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Asymmetric relationship between macroeconomic uncertainty and stock market performance: a study of the Indian stock market

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Abstract

This research attempts to scrutinize the asymmetric nexus of macroeconomic factors in determining the financial stock market performance using Index returns of BSE-SENSEX and NSE-NIFTY as proxies for stock market performance in India. The Non-linear ARDL (NARDL) results support unequivocally that the selected macroeconomic factors as inflation, exchange rates, broad money supply, call money rates, oil prices, gold prices, FII, and BTCR have an asymmetric nexus with the stock market performance. The study's empirical findings have significant consequences for policy in designing the asset allocation decisions by the investor, portfolio managers and policy makers in the circumstances of a sudden positive or negative shock in the stock market.

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1. Background

The volatile stock market always causes unpredictability about the returns on investment in the future. Capital is always expected to be invested in high-return sectors and withdrawn from poorly performing sectors to optimize capital efficiency (Wurgler, 2000). The comparable risk of losses and profits, along with investors' impulse to earn profits, makes them reckless and ultimately leads to failure to invest in the right stocks at the right time. Investors are compelled by these occurrences to forecast stock movement to optimize returns and minimize risks. Fama (1976); and Jensen (1978), whose model is a traditional model of efficient markets hypothesis (EMH), advocate that information that is publicly available about future returns is integrated into the valuation of financial assets. Financial markets drive the growth of the economy by channeling the savings into investments (Pagano, 1993). The theoretical framework of Arbitrage-Pricing-Theory by Ross (1976) focuses on the effects of economic forces and measures the risk vulnerability of variables that affect returns. The EMH and APT are theoretical frameworks for the information sentiment biases and valuations of financial instruments. One of the determinants of the rise or fall of the stock market index is the macroeconomic conditions of the economy. The economic statistics, as described by the macroeconomic indicators, represent the competitiveness of companies in the economy in terms of market capitalization. A stable economy gives guaranteed investment returns that ultimately affect financial markets. Investors' understanding of some macroeconomic variables can aid them in accurately predicting stock market performance. Potential investors apply their expectations of future macroeconomic conditions when making sensible investment decisions. However, financial pricing and forecasting are complex tasks involving chaotic and non-stationary data with multiple variables. This study further supports the findings of numerous previous studies by providing evidence for the impact of inflation, exchange rates, broad money supply, call money rates, oil prices, and gold prices on stock returns. These effects have already been extensively documented in the existing literature. In addition, we incorporate Foreign Institutional Investment in capital markets (FII) and bitcoin returns (BTCR) as two supplementary variables to serve as proxies for alternative investment strategies. Stock market gains are highly correlated with macroeconomic indices like industrial production, inflation, and interest rates (Fama, 1981, 1990; Fama and French, 1989). A plethora of available literature examines the effects of macro-indicators on stock performances in different dynamics. Different studies show varying relationship results for the variables. The nature of the linkage between inflation and stock values is ambiguous due to mixed evidence i.e., positive (Fisher, 1930; Nasseh and Strauss, 2000; Ibrahim, 2003) and negative (Chen et al., 1986; Marshall, 1992; Humpe and Macmillan, 2009; 2020; Delgado et al., 2018; Keswani and Wadhwa, 2018) must be empirically examined. Monetary theories suggest that as the amount of available money increases, the economy's purchasing power improves. Increased liquidity generates more demand for capital, which may cause a rise in the prices of equity securities, which is also advocated by Mukherjee and Naka (1995), Raymond (2009), and Tripathi and Kumar (2015). Varying results are also observed for interest rates (Ross, 1976; Rapach et al., 2005; Wongbangpo and Sharma, 2002; Parab and Reddy, 2019). The reported results from Bhattacharjee & Das (2021), Delgado et al (2018), Bhattacharya et al. (2003), and Gay (2008) indicate the role of the exchange rate is also ambiguous as per existing literature. Gao et al. (2014), Manimaran et. al., (2009), and Huang et al. (2015) suggest a non-linear impact of the gold and oil prices on the economy and its stock market. Rao et al. (1999), Bose and Coondoo (2004), Rai and Bhanumurthy (2004), and Trivedi and Nair (2006) also support the idea that foreign investors may make enormous gains and function as market makers. The existing studies strongly suggest that whenever stock prices sharply decline, investors switch their money from

equities to gold. The negative relationship is also well documented in the literature (Gokmenoglu & Fazlollahi, 2015; Raza et al., 2016; Shiva and Sethi, 2015). Further, Dirican and Canoz (2017) discovered that the price of Bitcoin and the stock index have a long-term co-integration connection. Phong et al. (2019) also used the NARDL approach to examine the asymmetric behavior of macroeconomic factors on the Vietnam stock index using monthly data from April 2001 to October 2017 and confirmed a higher magnitude of negative cumulative sums of changes than a positive one for money supply and a higher magnitude of positive cumulative sums of changes than a negative one for interest rates.

Nevertheless, the current study contributes to the rich set of literature employing reliable and robust methods like the NARDL model. Siddiqui and Roy (2020) also investigated exchange rates, FIIs, and stock markets from January 2008 to May 2018 and reported returns explaining FII flows indicating information asymmetry. There is widespread evidence which depicts that macroeconomic variables follow a nonlinear pattern (asymmetric behavior) which linear models fail to capture. (Naifar and Al Dohaiman, 2013; Bildirici and Turkmen, 2015; Anoruo, 2011). Hence, the existing literature indicates that macroeconomic factors have the ability to affect the stock market performance and the presence of asymmetry.

Due to the conflicting results, and inconsistencies in the literature with reference to the effects of distinct factors in different economies, making the right decision can be challenging for investors, regulators, and policymakers. The objective of this research is multi-fold; i) to evaluate the short and long-run equilibrium along with asymmetric dynamics of macroeconomic parameters on stock returns; ii) to examine the error correction adjustments of each macro-variable from short-run to long-run.

2. Research Data

The data in our study comprises monthly BSE SENSEX prices and NSE NIFTY index prices along with macroeconomic variables like Inflation (INF), Exchange Rates (ER), Broad Money supply (M3), Call Money Rates (CMR) as proxy of interest rates, Oil Prices (OP), Gold Prices (GP), Foreign Institutional Investment in capital markets (FII), and Bitcoin returns (BTCR) from January 2013 through June 2021. The above variables are selected as the existing theoretical and empirical econometric literature indicates the existence of a significant relation between individual variables and with stock market. In addition, gold prices, FII flow, and bitcoin returns are taken as variables as these may also affect the stock price performance as the proxy for the alternate investment opportunities available to investors. The gold prices, FII flow, and bitcoin returns affect the liquidity and volatility in the financial market. The period selected for this investigation starts with the period after the revision of the base year for CPI in the context of India.

3. Methodology

We also employ the NARDL model to examine the short and long-run asymmetries between stock returns and macro variables. NARDL is appealing because, compared to other cointegration approaches, it is the most straightforward way to modelling combined short and long-run asymmetries (Fousekis et al., 2016). Following the trending approach of Shin et al. (2014), the non-linear asymmetric cointegration regression is represented as follows:

$$y_t = \alpha^+ x_t + \alpha^- x_t + \varepsilon_t \quad \text{-(1)}$$

Where x_t is broken down into as $x_t = \beta_0 + x_t^+ + x_t^-$ and $x_t^+ and\ x_t^-$ are the changes, as part in x_t.

$$x_t^+ = \sum_{i=1}^{t} \Delta x_i^+ = \sum_{i=1}^{t} \max(\Delta x_i, 0) \quad \text{-(2)}$$

and

$$x_t^- = \sum_{i=1}^{t} \Delta x_i^- = \sum_{i=1}^{t} \min(\Delta x_i, 0) \quad \text{-(3)}$$

This is a simple approach for framing an asymmetric co-integration. Hence the generalized form of the NARDL (p,q) model is as follows:

$$y_t = \sum_{i=1}^{p} \emptyset_i y_{t-i} + \sum_{i=0}^{q} (\theta_i^+ x_{t-i}^+ + \theta_i^- x_{t-i}^-) + \varepsilon_t \quad \text{-(4)}$$

In a variety of applications, the resulting partial sum methods preserve an economically sound and aesthetically pleasing interpretation (Shin et al, 2014). Further, the heteroskedasticity test, functional form, and normality test are verified to confirm the significance and stability of the NARDL model.

4. Results And Discussions

4.1. Stationarity test

We have conducted DF and PP stationary tests to evaluate the integration order of the variables. The results at level I(0) and first difference I(1) are reported in Table 1. The Z(t) statistics confirm that all the regressors are either I(0) or I(1) but not I(2) regressors; as required by the ARDL approach. Thus, this study progresses with the ARDL model.

Table 1: Stationarity test results

Variables	**DF test**		**PP test**	
	At I(0)	**At I(1)**	**At I(0)**	**At I(1)**
INF	-6.512***	--	-6.448***	--
LogM3	-0.727	-10.074***	0.865	-10.523***
CMR	-0.189	-7.712***	-0.087	-7.447***
ER	-1.788	-8.178***	-1.815	-8.147***
LogOP	-1.908	-6.876***	-2.107	-6.551***
FII	-7.772***	--	-7.759***	--
LogGP	0.484	-8.101***	0.247	-8.029***

BTCR	-9.050***	--	-9.020***	--
BSESR	-7.809***	--	-7.688***	--
NSESR	-7.746***	--	-7.620***	--

Note: *** represent MacKinnon approximate p-value significance for Z(t) at 1% significance

The short-run and long-run coefficients estimate outcomes for the asymmetry of the NARDL model are listed in Table 2. The error correction term is negative and statistically significant at a 1% level, confirming the co-integration of variables and indicating the speed of convergence from the short run to the long run. The study contributes to the fact that money supply and gold prices show significant long-run asymmetry; however, money supply, oil price, and bitcoin returns show significant short-run asymmetry. This confirms that the shocks of changes in money supply and gold prices affect the market returns for longer periods whereas oil prices and bitcoin shocks are absorbed in shorter periods. The NARDL results confirm the asymmetric nexus, specifically in the case of interest rate as a positive change in interest rate worsens the stock returns, whereas a negative change improves the stock return. We conclude that the stock returns respond inversely to the positive and negative long-run shocks of gold prices under both panels. Further, money supply is more responsive to the negative long-run shocks of money supply and interest rate than to the positive shocks. However, the stock returns respond more to the positive long-run shocks of oil prices, gold prices, and bitcoin returns than to the negative. The reason behind such asymmetry of the higher impact of negative shocks of money supply and interest rate may be due to negative sentiments of investors led by changes in monetary policy changes. On the contrary, the asymmetry of the higher impact of positive shocks of oil prices, gold prices, and bitcoin returns can be attributed to the positive sentiments of investors towards the stock market led by changes in alternate investment options and commodities. Although, as per our ARDL results, bitcoin returns do not affect stock returns significantly in the Indian financial market, as per NARDL assessment, the bitcoin returns do have a short-term asymmetric effect. This may be because the increased stock returns attract the crypto-currency investors to invest in stocks but the same is not true in the vice versa case due to the non-regulatory nature of the crypto-currency market.

Table 2: NARDL Asymmetric statistics

Panel A- BSE Returns	**LR effects (+)**		**LR effects (-)**		
LR	**Coefficient**	**F-stat**	**LR**	**Coefficient**	**F-stat**
INF	1.116	0.896	INF	-1.159	1.238
LogM3	48.898	1.167	LogM3	93.548*	3.844
CMR	-3.662*	3.891	CMR	7.335***	14.82
ER	0.527	1.944	ER	0.071	0.008
LogOP	11.765*	2.847	LogOP	-8.142**	4.444
FII	0***	7.663	FII	0***	13.87
LogGP	-48.934***	7.516	LogGP	-34.758*	3.329
BTCR	-0.048**	4.435	BTCR	0.04*	2.81
	Long-run Asymmetry			Short-run Asymmetry	
	F-Stat	Prob		F-Stat	Prob
INF	0.002	0.967	INF	2.815	0.100
LogM3	8.116***	0.006	LogM3	5.389**	0.024
CMR	2.485	0.121	CMR	0.812	0.372
ER	0.379	0.541	ER	0.527	0.471
LogOP	0.159	0.692	LogOP	7.684***	0.008
FII	0.405	0.528	FII	1.294	0.261
LogGP	6.123**	0.017	LogGP	0.043	0.837

BTCR	0.366	0.548	BTCR	3.818*	0.056
ECT (-1): -1.121554***					
Cointegration test statistics:	t_BDM =	-6.1275			
	F_PSS =	4.2942			
Diagnostics					
Breusch/Pagan heteroscedasticity test (chi2)					1.51
Ramsey RESET test (F)					1.502
Jarque-Bera					0.3389
Adj R-sq					0.8261

Panel B- NSE

Returns	Long-run effects (+)		Long-run effects (-)		
LR	Coefficient	F-stat	SR	Coefficient	F-stat
INF	0.896	0.5249	INF	-1.286	1.392
LogM3	33.364	0.4911	LogM3	90.679*	3.306
CMR	-3.466*	3.332	CMR	7.258***	13.39
ER	0.457	1.339	ER	0.009	0.0001
LogOP	13.619*	3.423	LogOP	-7.295*	3.259
FII	0.000***	8.145	FII	-0.000***	13.04
LogGP	-48.481**	6.784	LogGP	-29.095	2.103
BTCR	-0.050**	4.368	BTCR	0.045*	3.246
	Long-run Asymmetry			Short-run Asymmetry	
	F-Stat	Prob		F-Stat	Prob
INF	0.1228	0.727	INF	2.049	0.159
LogM3	5.593**	0.022	LogM3	4.811**	0.033
CMR	2.42	0.126	CMR	1.045	0.312
ER	0.2069	0.651	ER	0.6517	0.423
LogOP	0.4348	0.513	LogOP	6.873**	0.012
FII	0.1851	0.669	FII	1.394	0.243
LogGP	4.804**	0.033	LogGP	0.2435	0.624
BTCR	0.119	0.732	BTCR	3.433*	0.070
ECT (-1): -1.092943***					
Cointegration test statistics:	t_BDM =	-6.0206			
	F_PSS =	3.9742			
Diagnostics					
Breusch/Pagan heteroscedasticity test (chi2)					2.084
Ramsey RESET test (F)					1.61
Jarque-Bera					0.4639
Adj R-sq					0.8231

Note: Long-run effect [-] refers to a permanent change in exog. var. by -1. ***Significant at 1 percent; **Significant at 5 percent; *Significant at 10 percent

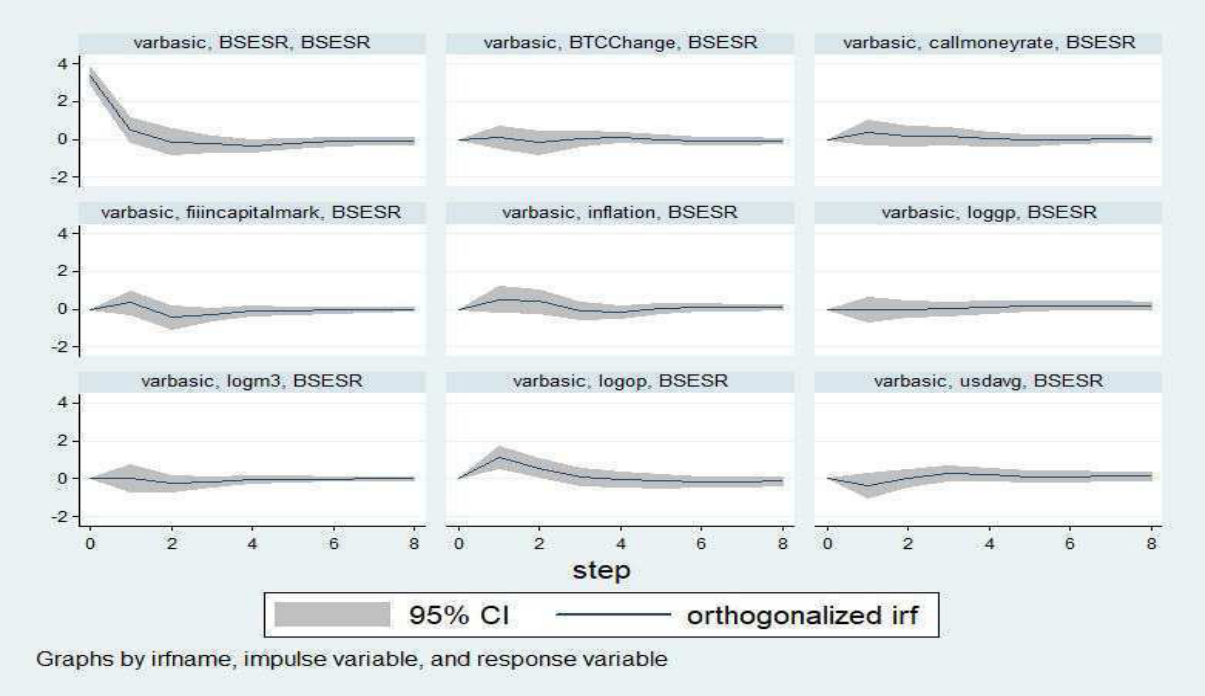
4.2. Impulse Response Analysis

Besides, the dynamic response of stock returns is due to the impulse of the endogenous innovations of the macroeconomic variables involving impulse response function (IRF) which is presented in Figure 1 (a-b). It is evident in Figure 1 (a) that the innovation of FII has an initial positive impact on the stock performance of both the panels of BSE and NSE but subsequently pulls stock returns downwards and keeps it towards the baseline. It means, that FII innovation also has a return-pull impact in the long run. On the contrary, the inflation and Oil price innovation pull returns up with an

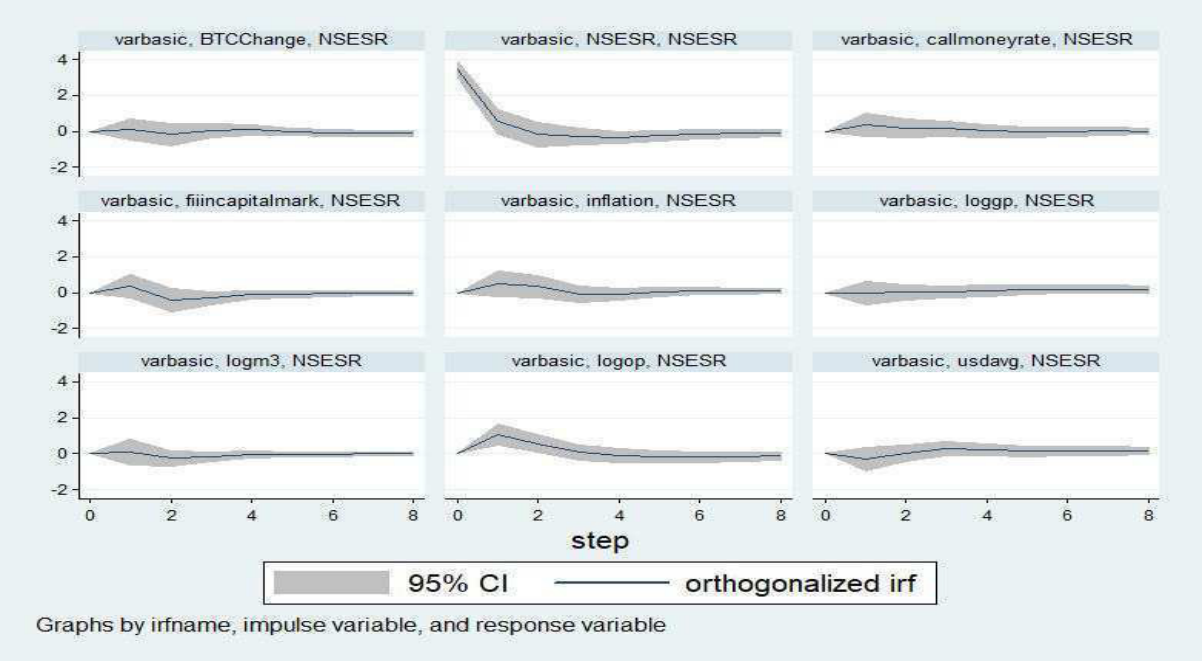
initial positive impact but subsequently pull growth downward to keep it at the baseline. It also implies the return stable impact in the long run.

Figure 1: Impulse Response Graphs

Panel A- BSE Returns



Panel B- NSE Returns



5. Conclusion

This empirical study investigated the asymmetric long and short-run relationship of macroeconomic factors with Stock Index returns represented by BSE-SENSEX and NSE-NIFTY indices using the NARDL approach. The results clearly show a significant long-run relation along with the short-run effect of stock index returns with macroeconomic factors. The effects of Bitcoin returns were found to be insignificant. The results are consistent in the case of both the panels, BSE SENSEX Index returns and NSE NIFTY Index returns, and are also supported by valid post-diagnostic tests and stability tests confirming the robustness of our model specification. The results validate that stock returns can be forecasted using available macroeconomic data. The purpose of empirical NARDL asymmetric assessment is to expand the existing knowledge by examining the asymmetric impacts of changes in input factors on Indian stock returns. The results indicate unequivocally that the selected macroeconomic factors have an asymmetric nexus with the stock market performance.

6. Policy Ramifications

The study's empirical findings have significant central policy ramifications. The conclusions may serve as a guide for investors and policymakers in deciding whether to invest in certain securities or implement certain policies because these relations have crippling effects. This calls for the need for reevaluation of economic policymaking with a focus on minimizing these effects. The policymakers need to be aware that in efforts to correct the macroeconomic ills of inflation or unemployment using macroeconomic variables of money supply, and interest rates, they may unwittingly disturb the equity market returns, causing further slowdown of the economy. While constructing their asset allocation strategies, market players, particularly portfolio managers, and investors, should take into account these indicators' sensitivity in the event of sudden asymmetric shocks in the stock market. In the short and long terms, these components respond in a variety of ways.

7. Limitations And Future Scope

Some limitations apply to this research. This is because daily data, not monthly data, is more important to issuers and investors. i) We were unable to conduct daily level evaluations because, among other limitations, daily macroeconomic indicators were not available for this study. ii) The study did not take into account macroeconomic factors like GDP, employment, labor productivity, foreign direct investment, or aggregate outputs owing to data limitations; perhaps, industry-specific studies will take these factors into account.

As the study's exchange rate indicates, a long-run relationship does not necessarily imply the presence of a similar relationship in the short run. This is an important point to keep in mind when concluding. Further research can be conducted to understand: i) if the stock market's inefficiencies in absorbing macroeconomic information create earning opportunities, and ii) if selecting stocks from the Index cluster could lead to superior earnings. It may be possible to experiment with various ARDL lags and dimensions in future research.

References

1. Anoruo, E. (2011). Testing for linear and nonlinear causality between crude oil price changes and stock market returns. *International Journal of Economic Sciences and Applied Research*, *4*(3), 75-92.
2. Bhattacharjee, A., & Das, J. (2021). Investigating the long-run and the short-run relationship between domestic macroeconomic forces and Indian equity market: Evidence based on ARDL bounds testing approach. *Paradigm*, *25*(1), 61-76.
3. Bhattacharya, B. (2012). Causal relationship between stock market and exchange rate, foreign exchange reserves and value of trade balance in India: An empirical analysis.
4. Bildirici, M. E., & Turkmen, C. (2015). Nonlinear causality between oil and precious metals. *Resources Policy*, *46*, 202-211.
5. Bose, S., & Coondoo, D. (2004). The impact of FII regulations in India: A time-series intervention analysis of equity flows. *ICRA Bulletin*, *2*(18), 54-83.
6. Chen, N. F., Roll, R., & Ross, S. A. (1986). Economic forces and the stock market. *Journal of business*, 383-403.
7. Delgado, N. A. B., Delgado, E. B., & Saucedo, E. (2018). The relationship between oil prices, the stock market and the exchange rate: Evidence from Mexico. *The North American Journal of Economics and Finance*, *45*, 266-275.
8. Dirican, C., & Canoz, I. (2017). The cointegration relationship between Bitcoin prices and major world stock indices: An analysis with ARDL model approach. *Journal of Economics Finance and Accounting*, *4*(4), 377-392.
9. Fama, E. F. (1976). Efficient Capital Markets–Portfolio Decisions and Securities Prices.
10. Fama, E. F. (1981). Stock returns, real activity, inflation, and money. *The American economic review*, *71*(4), 545-565.
11. Fama, E. F. (1990). Stock returns, expected returns, and real activity. *The journal of finance*, *45*(4), 1089-1108.
12. Fama, E. F., & French, K. R. (1989). Business conditions and expected returns on stocks and bonds. *Journal of financial economics*, *25*(1), 23-49.
13. Fisher, Irving. *Theory of interest: as determined by impatience to spend income and opportunity to invest it*. Augustusm Kelly Publishers, Clifton, 1930.
14. Fousekis, P., Katrakilidis, C., & Trachanas, E. (2016). Vertical price transmission in the US beef sector: Evidence from the nonlinear ARDL model. *Economic Modelling*, *52*, 499-506.
15. Gao, X., An, H., Fang, W., Li, H., & Sun, X. (2014). The transmission of fluctuant patterns of the forex burden based on international crude oil prices. *Energy*, *73*, 380-386.
16. Gay Jr, R. D. (2008). Effect of macroeconomic variables on stock market returns for four emerging economies: Brazil, Russia, India, and China. *International Business & Economics Research Journal (IBER)*, *7*(3).
17. Gokmenoglu, K. K., & Fazlollahi, N. (2015). The interactions among gold, oil, and stock market: Evidence from S&P500. *Procedia Economics and Finance*, *25*, 478-488.
18. Huang, X., An, H., Gao, X., Hao, X., & Liu, P. (2015). Multiresolution transmission of the correlation modes between bivariate time series based on complex network theory. *Physica A: Statistical Mechanics and Its Applications*, *428*, 493-506.
19. Humpe, A., & Macmillan, P. (2009). Can macroeconomic variables explain long-term stock market movements? A comparison of the US and Japan. *Applied financial economics*, *19*(2), 111-119.
20. Humpe, A., & McMillan, D. G. (2020). Macroeconomic variables and long-term stock market performance. A panel ARDL cointegration approach for G7 countries. *Cogent Economics & Finance*, *8*(1), 1816257.
21. Ibrahim, M. (2003). Macroeconomic forces and capital market integration A VAR analysis for Malaysia. *Journal of the Asia Pacific Economy*, *8*(1), 19-40.
22. Jensen, M. C. (1978). Some anomalous evidence regarding market efficiency. *Journal of financial economics*, *6*(2/3), 95-101.

23. Keswani, S., & Wadhwa, B. (2018). An empirical analysis on association between selected macroeconomic variables and stock market in the context of BSE. *The Indian Economic Journal*, *66*(1-2), 170-189.
24. Manimaran, P., Panigrahi, P. K., & Parikh, J. C. (2009). Multiresolution analysis of fluctuations in non-stationary time series through discrete wavelets. *Physica A: Statistical Mechanics and its Applications*, *388*(12), 2306-2314.
25. Marshall, D. A. (1992). Inflation and asset returns in a monetary economy. *The Journal of Finance*, *47*(4), 1315-1342.
26. Mukherjee, T. K., & Naka, A. (1995). Dynamic relations between macroeconomic variables and the Japanese stock market: an application of a vector error correction model. *Journal of financial Research*, *18*(2), 223-237.
27. Naifar, N., & Al Dohaiman, M. S. (2013). Nonlinear analysis among crude oil prices, stock markets' return and macroeconomic variables. *International Review of Economics & Finance*, *27*, 416-431.
28. Nasseh, A., & Strauss, J. (2000). Stock prices and domestic and international macroeconomic activity: a cointegration approach. *The quarterly review of economics and finance*, *40*(2), 229-245.
29. Pagano, M. (1993). Financial markets and growth: An overview. *European economic review*, *37*(2-3), 613-622.
30. Parab, N., & Reddy, Y. V. (2020). The dynamics of macroeconomic variables in Indian stock market: a Bai–Perron approach. *Macroeconomics and Finance in Emerging Market Economies*, *13*(1), 89-113.
31. Phong, L. H., Van, D. T. B., & Bao, H. H. G. (2019). A nonlinear autoregressive distributed lag (NARDL) analysis on the determinants of Vietnam's stock market. In *Beyond Traditional Probabilistic Methods in Economics 2* (pp. 363-376). Springer International Publishing.
32. Rai, K., & Bhanumurthy, N. R. (2004). Determinants of foreign institutional investment in India: The role of return, risk, and inflation. *The Developing Economies*, *42*(4), 479-493.
33. Rao, K. S., Murthy, M. R., & Ranganathan, K. V. K. (1999). Foreign institutional investments and the Indian stock market. *Journal of Indian School of Political Economy*, *11*(4), 623-647.
34. Rapach, D. E., Wohar, M. E., & Rangvid, J. (2005). Macro variables and international stock return predictability. *International journal of forecasting*, *21*(1), 137-166.
35. Raymond, K. (2009). Is there a long run relationship between stock prices and monetary variables? Evidence from Jamaica. *Financial Stability Department Bank of Jamaica*, *3*, 12-34.
36. Raza, N., Shahzad, S. J. H., Tiwari, A. K., & Shahbaz, M. (2016). Asymmetric impact of gold, oil prices and their volatilities on stock prices of emerging markets. *Resources Policy*, *49*, 290-301.
37. Ross, S. A. (2013). The arbitrage theory of capital asset pricing. In *Handbook of the fundamentals of financial decision making: Part I* (pp. 11-30).
38. Shin, Y., Yu, B., & Greenwood-Nimmo, M. (2014). Modelling asymmetric cointegration and dynamic multipliers in a nonlinear ARDL framework. *Festschrift in honor of Peter Schmidt: Econometric methods and applications*, 281-314.
39. Shiva, A., & Sethi, M. (2015). Understanding dynamic relationship among gold price, exchange rate and stock markets: Evidence in Indian context. *Global Business Review*, *16*(5_suppl), 93S-111S.
40. Siddiqui, S., & Roy, P. (2021). Asymmetric Effects of Exchange Rate and Its Relationship with Foreign Investments: A Case of Indian Stock Market. *Vision*, *25*(4), 415-427.
41. Tripathi, V., & Kumar, A. (2015). Do macroeconomic variables affect stock returns in BRICS markets? An ARDL approach. *Journal of Commerce & Accounting Research*, *4*(2).
42. Trivedi, P., & Nair, A. (2003, January). Determinants of FII investment inflow to India. In *Fifth Annual Conference on Money & Finance in the Indian Economy, held by Indira Gandhi Institute of Development Research, Mumbai, January*.
43. Wongbangpo, P., & Sharma, S. C. (2002). Stock market and macroeconomic fundamental dynamic interactions: ASEAN-5 countries. *Journal of asian Economics*, *13*(1), 27-51.
44. Wurgler, J. (2000). Financial markets and the allocation of capital. *Journal of financial economics*, *58*(1-2), 187-214.