The pre- and post-COVID-19 empirical analysis of stocks returns, inflation and output in Thailand

Nonthaporn Seehapan[1], Kajakorn Chomaitong[1], Pao Jampangoen[1], Nattawut Hantrakul[1] & Saranyaa Niemchai[1]

Corresponding author: nonthaporns@gmail.com

Received: 02/07/67 Revised: 16/07/67 Accepted: 16/07/67

Abstract

This research aims to examine the relationship between stock returns, inflation, and output in Thailand, investigate the inverse relationship between Thailand's real output and inflation, and analyze the positive relationship between Thailand's stock returns and real output. The research investigates the Fisher Hypothesis puzzle and revisits Fama's Hypothesis, exploring the dynamics between these macroeconomic variables and stock returns in an emerging market context. Utilizing data sourced from CEIC spanning from January 2015 to December 2023, encompassing both pre- and post-COVID-19 periods, the study employs least squares regression and ARMA maximum likelihood estimation techniques for analysis. Inflation generally increases the prices of goods and services, resulting in higher production costs, which can lower output. However, stock prices often reflect firms' performance or output growth. The findings reveal a significant

[1] Faculty of Business Administration, Ramkhamhaeng University

negative relationship between output growth and inflation in Thailand. Additionally, the study finds no significant relationship between real stock returns and output growth; instead, real stock returns are primarily influenced by their past values. Consequently, shareholders do not necessarily benefit from economic growth alone and should diversify their investment strategies beyond countries with high growth rates. These insights provide valuable guidance for investors navigating economic uncertainties and optimizing investment decisions in emerging markets.

Keyword: stock returns; Inflation; output; Fama's hypothesis; COVID-19

Introduction

The COVID-19 pandemic has dramatically influenced global economic conditions, leading to a significant rise in inflation. Economic activities worldwide have been disrupted, causing unprecedented shifts in various macroeconomic variables. Prior to the pandemic, inflation averaged around 2.1 percent over the previous decade. However, by August 2022, global inflation had surged to 7.5 percent (Binici, Centorrino, Cevik, & Gwon, 2022). The COVID-19 pandemic's impact on stock market volatility in the face of inflation induced price bubbles is particularly significant in terms of the economic effects of the disease (Jelilov, Iorember, Usman, & Yua, 2020). In accordance with Fama (1981) theory, inflation was inversely correlated with output, while stock prices showed a positive connection with

output. Inflation generally rises the price of goods and services, with the higher prices cause the higher cost of production which, in turns, lower the output. However, the stock prices which is reflected by the firms' performance or the output growth. This concept was predominantly built upon Fisher (1930) idea that inflationary expectations who claimed that the expected inflation and real return are employed to calculate the nominal stock returns.

Comparable investigations have been carried out by Li, Narayan, and Zheng (2010) revealing that the UK stock market lacks effective short-term inflation hedging capabilities, with stock returns showing minimal response to immediate inflation fluctuations. In contrast, Adams, McQueen, and Wood (2004) demonstrated a pronounced impact of inflation on stock market performance, finding that increases in the Producer Price Index (PPI) and Consumer Price Index (CPI) lead to declines in stock values over longer-term horizons. Fama (1981) contributes to this understanding with his dual relationship hypothesis, suggesting that inflation and stock returns are interconnected and influence real economic output. Building on Fama's framework, this study assesses two hypotheses: (1) an inverse correlation between real output and inflation, positing that higher inflation rates may suppress economic output, and (2) a positive association between stock returns and real production, indicating that a robust stock market can strengthen economic growth through increased investment and consumption. These findings collectively underscore the intricate dynamics between inflation, stock market behavior, and broader economic outcomes.

Being the one of the attractive emerging economies in Southeast Asia, Thailand stands out as one of the vibrant emerging economies in Southeast Asia, offering diverse opportunities for investors. According to stock exchange of Thailand (as of September 2023), the value of market capitalization of Thai stock market is more than 500 billion USD. Moreover, since 2012, Thailand has maintained the position of having the most liquid market in ASEAN, enhancing its attractiveness for investment (Suwannapak & Chancharat, 2022). Despite these strengths, empirical research in emerging markets like Thailand remains limited. This research aims to fill this gap by analyzing the dynamics of Thai stock prices, inflation, and output. This focus is particularly pertinent in the context of global shocks such as the COVID-19 pandemic, which have intensified economic uncertainties worldwide. By examining data from the pre- and post-COVID-19 periods (2015 to 2023), the research seeks to provide insights crucial for investors looking to hedge against inflation and navigate volatile market conditions. Understanding how Thai stock market performance responds to inflationary pressures and economic disruptions will be invaluable for investors seeking to make informed decisions among evolving global challenges.

This research revisits Fama's hypothesis, which theorizes a strong relationship between macroeconomic variables (inflation and output) and stock returns. Accordingly, the research objectives are defined as follows:

Research Objectives:

1. To examine the relationship between stock returns, inflation, and output in Thailand.

2. To investigate the inverse relationship between Thailand's real output and inflation.

3. To analyze the positive relationship between Thailand's stock returns and real output.

These objectives aim to provide a comprehensive understanding of the interactions among key economic indicators in the context of Thailand.

Literature reviews

The most widely accepted theory for real stock returns and inflation linkage is Fama (1981) who defines this connection between real economic activity and stock returns and divides it into two hypotheses: first, real economic activity and inflation have a negative relationship; and second, real economic activity and stock returns have a positive relationship. A "proxy effect hypothesis" describes this inverse association. Moreover, nominal interest should accurately represent increases in inflation, according to the Fisher hypothesis (Fisher, 1930). If the Fisher hypothesis is correct, common stocks can be used as an inflation hedge; this is referred to as the "generalized Fisher effect."

However, there are several empirical researches that both supported and challenged these theories. The positive relationship between

inflation and stock returns are claimed to be a good hedge against inflation since the higher inflation shows the higher returns. These linkages are examined by Hasan (2008) who confirmed the Fisherian theory in the UK market as well as Alagidede and Panagiotidis (2012) who employed the G7 countries and discovered the positive correlations between inflation and stock returns. Another research in the developed economy include Chang (2013) who conclude that stock market investments can be served as an inflation hedge in Japan. Moreover, there is a research in the emerging market as well, Tiwari, Dar, Bhanja, Arouri, and Teulon (2015) confirmed these positive relationship in the Pakistan market.

In contrast, several researches found the negative relationship between stock returns and inflation which imply that the investors cannot hedge the stock investment against inflation. The idea is supported by the research from Tripathi and Kumar (2014) found the empirical evidence from the BRICS market and stated that the inflation and stock returns do not cointegrated in the long run and showed that stock returns in BRICS nations may fluctuate briefly as a result of changes in inflation, but equity markets don't seem to be a reliable long-term defense against inflation. The selected developed markets are reexamined by Lee (2010) who demonstrated that there are two regimes with positive and negative stock return-inflation linkages. This finding is contradicted to the theory which expects only the negative sign between the inflation and returns. Antonakakis, Gupta, and Tiwari (2016) also supported the mixed relationship. They studied the US

stock returns and inflation over times and discovered the mixed relationships during the different timeframe.

Raghutla, Sampath, and Vadivel (2020) investigated the Fisher hypothesis puzzle as well as Fama hypothesis in Indian market and revealed the negative relationship between inflation and output. Additionally, they find the positive relationship between the output and stock returns. This relationship is also confirmed by Durai and Bhaduri (2009) who supported Fama's hypothesis only for the long time scale but the other time scales still a puzzle. The investigation of the stock returns, inflation and the real activity in emerging economies are studied by Cifter (2015) who concluded that the relationship is dependent with the time regime. According to the empirical findings in two emerging countries: Mexico and South Africa, there is a negative correlation between real stock returns and inflation that only exists during recessionary times. It is discovered that, contrary to the regime-dependent proxy effect hypothesis, stock returns behave differently in response to inflation in a given regime.

Data and Methodology

Data

This study uses monthly data from January 2015 to December 2023. Using appropriate proxies is crucial for accurate economic analysis. The Industrial Production Index (IPI) is a reliable measure of output growth

as it reflects real economic production. The Producer Price Index (PPI) captures inflation by measuring price changes from the producer's perspective, offering a comprehensive view of inflationary pressures. Lastly, the Stock Exchange of Thailand (SET) index effectively represents stock returns, reflecting the overall performance of the Thai stock market. All the data is acquired from CEIC which is widely recognized for its reliability and comprehensive coverage of economic and financial data. It offers extensive datasets that encompass macroeconomic, industry-specific, and financial market indicators from numerous countries. All data is converted to natural logarithm to linearize the relationships between dependent and independent variables, facilitating more straightforward and interpretable analysis. This transformation is commonly employed in empirical research to stabilize variance and normalize distributions. The approach is supported by its use in studies such as Raghutla et al. (2020), SAMPATH (2018) and Chandrashekar, Sakthivel, Sampath, and CHITTEDI (2018).

Table 1 presents descriptive statistics for Thailand's SET, PPI, and IPI from January 2015 to December 2023. The mean values are 1549.285 for SET, 102.3222 for PPI, and 98.72056 for IPI, with median values of 1575.595, 100.05, and 99.265, respectively. The maximum observed values are 1830.13 for SET, 116.2 for PPI, and 118.17 for IPI, while the minimum values are 1125.86, 96, and 74.35, respectively. The SET index and IPI exhibit slight leftward skewness, while the PPI shows a rightward skew. The kurtosis values indicate that the IPI distribution is more peaked than normal, while the SET and PPI are closer to a normal distribution. The

Jarque-Bera test results suggest that PPI and IPI significantly deviate from normality, while the SET index shows a slight deviation. Each variable has 108 observations, reflecting data collected monthly over the specified timeframe.

Table 1 Descriptive data

	SET	PPI	IPI
Mean	1549.285	102.3222	98.72056
Median	1575.595	100.05	99.265
Maximum	1830.13	116.2	118.17
Minimum	1125.86	96	74.35
Std. Dev.	138.7694	5.34612	7.203264
Skewness	-0.576552	1.224819	-0.471929
Kurtosis	3.089234	3.094978	4.363787
Jarque-Bera	6.019245	27.04385	12.37853
Probability	0.04931	0.000001	0.002051
Sum	167322.8	11050.8	10661.82
Sum Sq. Dev.	2060493	3058.167	5551.911
Observations	108	108	108

Methodology

Fama's hypothesis

The purpose of this study is to examine the stock returns, inflation and the real output relationship. Specifically, it investigates two main hypotheses: (1) the negative relationship between inflation and real output, and (2) the positive relationship between stock returns and real output. Firstly, the negative relationship between the inflation and the real output is analyzed. This statement is contradicted to the relationship implied by the Philips curve. Secondly, the positive relationship between the stock returns and real output is investigated. The Fama hypothesis is investigated by Durai and Bhaduri (2009) and Chatrath, Ramchander, and Song (1996). The association between stock return and inflation is specified by equations as follow:

$$SET_t - PPI_t = \alpha + \beta(PPI_t|\varphi_{t-1})_i + \varepsilon_i \quad (1)$$

$$SET_t - PPI_t = \alpha + \beta_1(PPI_t|\varphi_{t-1})_i + \beta_2(PPI_t - E(PPI_t|\varphi_{t-1})_i + \upsilon_t \quad (2)$$

Where SET_t is the nominal stock returns and PPI_t is the inflation rate. The term $SET_t - PPI_t$ represent the inflation adjusted which is the real stock market returns. Additionally, inflation (PPI_t) is the combination of expected inflation ($E(PPI)$) and the unexpected inflation ($U(PPI)$). The findings support an inverse relationship of stock return. The randomly distributed error terms are defied by ε_i and υ_t. The empirical relationship between variables is estimated by the following individual equations:

$$PPI_t = \delta + \sum_{i=-k}^{k} \alpha_i IPI_{t-1-i} + \varepsilon_i \quad (3)$$

$$SET_t - PPI_t = \tau + \sum_{i=-k}^{k} \beta_i IPI_{t+1} + \varphi_t \quad (4)$$

The economic growth is proxied by IPI_t. Due to the lack of theory and past empirical evidence about the relationship between output and stock returns and rate of inflation in Thailand, both lead and lag values (k) of IIP are included. The random error term is specified by ε_i. The negative association between PPI (inflation) and IPI (output) is calculated in equation (3) and some of α_i are suggested to be significantly negative. The positive relationship of stock returns (SET) and output (IPI)) is tested by equation (4) and some of the term β_i should be significantly positive.

Nevertheless, equation (1) and (2) explain the proxy hypothesis effect. The first two equations specify the negative relationship between inflation and stock returns. These equations are treated as single equation (Johnston & DiNardo, 1987). Moreover, the two-step ordinary least squares technique is applied to this study to investigate the associations of stock returns and both the expected and unexpected inflation. The Ordinary Least Squares (OLS) method is chosen for this study due to its simplicity, efficiency, robustness, and the availability of diagnostic tools. These characteristics make OLS an appropriate method for examining the intricate relationships between stock returns, inflation, and output in Thailand. The followings are regression equations:

$$PPI_t = \mu + \sum_{i=-k}^{k} \beta_i IPI_{t+1} + \varepsilon_t \quad (5)$$

$$SET_t - PPI_t = \alpha + \beta_1 \varepsilon_t + \sum_{i=-k}^{k} IPI_{t+1} + \upsilon_t \quad (6)$$

The empirically calculated residual from Equation (6), ε_t, denotes the inflation variable that is purged of the relationship between rate of inflation and output. Where $SET_t - PPI_t$ are lagged values of stock returns and leading value of IPI. The assumption that stock returns are independent of inflation would be supported by the coefficient of 1 = 0 in Equation (6). The estimations are made for both the expected inflation $(E(PPI_t))$ and the unexpected inflation $(U(PPI_t))$ components.

Table 2 Correlation Matrix

	SET	PPI	IPI
SET	1		
PPI	0.325289	1	
IPI	0.394363	-0.06469	1

Table 2 shows the correlation matrix for output growth (IPI), inflation (PPI), and stock returns (SET). The correlation between stock returns (SET) and inflation (PPI) is 0.325289, indicating a positive relationship. The correlation between stock returns (SET) and output growth (IPI) is 0.394363, also suggesting a positive relationship. Conversely, inflation (PPI) and output growth (IPI) have a negative correlation of -0.06469, implying an inverse relationship.

Empirical Results

In the empirical results, since the data is time series, the order of integration needs to be identified. To determine this, the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests were employed, with the null hypothesis being that the series has a unit root (non-stationary). The results, reported in Table 3, show that for stock returns (SET), inflation (PPI), and output growth (IPI), both ADF and PP tests indicate non-stationarity at the level but stationarity at the first difference. These results confirm that the variables become stationary after first differencing, implying that they are integrated of order one (I(1)).

Table 3 Unit root

	ADF		PP	
Variables	**level**	**first difference**	**level**	**first difference**
SET	-2.3395	-9.9644***	-2.4095	-9.9784***
PPI	-1.2877	-6.3739***	-0.6201	-5.4442***
IPI	-2.0373	-3.8232***	-7.4104	-32.1605***

*** Significant at 1% level

Table 4 Inflation and output

Dependent Variable: PPI

Variable	**Coefficient**	**Prob.**
C	113.998	0
IPI	-0.11827	0.0995*
R-squared	0.025394	
Adjusted R-squared	0.0162	
Durbin-Watson stat	0.069279	

* Significant at 10% level

The hypothesis regarding the negative relationship between inflation and real output is tested through estimation results presented in Table 4 which is the estimation results from equation 3. The coefficient for inflation (PPI) is negative and statistically significant at the 10% level. This indicates a significant negative relationship between inflation (PPI) and output growth (IPI). These findings are consistent with the results reported by Chatrath et al. (1996), Durai and Bhaduri (2009) and Raghutla et al. (2020).

Table 5 Stock returns and output

Dependent Variable: SET-PPI

Variable	Coefficient	Prob.
C	1750.204	0
IPI	-3.07171	0.1063
R-squared	0.024419	
Adjusted R-squared	0.015215	
Durbin-Watson stat	0.242215	

Second hypothesis, which suggests a positive relationship between stock returns and real output, is evaluated through the estimation results presented in Table 5. Equation 4 proxies real stock returns with SET-PPI. The analysis indicates a lack of statistically significant relationship between real stock returns and output growth. This finding is consistent with Fichtner and Joebges (2024) who similarly found an unstable relationship between stock returns and GDP growth across G7 countries.

Table 6 examines the relationship between inflation and real output growth. The regression analysis includes lagged values of inflation (PPI_t) and leading values of output growth (IPI_t). The regression model includes lagged values of inflation and leading values of output growth over 1, 3, 6, 9, and 12 months. The estimated results reveal a statistically significant negative relationship between inflation (PPI) and output growth (IPI). Additionally, the coefficients indicate that lagged values of output growth (IPI) alone are empirically significant. These results indicate that fluctuations

in output growth lead to subsequent declines in inflation (PPI), suggesting a causal relationship where changes in economic output influence inflationary trends. This highlights that economic conditions affecting output may impact inflationary trends thereafter, rather than inflation directly influencing output growth. The implication is that policies designed to stimulate economic growth could potentially mitigate inflationary pressures as a secondary effect, offering valuable insights for policymakers tasked with managing economic stability.

Table 6 Inflationary trends and output growth

Dependent Variable: PPI

Variable	**Coefficient**	**Prob.**
C	149.7913	0
IPI	0.028012	0.5033
IPI(1)	-0.037487*	0.06698
IPI(3)	-0.132726***	0.0033
IPI(6)	-0.124382**	0.0161
IPI(9)	-0.075493	0.1227
IPI(12)	-0.150174***	0
AR(12)	-0.366204***	0.0085
AR(9)	0.14369	0.5129

Dependent Variable: PPI

Variable	Coefficient	Prob.
AR(6)	-0.132666	0.4938
AR(3)	1.119107***	0
SIGMASQ	2.371357***	0
R-squared	0.896366	101.3323
Adjusted R-squared	0.882795	4.808622
Durbin-Watson stat	0.713883	

***, **, * Significant at 1%, 5% and 10% level, respectively

The analysis of the relationship between real stock returns (SET-PPI) and output growth (IPI) is shown in table 7. The results indicate that there is no statistically significant relationship between real stock returns and output growth. However, the significant autoregressive (AR) terms indicate that past values of real stock returns significantly impact their current values. These findings suggest a positive persistence in stock return behavior over time. These findings imply that while current stock returns may not directly correlate with current output growth, historical stock performance plays a crucial role in shaping present stock market dynamics. This underscores the importance of considering temporal trends in stock market analysis and suggests potential strategies for investors and policymakers to anticipate future market movements based on historical data.

Table 7 Real stock returns and output growth

Dependent Variable: SET-PPI

Variable	Coefficient	Prob.
C	1701.637	0.0096
IPI	-2.38709	0.4067
IPI(1)	-2.07107	0.2257
IPI(3)	0.339527	0.872
IPI(6)	-0.90467	0.6164
IPI(9)	0.667355	0.7218
IPI(12)	1.851577	0.5586
AR(12)	-0.16226	0.3367
AR(9)	-0.16666	0.3418
AR(6)	0.218765*	0.0666
AR(3)	0.690408***	0
SIGMASQ	8171.817***	0
R-squared	0.614957	
Adjusted R-squared	0.564535	
Durbin-Watson stat	0.759755	

***, **, * Significant at 1%, 5% and 10% level, respectively

These results provide valuable insights for policymakers and investors, emphasizing the significance of understanding temporal trends and historical performance in economic and financial analysis. Policies aimed at stimulating economic growth may effectively mitigate inflationary pressures

as a secondary effect, leveraging historical data to anticipate future market movements and promote economic stability.

Conclusion

The COVID-19 pandemic has brought significant volatility to stock markets, increased inflation, and slowed output growth, attracting global attention. This research tests two hypotheses: first, the inverse relationship between output growth and inflation, and second, the positive association between real stock returns and real production in Thailand during the period from January 2015 to December 2023, encompassing both pre- and post-pandemic phases. The results indicate a significant negative relationship between output growth and inflation, confirming the first hypothesis. However, the second hypothesis is not supported. While stock prices often reflect firms' performance or output growth, the study finds no significant relationship between real stock returns and output growth. Instead, the analysis reveals that real stock returns are primarily influenced by their historical values. Madsen, Dzhumashev, and Yao (2013) empirically examine the link between stock returns and per capita output growth, revealing an ambiguous relationship influenced by varying output volatility. They find that stock returns are positively associated with economic growth only during periods of high output volatility. Outside of these periods, no such relationship is evident, suggesting that shareholders may not benefit consistently from economic growth and should diversify their investment resources beyond countries with high growth rates.

These results provide valuable insights for policymakers and investors, emphasizing the significance of understanding temporal trends and historical performance in economic and financial analysis. The findings suggest that policies designed to stimulate economic growth may have the dual benefit of not only fostering economic expansion but also mitigating inflationary pressures over time. By leveraging historical data, policymakers can better anticipate and manage future market movements, thereby promoting economic stability. This underscores the importance of a nuanced approach to economic policymaking that considers both short-term impacts and long-term sustainability. Future research could explore more specific mechanisms through which economic policies influence inflation dynamics and examine how different policy interventions might affect various sectors of the economy differently. Additionally, incorporating more granular data and refining statistical models could provide further insights into the complex interplay between economic variables observed in this study.

References

Adams, G., McQueen, G., & Wood, R. (2004). The effects of inflation news on high frequency stock returns. *The Journal of Business, 77*(3), 547-574.

Alagidede, P., & Panagiotidis, T. (2012). Stock returns and inflation: Evidence from quantile regressions. *Economics letters, 117*(1), 283-286.

Antonakakis, N., Gupta, R., & Tiwari, A. K. (2016). *Time-varying correlations between inflation and stock prices in the United States over the last two centuries*. Retrieved from https://econpapers.repec.org/paper/prewpaper/201605.htm

Binici, M., Centorrino, S., Cevik, M. S., & Gwon, G. (2022). *Here Comes the Change: The Role of Global and Domestic Factors in Post-Pandemic Inflation in Europe*: International Monetary Fund.

Chandrashekar, R., Sakthivel, P., Sampath, T., & CHITTEDI, K. R. (2018). Macroeconomic variables and stock prices in emerging economies: A panel analysis. *Theoretical & Applied Economics, 25*(3).

Chang, H.-F. (2013). Are 'stock returns'a hedge against inflation in Japan? Determination using ADL bounds testing. *Applied Economics Letters, 20*(14), 1305-1309.

Chatrath, A., Ramchander, S., & Song, F. (1996). Stock prices, inflation and output: Evidence from India. *Journal of Asian Economics, 7*(2), 237-245.

Cifter, A. (2015). Stock returns, inflation, and real activity in developing countries: A Markov-switching approach. *Panoeconomicus, 62*(1), 55-76.

Durai, S. R. S., & Bhaduri, S. N. (2009). Stock prices, inflation and output: Evidence from wavelet analysis. *Economic Modelling, 26*(5), 1089-1092.

Fama, E. F. (1981). Stock returns, real activity, inflation, and money. *The American economic review, 71*(4), 545-565.

Fichtner, F., & Joebges, H. (2024). *Stock market returns and GDP growth*. Retrieved from https://www.econstor.eu/handle/10419/283065

Fisher, I. (1930). The theory of interest. *New York, 43*, 1-19.

Hasan, M. S. (2008). Stock returns, inflation and interest rates in the United Kingdom. *The European Journal of Finance, 14*(8), 687-699.

Jelilov, G., Iorember, P. T., Usman, O., & Yua, P. M. (2020). Testing the nexus between stock market returns and inflation in Nigeria: Does the effect of COVID‐19 pandemic matter? *Journal of Public Affairs, 20*(4), e2289.

Johnston, J., & DiNardo, J. (1987). Econometric Methods. p188-90. In: McGraw-Hill Press.

Lee, B. S. (2010). Stock returns and inflation revisited: An evaluation of the inflation illusion hypothesis. *Journal of Banking & Finance, 34*(6), 1257-1273.

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

Madsen, J. B., Dzhumashev, R., & Yao, H. (2013). Stock returns and economic growth. *Applied Economics, 45*(10), 1257-1271.

Raghutla, C., Sampath, T., & Vadivel, A. (2020). Stock prices, inflation, and output in India: An empirical analysis. *Journal of Public Affairs, 20*(3), e2052.

SAMPATH, T. (2018). Financial development, trade openness and growth in India. *The distinctivities of the complexity 3, 25*(1), 113.

Suwannapak, S., & Chancharat, S. (2022). Stock Market Volatility Response to COVID-19: Evidence from Thailand. *Journal of Risk and Financial Management, 15*(12), 592.

Tiwari, A. K., Dar, A. B., Bhanja, N., Arouri, M., & Teulon, F. (2015). Stock returns and inflation in Pakistan. *Economic Modelling, 47*, 23-31.

Tripathi, V., & Kumar, A. (2014). Relationship between Inflation and stock returns–evidence from BRICS markets using Panel Co integration Test. *International Journal of Accounting and financial reporting, 4*(2), 647-658.