survey based measure for inflation uncertainty was used. For future research a similar group of countries can be used, but instead of using a survey based measure or the GARCH model, the authors can use a forecast based measure (VAR model) or another model based measure such as the ARCH model. The ARCH model might be more appropriate for more infrequent data such as monthly or quarterly data. Another model that can be used is a stochastic volatility model. These models may be better fit to measure inflation uncertainty for the countries included in this paper and other countries.

As the R^2 of the models were low, the inclusion of other variables such as industry specific charactaristics, exchange rate, money supply and other macroeconomic variables can be incorporated into the model. Using other variables in the models can give a better overview of determinants of stock market returns in each country.

Another recommendation is that sector specific research can be done. This paper focused on indexes or composites as a whole, but future research can expand the sector specific research conducted in this paper. The sector specific research can be expanded to look at inflation uncertainty or inflation volatility or simply stock market volatility and its relationship with inflation or inflation volatility.

Additionally, this paper used monthly data for a 16-year period. For future research a longer time frame might be more appropriate, or the use of quarterly data instead of monthly data might yield better results. This might help when using central bank interest rates that do not change often and monthly changes rarely deviate higher than 25 basis points.

Finally due to the shortcomings of regression models, it is recommended to use other models such as the Vector error correction model (VECM) or another similar model to explain the relationship between different variables.

REFERENCES

Adusei, M. (2014, February). The Inflation-Stock market returns Nexus: Evidence from the Ghana Stock Exchange. *Journal of Economics and International Finance, Vol. 6(2),*, pp. 38-46.

Alexakis, P., Apergis, N., & Xanthakis, E. (1996, May). Inflation volatility and stock prices: Evidence from ARCH effects. *International Advances in Economic Research volume 2, pages101–111 (1996)*, pp. 101-111.

Anderson, R. G. (2006, July 1). *Inflation's Economic Cost: How Large? How Certain?* Retrieved from stlouisfed.org: https://www.stlouisfed.org/

Aurangzeb, Ahmed, A., & Mubarik, S. (2012). Impact of Interest Rate and Inflation on Stock Market Index: A case of Pakistan . *Journal of Humanities & Social Sciences JHSS XX, No. 2*, pp. 1-9.

Azar, S. A. (2013, November). The Spurious Relation between Inflation Uncertainty and Stock Returns: Evidence from the U.S. *Review of Economics & Finance, Better Advances Press, Canada, vol. 3*, pp. 99-109.

Azar, S. A. (2014). Inflation and Stock Returns II . *International Journal of Economics and Finance; Vol. 6, No. 1; 2014*, pp. 208-219.

Ball, L. (1992). Why does higher inflation raise inflation uncertainty? *Journal of Monetary Economics, Vol. 29 (3)*, pp. 371-378.

Batayneh, K., Al Salamat, W., & Momani, M. (2021, September 2). The impact of inflation on the financial sector development: Empirical evidence from Jordan. *Cogent Economics & Finance Volume 9, 2021 - Issue 1*.

Bhar, R. (2010). Inflation Uncertainty and Stock Return: A Reassessment of Macroeconomic Time Series. *International Review of Applied Financial Issues and Economics; Brussels Vol. 2, Iss. 3, ,* pp. 416-427.

Buffett, W. (1977, May). *How Inflation Swindles the Equity Investor* . Fortune Classics.

Bui, T. N. (2019). INFLATION AND STOCK INDEX: EVIDENCE FROM VIETNAM. *Journal of Management Information and Decision Sciences Volume 22, Issue 4*, pp. 408-414.

Buono, M. J. (1989, Winter). THE RELATIONSHIP BETWEEN THE VARIABILITY OF INFLATION AND STOCK RETURNS: AN EMPIRICAL INVESTIGATION. *The Journal of Financial Research, Volume 12, Issue 4*, pp. 329-339.

Caplinger, D. (2020, January). What Is a Stock Market Index? The Motley fool.

Caporale, G. M., Onorante, L., & Paesani, P. (2009, July). Inflation and Inflation Uncertainty in the Euro Area. *CESifo Working Paper, No. 2720*. Center for Economic Studies and ifo Institute (CESifo), Munich.

Carlson, B. (2021, March 22). Inflation Matters More For the Stock Market Than Interest Rates. A Wealth of Common Sense.

Carlson, B. (2022, February 13). Why the Stock Market Doesn't Like High Inflation. A Wealth of Common Sense.

Constantinos, K., & Emmanouil, T. (2012, June). Assymetric Effects of Inflation on Stock Market Prices: New Empirical Evidence Using Greek Data. *The Journal of Applied Business Research, Volume 28, Number 3*, pp. 325-332.

de Pedys's, V. (2022, February 16). Inflation will not sink high-growth, tech stocks in 2022. ESCP Business School.

Demir, C. (2019, February). Macroeconomic Determinants of Stock Market Fluctuations: The Case of BIST-100. *Economies 2019, 7, 8*. Economies .

Dictionary, F. F. (2009). Inflation uncertainty.

Dotsey, M., & Sarte, P. D. (2000). Inflation uncertainty and growth in a cash-in-advance economy. *Journal of Monetary Economics, vol. 45, issue 3*, pp. 631-655.

Dovern, J., & Wisser, J. (2011). Accuracy, unbiasedness and efficiency of professional macroeconomic forecasts: An empirical comparison for the G7. *International Journal of Forecasting, 27*, pp. 452-465.

Eita, J. H. (2012, June). Inflation And Stock Market Returns In South Africa. *International Business & Economics Research Journal Volume, 11, Number 6*, pp. 677-686.

Eurostat. (2022, January 7). Flash estimate - December 2021. *Euroindicators*. Eurostat.

Fahlevi, M. (2019). The Influence of Exchange Rate, Interest Rate and Inflation on Stock Price of LQ45 Index in Indonesia. *Advances in Social Science, Education and Humanities Research, volume 343*, pp. 157-163.

Fidelity. (2022, 19 01). Tricky times for tech stocks. *History suggests inflation, earnings, and the economy could pose challenges in 2022*. Fidelity.com.

Fisher, I. (1933, October). The Debt-Deflation Theory of Great Depressions. *Econometrica Vol. 1, No. 4*, pp. 337-357.

Friedman, M. (1977, June). Nobel Lecture: Inflation and Unemployment. *Journal of Political Economy Vol. 85, No. 3*, pp. 451-472.

Garza-Garcia, J., & Yue, Y. (2010, March). International Determinants of Stock Market Performance in China: A Cointegration Approach. *Centre for Global Finance Working Paper Series (ISSN 2041-1596) Paper Number: 03/10*. Centre for Global Finance.

Grimme, C., Henzel, S., & Wieland, E. (2012, March). Inflation uncertainty revisited: Do different measures disagree? *Ifo Working Paper No. 111*. Ifo Working Papers.

Hemamala, K., & A.L.M, J. (2016). Relationship between Inflation and Stock Market Return: Special Reference to the Colombo Stock Exchange (CSE). *5th Annual International Research Conference- 2016 Faculty of Management and Commerce- SEUSL*.

Iorember, P., Sokpo, J., & Terzungwe, U. (2017, November 12). Inflation and Stock Market Returns Volatility: Evidence from the Nigerian Stock Exchange 1995Q1-2016Q4: An E-GARCH Approach. *MPRA Paper No. 85656,*. Munich Personal RePEc Archive.

Lee, K. (1999). Unexpected inflation, inflation uncertainty, and stock returns. *Applied Financial Economics, Volume 9, Issue 4*, pp. 315-328.

Leonhardt, M. (2021, December 3). *Why U.S. officials say inflation is no longer 'transitory'*. Fortune.com.

Li, L., Narayan, P. K., & Zheng, X. (2010, December). An analysis of inflation and stock returns for the UK. *Journal of International Financial Markets, Institutions and Money, Volume 20, Issue 5*, pp. 519-532.

Murithi, M. (2012, October). THE IMPACT OF INFLATION ON STOCK MARKET RETURNS AND VOLATILITY: EVIDENCE FROM NAIROBI SECURITIES EXCHANGE. THE UNIVERSI TY OF NAIROBI, DEPARTMENT OF ACCOUNTING AND FINANCE.

Nkoro, E., & Uko, A. K. (2016). Exchange Rate and Inflation Volatility and Stock Prices Volatility: Evidence from Nigeria, 1986-2012. *Journal of Applied Finance & Banking, vol. 6, no. 6*, pp. 57-70.

Ogunmuyiwa, M. S. (2015). Does Inflation Granger Cause Stock Market Performance In Nigeria . *Research Journal of Finance and Accounting Vol.6, No.16*, pp. 72-76.

Oner, C. (2010, March). Back to Basics: What Is Inflation? *FINANCE & DEVELOPMENT, March 2010, Volume 47, Number 1*. IMF.

Phiri, A. (2016, March 24). Long run equilibrium adjustment between inflation and stock market returns in South Africa: A nonlinear perspective. *MPRA Paper No. 70260*. Munich Personal RePEc Archive.

Pindyck, R. (1991, Septmember). Irreversibility, Uncertainty, and Investment. *Journal of Economic Literature Vol. XXIX* , pp. 1110-1148.

Pourgerami, A., & Maskus, K. (1987). The Effects of Inflation on the Predictability of Price Changes in Latin America: Some Estimates and Policy Implications. World Development, 15,. *World Development, vol. 15, issue 2,*, pp. 287-290.

Qamri, G. M., Ul Haq, M., & Akram, F. (2015). The Impact of Inflation on Stock Prices: Evidence from Pakistan. *Microeconomics and Macroeconomics 2015, 3(4)*, pp. 83-88.

Toniok, S. (2017, November). THE EFFECT OF INFLATION ON STOCK MARKET RETURNS AT THE NAIROBI SECURITIES EXCHANGE. UNIVERSITY OF NAIROBI, SCHOOL OF BUSINESS.

Treeck, J. (2021, November 15). *ECB's Christine Lagarde: Inflation to last longer, but no rate hikes next year*. Politico.

Tretina, K., & Schmidt, J. (2022, January 19). Investing Basics: What Is A Market Index? Forbes Advisor.

Tripathi, V., & Kumar, A. (2014, December 14). Relationship between Inflation and Stock Returns – Evidence from BRICS markets using Panel Co integration Test. *International Journal of Accounting and Financial Reporting 2014, Vol. 4, No. 2*, pp. 647-659.

Tripathi, V., & Kumar, A. (2015, August 23). Short Run Causal Relationship between Inflation and Stock Returns- An Empirical Study of BRICS Markets*. *Asian Journal of Management Applications and Research, Vol.05, No.01*.