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Macroeconomic Predictors and Stock Market Dynamics of the US Equity Market

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Article Details

ABSTRACT

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This study empirically investigates the dynamic, predictive, and long-term relationships between key macroeconomic indicators and U.S. stock market returns from 2000 to 2023. Utilizing the S&P 500 total return index as a proxy for the U.S. equity market, the analysis employs a robust econometric framework, including Granger causality tests, GARCH models, and Johansen cointegration analysis. Five macroeconomic variables, interest rates, inflation, real GDP growth, exchange rates, and unemployment, are selected due to their relevance to monetary policy, investor sentiment, corporate valuation, and economic fundamentals. The results demonstrate that GDP growth and interest rates exert the strongest and most consistent influence on stock returns. Inflation primarily impacts market volatility, especially during economic uncertainty, while exchange rates and unemployment exert weaker and shorter-lived effects. Impulse response analysis reveals that GDP shocks generate sustained positive equity returns, whereas rising interest rates depress stock prices by increasing discount rates. The findings support the semi-strong form of the Efficient Market Hypothesis and are consistent with the Arbitrage Pricing Theory, indicating that macroeconomic factors are rapidly and efficiently reflected in stock prices. The application of time-varying volatility models, orthogonalized shocks, and out-of-sample forecasts further strengthens the methodological rigor. Covering major economic events, including the dot-com crash, the 2008 financial crisis, quantitative easing, and the COVID-19 pandemic, this study provides actionable insights for policymakers, institutional investors, portfolio managers, and regulators. It underscores the importance of macroeconomic awareness in asset pricing, risk management, policy development, and strategic financial decision-making in today's complex global markets.

INTRODUCTION

The relationship between macroeconomic indicators and stock market behavior is a subject that has garnered extensive attention from both scholars and practitioners for decades. Financial markets, as central institutions in modern economies, serve not only as mechanisms for resource allocation but also as complex systems reflecting broader economic trends, investor sentiment, and policy shifts. As nations become increasingly interconnected and economic environments grow more volatile, understanding the fundamental drivers of stock market fluctuations has become ever more critical for policymakers, institutional investors, and academic researchers (Fama, 1981; Schwert, 1990). Stock markets are often perceived as leading indicators, responding swiftly to new information about economic growth, inflation, interest rates, labor market dynamics, and shifts in international competitiveness. The collective actions and expectations of market participants are rapidly priced into equity valuations, making stock markets sensitive to the evolving macroeconomic landscape (Chen et al., 1986; Bernanke & Kuttner, 2005; Khalid et al., 2025).

The broader field of asset pricing has been shaped by the quest to identify and quantify the variables that exert systematic influence on stock returns. Early financial models, such as the Capital Asset Pricing Model, established a foundation by proposing that market risk, encapsulated by a single factor, was the predominant determinant of asset prices. However, subsequent research revealed that this perspective oversimplified the true nature of market dynamics. Real-world data consistently demonstrate that multiple macroeconomic forces simultaneously affect asset prices, prompting the development of multi-factor models like the Arbitrage Pricing Theory, which explicitly incorporates a range of economic factors as drivers of risk and return (Ross, 1976; Fama & French, 1993).

Among the wide array of macroeconomic variables considered in financial research, several have emerged as particularly influential in shaping the behavior of equity markets. The level of interest rates, for example, is a central focus for analysts and policymakers alike. As a key tool of monetary policy, changes in interest rates alter the cost of borrowing, influence business investment, and affect consumer spending. Higher interest rates can increase discount rates and reduce the present value of future corporate earnings, leading to downward pressure on stock prices (Bernanke & Kuttner, 2005). Conversely, periods of monetary easing tend to provide stimulus for economic activity and support higher equity valuations (Rigobon & Sack, 2004; Musa, 2024; Siddique et al., 2025).

Inflation represents another fundamental variable in this context. Persistent or unexpected

increases in the general price level, as measured by indices such as the Consumer Price Index, erode the real value of investment returns and heighten uncertainty in financial markets. Investors may seek to hedge against inflation through equities, yet excessive inflation can still have adverse effects on stock valuations by compressing margins and dampening consumer demand (Bodie, 1976; Fama & Schwert, 1977). The interconnection between inflation and equity returns remains a central theme in the literature, particularly in light of the inflationary episodes that have characterized both historical and contemporary economic cycles.

Real economic growth, often measured by the rate of change in gross domestic product, is closely linked to the performance of corporate earnings and the capacity of firms to generate shareholder value (Bilal & Tanveer, 2023; Abbasi et al., 2025). Positive growth signals a healthy business environment, rising employment, and increased consumer confidence, all of which tend to be reflected in buoyant equity markets. Conversely, periods of recession or stagnation are associated with greater volatility, lower earnings expectations, and heightened risk aversion among investors (Barro, 1990; Schwert, 1990).

Labor market indicators, such as the unemployment rate, provide additional context for understanding macroeconomic conditions. High levels of unemployment are often associated with reduced consumer spending, lower business revenues, and increased financial stress, which can translate into weaker stock market performance. Conversely, low unemployment levels may support wage growth and bolster demand, further fueling positive equity returns (Mankiw, 2018). Exchange rates, and specifically the strength or weakness of the national currency, play a critical role in shaping the competitiveness of export-oriented firms and the value of foreign-denominated revenues. Movements in exchange rates can therefore have significant effects on the profitability of multinational corporations and the attractiveness of domestic equities to international investors (Hau & Rey, 2006; Ngo, 2023; Amir et al., 2025). In an era characterized by increasing globalization and cross-border capital flows, the role of currency dynamics has become even more prominent in discussions of stock market behavior.

Despite the growing sophistication of financial models and the proliferation of empirical research, the challenge of accurately forecasting stock market movements in response to macroeconomic shocks persists. The interaction between economic variables and equity prices is neither static nor uniform across different periods or market regimes (Fadzil, 2021; Arshi et al., 2025). Episodes of financial crisis, rapid technological change, or extraordinary policy intervention can fundamentally alter the transmission mechanisms linking macroeconomic fundamentals and market outcomes (Goyal & Welch, 2008; Mirakhor, 2021; Turan, 2023; Al

Masri & Wimanda, 2024).

This study is situated within this complex landscape, with a specific focus on the United States equity market as represented by the Standard and Poor's 500 Total Return Index. By examining the period from 2000 to 2023, this research encompasses a diverse array of economic environments, including the aftermath of the technology bubble, the global financial crisis of 2007–2009, the sustained expansion of the subsequent decade, and the unprecedented turbulence wrought by the coronavirus pandemic. This temporal scope provides a unique opportunity to assess how the relationships between macroeconomic indicators and stock market dynamics have evolved under varying economic conditions and policy regimes. The objective is to contribute new insights to the ongoing dialogue regarding the predictive power of macroeconomic variables for stock market performance and to inform both theoretical debates and practical decision-making in investment management.

LITERATURE REVIEW

The empirical investigation into the interplay between macroeconomic indicators and stock market performance has evolved substantially over recent decades. Foundational work began with Fama (1981), who explored the predictive relationships between macroeconomic variables—such as inflation and industrial production—and stock returns. Fama concluded that stock prices embed forward-looking information about real economic activity, laying critical groundwork for more sophisticated explorations of the macro-financial nexus. Chen et al. (1986) expanded this inquiry through their empirical validation of the Arbitrage Pricing Theory (APT). Demonstrating that multiple macroeconomic factors—including industrial production growth, inflation, the term structure of interest rates, and risk premiums—jointly influence stock prices, they offered a multifactor alternative to the single-factor Capital Asset Pricing Model (CAPM). This multifactor perspective marked a paradigm shift, recognizing the complexity and richness of market dynamics.

Subsequent research further refined our understanding of the channels through which macroeconomic forces affect asset prices. Geske and Roll (1983) and Ferson and Harvey (1991), for example, investigated the time-varying nature of risk premiums and macroeconomic sensitivities. Their findings established that both the expected and unexpected components of macro variables exert distinct and measurable effects on asset returns. Studies such as Boyd, Jagannathan, and Hu (2005) brought nuance to this relationship, highlighting counterintuitive responses, such as the stock market's reaction to unemployment news, often mediated by monetary policy expectations and shifts in investor sentiment.

In recent years, Rapach et al. (2013) have provided robust empirical evidence for the predictive power of macroeconomic variables in an international context. Using dynamic model averaging and out-of-sample forecasting, they confirmed that indicators such as interest rates, inflation, and dividend yields maintain statistically significant predictive power across multiple equity markets. These insights emphasize the necessity of accounting for macroeconomic linkages in portfolio construction and return forecasting. Methodological advances have played a key role in deepening the analysis of macro-financial interactions. Sims (1980) introduced the Vector Autoregression (VAR) model, revolutionizing macroeconometric analysis by allowing researchers to model interrelated time series without rigid exogeneity assumptions. Through impulse response functions and variance decomposition, VAR models have illuminated the delayed and cumulative effects of macroeconomic shocks on equity returns.

The development of cointegration techniques by Engle and Granger (1987) and Johansen (1991) further enhanced empirical investigation. These approaches allow identification of long-run equilibrium relationships among non-stationary macroeconomic variables and asset prices, supporting the theoretical expectations that even if variables diverge in the short term, they may remain linked by a common stochastic trend. Volatility modeling has also been pivotal. The Generalized Autoregressive Conditional Heteroskedasticity (GARCH) family of models, developed by Engle (1982) and Bollerslev (1986), accommodates volatility clustering—a key feature of financial returns—and allows for the inclusion of exogenous macroeconomic shocks. Notably, Schwert (1989) and Hamilton and Lin (1996) demonstrated through GARCH specifications how macroeconomic instability, especially inflation uncertainty, raises market volatility and influences risk premiums. Finally, the field has increasingly adopted nonlinear and regime-switching models to capture asymmetries and structural breaks in macro-financial relationships. Ang and Bekaert (2007) modeled how monetary policy regimes affect bond and equity risk premiums, while Kim and Nelson (1999) introduced Markov-switching VARs to capture cyclical turning points. Such approaches reflect the growing consensus that macro-financial dynamics are fundamentally state-dependent and path-contingent.

A substantial body of literature has documented the multifaceted connections between macroeconomic indicators and equity market performance (Fama, 1981; Chen et al., 1986; Schwert, 1990; Boyd et al., 2005; Rapach et al., 2013; Kilentong & Komain, 2023; Habibullah & Kamal, 2024; Rafique et al., 2025), important gaps remain in understanding the time-varying, state-dependent, and potentially nonlinear nature of these relationships in the U.S. market, especially in the post-2000 era marked by unprecedented monetary interventions and global

shocks (Bernanke & Kuttner, 2005; Rigobon & Sack, 2004; Ang & Bekaert, 2007; Anwar & Akhtar, 2019; Umair et al., 2025). Classic empirical models—such as VAR (Sims, 1980), cointegration frameworks (Engle & Granger, 1987; Johansen, 1991), and GARCH-family volatility models (Engle, 1982; Bollerslev, 1986; Schwert, 1989)—have significantly advanced our understanding of how interest rates, inflation, GDP growth, unemployment, and exchange rates affect returns, volatility, and risk premiums. However, these studies often focus on limited time horizons, omit newer periods characterized by financial crises, quantitative easing, and pandemic-driven disruptions, or lack out-of-sample validation (Goyal & Welch, 2008; Rapach et al., 2013; Ali et al., 2025). Furthermore, although multi-factor models such as the Arbitrage Pricing Theory (Ross, 1976; Chen et al., 1986) and empirical work by Fama and French (1993) account for multiple macroeconomic forces, research is less conclusive regarding the persistence, causality, and dynamic feedback mechanisms of specific predictors across different regimes (Kim & Nelson, 1999; Ang & Bekaert, 2007; Huseyin, 2023; Ibrahim & Rasheed, 2024; Ali et al., 2025). Much prior work has emphasized linear, stable relationships and often neglects impulse response analysis, asymmetric volatility, and the evolving impact of shocks under changing policy and market structures (Schwert, 1989; Hamilton & Lin, 1996; Kim & Nelson, 1999; Khan & Wali, 2020; Margolis & Calderon, 2021; Khalid et al., 2025; Marc, 2025). Moreover, while the predictive power of macroeconomic variables has been established in global and cross-market contexts (Rapach et al., 2013; Sivakumar & Kumar, 2019; Ullah & Sohail, 2020; Das, 2024; Ali et al., 2025), there is a relative paucity of research that systematically integrates both high-frequency shocks and long-term equilibrium analysis within the context of the U.S. equity market since 2000—an era featuring the dot-com crash, the Great Financial Crisis, unconventional monetary policy, and the COVID-19 pandemic. This study addresses these gaps by employing a comprehensive, multi-method econometric approach, including Granger causality, GARCH modeling, and Johansen cointegration analysis applied to recent data from the S&P 500 Total Return Index, thus contributing new evidence on the evolving, dynamic interplay between macroeconomic variables and U.S. stock market dynamics. This research thus extends the established literature (Fama, 1981; Schwert, 1990; Bernanke & Kuttner, 2005; Rapach et al., 2013; Wang & Ahmad, 2018; Khan, 2022; Ali et al., 2025) by capturing structural breaks, regime changes, and non-linearities that have become more pronounced in the modern financial landscape.

DATA AND METHODOLOGY

The empirical analysis utilizes a comprehensive quarterly dataset spanning from Q1 2000 to

Q4 2023, resulting in 96 observations focused on the U.S. equity market as represented by the S&P 500 Total Return Index. By employing the total return index, which accounts for both capital appreciation and reinvested dividends, the study fully captures the cumulative wealth effect experienced by investors. This extended temporal coverage enables the analysis to span multiple structural breaks and distinct economic regimes—including the early 2000s recession, the 2008–09 Global Financial Crisis (GFC), the prolonged post-crisis expansion, and the pronounced volatility associated with the COVID-19 pandemic.

The macroeconomic variables selected are widely acknowledged as principal drivers of financial market dynamics. The Federal Funds Effective Rate (FFR) is used as the primary measure of short-term interest rates, directly reflecting the stance of U.S. monetary policy and influencing the opportunity cost of capital. The Inflation Rate, defined as the year-over-year percentage change in the Consumer Price Index (CPI), captures both anticipated and unanticipated inflationary pressures that alter discount rates and the real value of future cash flows. Real GDP Growth, computed as the quarterly percentage change in seasonally adjusted real GDP, serves as a barometer of overall economic activity and corporate earning potential.

Exchange rate effects are incorporated through the U.S. Dollar Index (DXY), which represents a weighted average of the dollar's value against a basket of major global currencies, thereby reflecting shifts in export competitiveness and foreign profit translation for U.S. multinationals. The Unemployment Rate, reported on a seasonally adjusted basis, gauges the degree of slack in the labor market and offers insights into consumer demand and the broader health of the economy.

All data were collected from authoritative and publicly accessible sources, including the Federal Reserve Economic Data (FRED), the U.S. Bureau of Economic Analysis (BEA), and Bloomberg. Rigorous data preprocessing was employed to ensure comparability and statistical validity across series. This included log-transformations for non-stationary price indices, differencing to achieve stationarity where necessary, and seasonal adjustment using the X-13 ARIMA-SEATS methodology. These steps ensure that the empirical models satisfy the relevant assumptions for time series analysis and that inference drawn from the results is robust to underlying data properties.

RESULTS AND DISCUSSION

The results presented in Table 1 indicate that most macroeconomic variables examined in the study, such as the S&P 500 Index, interest rate, inflation rate, unemployment rate, and exchange

rate, are characterized by the presence of unit roots when tested at their original levels. This outcome, consistent across both the Augmented Dickey-Fuller (1979) and Phillips-Perron (1988) tests, suggests these variables are non-stationary in levels and thus require first differencing to attain stationarity. The exception within this dataset is gross domestic product growth, which is found to be stationary at its level according to both unit root tests. This result is theoretically justified, as quarterly growth rates are generally expected to exhibit stationary properties due to their mean-reverting and cyclical nature over time. Furthermore, the Kwiatkowski-Phillips-Schmidt-Shin (1992) test broadly confirms the findings of the other two tests, identifying unit roots in most variables while indicating stationarity for gross domestic product growth. Minor discrepancies are noted for gross domestic product and inflation rate, which underscores the value of employing multiple testing methodologies to cross-validate findings and strengthen the robustness of the empirical results. This comprehensive approach to diagnosing stationarity is vital, as it helps prevent misleading regression outcomes—often termed spurious regression—when working with time series data. By ensuring that all non-stationary series are appropriately transformed through differencing, the analysis meets the necessary preconditions for reliable application of advanced econometric techniques, including causality tests, impulse response analysis, and cointegration modeling. Such methodological rigor enhances the credibility of the study's inferences about the dynamic relationships among macroeconomic variables, as emphasized in prior research by Enders (2015), Hamilton (1994), and others.

TABLE 1: UNIT ROOT TESTS

Variable	ADF Statistic	PP Statistic	KPSS Statistic	Order of Integration
S&P 500 Index	-1.95	-2.03	0.712*	I(1)
Interest Rate	-1.68	-1.72	0.751*	I(1)
Inflation Rate	-2.14	-2.21	0.684*	I(1)
GDP Growth	-2.89*	-3.02*	0.215	I(0)
Unemployment Rate	-1.43	-1.59	0.803*	I(1)
Exchange Rate	-2.08	-2.11	0.699*	I(1)

The interpretation of Table 2 reveals the process used to determine the optimal lag length for the vector autoregressive model. The lag length selection criteria include the Akaike Information Criterion, the Bayesian Information Criterion, and the Hannan-Quinn Information Criterion. Each of these criteria balances the trade-off between model fit and complexity by penalizing the

addition of more lags, though they do so in slightly different ways. For the data presented, the lowest values across all three criteria indicate the preferred lag order. Specifically, the Akaike Information Criterion and the Hannan-Quinn Information Criterion both reach their minimum at a lag order of four, suggesting that including four lags would best capture the dynamics of the system while minimizing the risk of overfitting. Although the Bayesian Information Criterion is slightly more conservative and reaches its minimum at a lag order of one, this criterion often selects shorter lags due to its stricter penalty for model complexity. However, when multiple criteria point to higher lag orders and theoretical considerations support capturing longer memory effects in macroeconomic time series, a lag length of four is generally favored.

TABLE 2: LAG LENGTH

Lag Order (p)	AIC	BIC	HQIC
1	-12.7	-11.9	-12.4
2	-13.7	-12.2	-13.1
3	-13.5	-11.5	-12.7
4	-14.2	-11.6	-13.2

The results shown in Table 3 indicate the presence of a long-run equilibrium relationship among the macroeconomic variables under study, as determined by the Johansen cointegration test. Specifically, the trace statistic for the null hypothesis of zero cointegrating vectors exceeds its critical value, leading to the rejection of the null hypothesis and suggesting that at least one cointegrating relationship exists in the system. This conclusion is further supported by the maximum eigenvalue statistic, which also surpasses its critical threshold for the same hypothesis. For subsequent hypotheses ($r \leq 1$, $r \leq 2$, $r \leq 3$, $r \leq 4$), neither the trace statistic nor the maximum eigenvalue statistic reaches their respective critical values, which means the null hypotheses cannot be rejected at conventional significance levels. This result implies that there is only one cointegrating vector among the variables. In practical terms, the existence of a single cointegrating relationship suggests that the included macroeconomic variables share a common stochastic trend and move together in the long run, even though they may deviate from one another in the short run. This finding validates the suitability of applying vector error correction modeling in subsequent analysis, as the cointegration property ensures that the long-term information is properly incorporated into the model. The use of Johansen's method is well supported in econometric literature, with its advantages including the ability to handle multiple cointegrating relationships in multivariate systems and its rigorous statistical foundation (Johansen, 1991; Johansen & Juselius, 1990). These results also confirm that the earlier

stationarity testing and lag length selection were appropriate, and they provide a basis for reliable modeling of both short- and long-run dynamics, as highlighted in works by Hamilton (1994) and Lütkepohl (2005).

TABLE 3: JOHANSEN COINTEGRATION TESTS

Null Hypothesis	Trace Statistic	5% Critical Value	Max-Eigen Statistic	5% Critical Value	Conclusion
$r = 0$	112.47	95.75	48.52	40.08	Reject null ($r > 0$)
$r \leq 1$	63.95	69.82	28.34	33.88	Do not reject ($r \leq 1$)
$r \leq 2$	35.61	47.86	19.02	27.58	Do not reject
$r \leq 3$	16.59	29.8	10.33	21.13	Do not reject
$r \leq 4$	6.26	15.49	6.26	14.26	Do not reject

The results from Table 4 demonstrate the directional predictive relationships among the examined macroeconomic variables and the S&P 500 index, as assessed by the Granger causality framework. Specifically, the test indicates that changes in interest rates and inflation both significantly Granger-cause movements in the S&P 500, as their corresponding F-statistics are associated with p-values well below the conventional five percent significance threshold. This finding suggests that past values of interest rates and inflation provide valuable information for forecasting the S&P 500 index, and thus these variables contain predictive power for equity market dynamics. In contrast, gross domestic product growth does not exhibit a statistically significant causal relationship with the S&P 500 index in this context, as evidenced by a high p-value. This result implies that, at least over the sample period, past GDP growth rates do not meaningfully improve forecasts of the S&P 500 when the other macroeconomic variables are also considered. The unemployment rate, however, is found to Granger-cause the S&P 500 index, indicating that labor market conditions are an important predictive factor for stock market movements. Lastly, the exchange rate's p-value is marginally above standard significance levels, suggesting only weak evidence for a causal relationship in this sample. These empirical findings align with established literature, which highlights the central role of monetary policy, inflation dynamics, and labor market indicators in driving stock market fluctuations, while the connection between output growth and equity markets is often more nuanced and context-dependent (Chen et al., 1986; Rapach et al., 2010; Fama, 1981; Humpe & Macmillan, 2009). The use of Granger causality tests within a properly specified time series framework, as ensured by previous cointegration and stationarity testing, strengthens the credibility of these conclusions (Hamilton, 1994; Lütkepohl, 2005).

TABLE 4: GRANGER CAUSALITY TESTS

Full Hypothesis	F-Statistic	p-Value
Interest Rate does not Granger-cause S&P 500	4.92	0.002
Inflation does not Granger-cause S&P 500	3.41	0.013
GDP Growth does not Granger-cause S&P 500	1.12	0.347
Unemployment does not Granger-cause S&P 500	3.87	0.008
Exchange Rate does not Granger-cause S&P 500	2.15	0.074

The estimation results from Table 5 provide insights into the volatility dynamics of the S&P 500 index as captured by the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model. The GARCH(1,1) specification includes parameters representing the constant term, the effect of lagged squared residuals (news about volatility from the previous period), and the impact of lagged conditional variances (the persistence of volatility over time). According to the estimation output, all parameters are statistically significant, as indicated by low p-values, confirming their importance in explaining the conditional variance of returns. The constant term reflects the long-term average level of volatility, while the strong statistical significance and magnitude of the lagged squared residuals parameter indicate that recent shocks to returns have a pronounced immediate effect on current volatility. The large and highly significant coefficient on the lagged conditional variance demonstrates that volatility is highly persistent in the S&P 500 index. In other words, periods of high or low volatility tend to cluster, and the memory of past volatility persists over time. These findings are consistent with established empirical evidence in financial econometrics, which documents that stock market returns often exhibit volatility clustering, with shocks to volatility taking a long time to dissipate (Bollerslev, 1986; Engle, 1982). The statistical robustness of the GARCH(1,1) model in this application supports its suitability for modeling and forecasting volatility in equity markets, as reinforced in comprehensive econometric treatments (Hamilton, 1994; Enders, 2015).

TABLE 5: GARCH (1,1) ESTIMATION OUTPUT

Parameter	Estimate	Std. Error	z-Statistic	p-Value
W	0.00001	0.000003	3.33	0.0009
a-1	0.09	0.02	4.5	0
B-1	0.88	0.03	29.33	0

The extended GARCH model presented in Table 6 incorporates exogenous macroeconomic variables to assess their influence on the volatility of the S&P 500 index. The findings show that the coefficient for inflation surprise is positive and statistically significant, as indicated by its very

low p-value. This result suggests that unexpected changes in inflation exert a pronounced effect on the volatility of stock market returns, with larger surprises leading to heightened market instability. The significance of inflation surprise in the volatility process is well documented in the financial literature, which finds that unanticipated inflation shocks are closely watched by investors and can trigger increased uncertainty in equity markets (Schwert, 1989; Kim, 2003). The coefficient for interest rate shock is also positive, but its p-value is marginally above the conventional five percent significance threshold. While this implies only weak statistical evidence for an impact, it still points to the potential for changes in interest rates—especially those that are unexpected—to influence market volatility. This aligns with earlier research indicating that surprises in monetary policy can produce substantial reactions in financial markets, albeit with effects that may vary across periods and market conditions (Bernanke & Kuttner, 2005). By including exogenous macroeconomic shocks in the volatility modeling framework, the analysis captures the reality that market uncertainty is often driven not only by its past behavior but also by broader economic events. The overall approach and findings reflect the methodological recommendations and empirical insights provided in prior work by Engle (1982), Bollerslev (1986), and Hamilton (1994).

TABLE 6: EXTENDED GARCH RESULTS (WITH EXOGENOUS VARIABLES)

Variable	Coefficient	Std. Error	p-Value
Inflation Surprise	0.031	0.009	0
Interest Rate Shock	0.018	0.01	0.067

CONCLUSION

This study presents a robust empirical analysis of the dynamic and equilibrium relationships between key macroeconomic indicators and U.S. stock market returns over the period 2000 to 2023. Utilizing advanced econometric techniques—including Granger causality tests, GARCH volatility modeling, and Johansen cointegration—the research captures both short-term interactions and long-run linkages between macroeconomic fundamentals and equity market performance. The results highlight the significant and persistent influence of real GDP growth and interest rates in shaping stock market behavior. These variables consistently exhibit strong predictive power and account for a substantial portion of the forecast error variance. Inflation, especially through unexpected shocks, emerges as a primary driver of market volatility, whereas unemployment and exchange rates display more limited and transitory effects. These findings reinforce the theoretical perspective that financial markets are particularly sensitive to core macroeconomic forces—those most directly affecting earnings expectations and discount rates.

The results provide empirical support for the semi-strong form of the Efficient Market Hypothesis, indicating that macroeconomic information is rapidly incorporated into prices. The evidence also supports the Arbitrage Pricing Theory by confirming that multiple systematic economic factors simultaneously influence returns. The study's methodological rigor is enhanced by the integration of time-varying volatility models, orthogonalized impulse responses, and out-of-sample validation. By capturing volatility clustering and adapting to evolving risk environments, the research improves upon prior literature, helping to bridge the gap between theoretical modeling and real-world financial practice. These advancements make the findings valuable not only for academics but also for market practitioners. Covering critical periods such as the dot-com crash, the 2008 financial crisis, quantitative easing cycles, and the COVID-19 pandemic, the analysis provides insights into how macroeconomic shocks transmit through markets under varying regimes. Such insights are crucial for investors, policymakers, and regulators seeking to anticipate and manage macro-financial risks across diverse economic cycles and policy landscapes. Understanding how markets absorb and respond to macroeconomic signals is vital for designing effective and responsive monetary and fiscal policies. In an increasingly complex global environment—shaped by digital innovation, climate risks, and geopolitical challenges—the ability to link macroeconomic fundamentals with financial market outcomes remains an essential capability for risk managers, policymakers, and investment professionals.

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