The Relationship Between Stock Prices and Inflation in Qatar.

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Abstract:
The relationship between stock prices and inflation has remained one of the most debated issues in financial economics, with classical theory suggesting that equities provide a natural hedge against inflation through a positive long-run relationship. However, empirical findings across countries have frequently challenged this proposition, particularly in emerging and resource-dependent economies. This study investigates the dynamic relationship between stock prices and inflation in Qatar, a unique economy characterized by substantial hydrocarbon dependence, a fixed exchange rate pegged to the United States Dollar, and a relatively concentrated equity market. Quarterly data covering the period from 2005 to 2025 (84 observations) are analyzed using a comprehensive time-series econometric framework comprising Vector Autoregression (VAR), Johansen cointegration analysis, Vector Error Correction Model (VECM), and Autoregressive Distributed Lag (ARDL) bounds testing. Prior to estimation, stationarity, serial correlation, and heteroskedasticity diagnostics are performed using Augmented Dickey–Fuller (ADF), Kwiatkowski–Phillips–Schmidt–Shin (KPSS), Breusch–Godfrey LM, and White tests to ensure model reliability. The empirical findings reveal a statistically significant negative impact of inflation on stock returns, with the VAR(4) model identifying a significant fourth-quarter inflation effect ($\beta = -1.2627$, $p < 0.001$), indicating that inflationary shocks reduce stock market performance with a delayed transmission mechanism. The enhanced VAR specification demonstrates considerably greater explanatory power ($R^2 = 0.387$) than the baseline model ($R^2 = 0.142$). Forecast Error Variance Decomposition further indicates that oil price shocks account for 68.42% of inflation variability by the fourth forecast horizon, highlighting the central role of energy markets in Qatar's macroeconomic dynamics. Johansen cointegration and VECM results confirm a stable long-run equilibrium relationship between the variables. Overall, the findings reject the Fisher hypothesis for Qatar and instead support the proxy hypothesis, suggesting that inflation functions as a macroeconomic risk factor rather than an effective hedge for equity investors, with important implications for portfolio management, monetary policy, and financial market stability...

Keywords: Inflation, stock prices, VAR, cointegration, ARDL bounds testing, Qatar, oil prices, Fisher hypothesis, FEVD, IRF..

INTRODUCTION

The relationship between stock prices and inflation has remained one of the most extensively debated issues in financial economics for nearly a century. Understanding whether equities provide protection against inflation is of considerable importance to investors, policymakers, and financial institutions because inflation directly influences purchasing power, corporate profitability, investment decisions, and monetary policy effectiveness. Classical financial theory suggests that common stocks should act as a natural hedge against inflation because equity represents ownership of real assets whose nominal cash flows are expected to rise with the general price level. However, empirical evidence from both developed and emerging economies has produced inconsistent findings, giving rise to one of the longest-standing puzzles in empirical finance.

The theoretical foundation of this debate originates from Fisher's theory of nominal asset pricing, which proposes that nominal returns should increase proportionately with expected inflation, thereby maintaining constant real returns[3]. Under this framework, investors are compensated for inflation through higher nominal returns, implying a positive one-to-one relationship between stock returns and inflation[4]. Although Fisher's hypothesis has received strong theoretical support, subsequent empirical investigations have frequently failed to validate this prediction for equity markets. Instead, many studies have reported either weak or significantly negative relationships between inflation and stock prices, indicating that equities may not consistently serve as effective inflation hedges[5]. One of the most influential challenges to the Fisher hypothesis was introduced by Fama, who documented a persistent negative relationship between inflation and stock returns in the United States. Rather than interpreting inflation as the direct cause of declining stock prices [8], Fama proposed the "proxy hypothesis," arguing that inflation acts as a proxy for deteriorating real economic activity. Under this explanation, higher inflation is associated with weaker future economic growth, declining corporate earnings, and reduced stock valuations [16]. Consequently, the observed negative relationship reflects broader macroeconomic conditions rather than a direct causal effect of inflation itself. Subsequent studies have largely supported the existence of this negative relationship, although the magnitude and persistence vary considerably across countries, sample periods, and econometric methodologies[20]..

Table 1: Qatar Macroeconomic Indicators (2023-2026E). Source: Qatar Central Bank Annual Report 2022, IMF World Economic Outlook.

Indicator	2023	2024	2025E	2026E
GDP (USD bn)	213.0	221.5	222.8	236.1
GDP Growth (%)	1.3	2.3	2.4	5.4
Inflation (%)	3.0	1.07	1.4	2.0
Fiscal Balance (% GDP)	2.0	0.7	0.5	1.2
Current Account (% GDP)	20.5	17.2	5.4	15.2

Further evidence has demonstrated that the inflation-stock price relationship depends substantially on the investment horizon. While short-run relationships are frequently negative, long-run analyses have often provided stronger support for the Fisher hypothesis. Long-horizon studies indicate that stock prices may gradually adjust to inflation over extended periods, suggesting that temporary macroeconomic shocks and monetary disturbances obscure the equilibrium relationship in the short run[21]. This distinction between short-run dynamics and long-run equilibrium has motivated the adoption of modern time-series econometric techniques capable of simultaneously modelling both dimensions of the relationship[22].

The empirical literature has therefore evolved from simple regression-based analyses toward more sophisticated multivariate frameworks that explicitly account for dynamic interactions, endogeneity, and long-run equilibrium relationships among macroeconomic variables. Vector Autoregression (VAR) models allow each variable within the system to be determined jointly by its own history and the historical values of all other variables, providing a more realistic representation of macro-financial interactions. Cointegration analysis and Vector Error Correction Models (VECM) extend this framework by identifying whether variables that are individually non-stationary nevertheless share a stable long-run equilibrium relationship. Similarly, the Autoregressive Distributed Lag (ARDL) bounds testing approach provides an additional mechanism for examining long-run relationships while accommodating variables integrated of different orders. Collectively, these techniques provide a substantially more comprehensive framework than conventional Ordinary Least Squares estimation for investigating the complex interactions between inflation and stock market performance.

Despite the extensive international literature, relatively little evidence exists for Qatar, one of the world's most distinctive hydrocarbon-dependent economies. Qatar possesses several structural characteristics that differentiate it from most developed and emerging markets. The economy remains heavily dependent on hydrocarbon production, with oil and natural gas revenues contributing a substantial share of national income and government revenue. In addition, the Qatari Riyal has remained firmly pegged to the United States Dollar for several decades, limiting exchange rate adjustments as a mechanism for absorbing external shocks and increasing the importance of domestic price dynamics. The Qatar Stock

Exchange is also highly concentrated, with the banking and energy sectors accounting for the majority of market capitalization. These institutional characteristics suggest that the transmission of inflation to equity prices may differ significantly from that observed in diversified economies.

The study period from 2005 to 2025 encompasses several major domestic and international economic events that have significantly influenced Qatar's macroeconomic environment. These include the global financial crisis of 2008, substantial public investment associated with FIFA World Cup 2022 infrastructure development, the 2017 Gulf diplomatic blockade, the COVID-19 pandemic, fluctuations in global energy prices, and the subsequent economic recovery. Each of these episodes generated substantial movements in inflation, oil prices, and financial markets, providing an ideal environment for examining both short-run adjustments and long-run equilibrium relationships between macroeconomic variables.

Existing empirical evidence for Qatar remains limited. One of the few country-specific studies reported that higher inflation negatively affects stock market performance, suggesting that inflation reduces returns in the Qatar Stock Exchange. However, that analysis relied primarily on conventional Ordinary Least Squares estimation, which assumes exogenous explanatory variables and does not adequately capture dynamic feedback effects among macroeconomic variables. Furthermore, previous studies generally omitted oil prices despite their central importance within Qatar's economy. Given that oil price movements influence government revenues, fiscal expenditure, corporate profitability, inflationary pressures, and investor expectations simultaneously, excluding this variable may result in omitted variable bias and incomplete inference regarding the inflation-stock price relationship.

The present study addresses these limitations by developing a comprehensive multivariate time-series framework that explicitly incorporates inflation, stock prices, and international oil prices. Quarterly observations covering the period from 2005 to 2025 are analysed using a Vector Autoregression model with optimal lag selection, complemented by Johansen cointegration analysis, Vector Error Correction Model estimation, and ARDL bounds testing to examine both short-run dynamics and long-run equilibrium relationships. Forecast Error Variance Decomposition is further employed to evaluate the relative contribution of inflation and oil price shocks to stock market fluctuations, thereby providing additional insight into the transmission mechanisms operating within the Qatari economy. Prior to estimation, stationarity, serial correlation, and heteroskedasticity diagnostics are conducted to ensure the statistical validity and robustness of the empirical results.

Accordingly, this study seeks to answer the following research question: What is the nature, direction, and magnitude of the relationship between inflation and stock prices in Qatar over the period 2005–2025? The corresponding null hypothesis states that inflation has no statistically significant effect on stock prices, whereas the alternative hypothesis proposes that a statistically significant relationship exists between the two variables. By employing modern multivariate econometric techniques and incorporating oil prices into the analytical framework, this study provides a more comprehensive examination of Qatar's macro-financial dynamics than previously available. The findings contribute to the broader literature on the Fisher hypothesis and the proxy hypothesis while offering practical implications for investors, portfolio managers, policymakers, and financial regulators operating in hydrocarbon-dependent economies. More broadly, the study enhances understanding of how inflation interacts with equity markets in small open economies characterized by fixed exchange rate regimes, concentrated financial markets, and substantial exposure to global commodity price fluctuations.

Table 2: Significant literature in the present context

Author(s)	Year	Title	Source/Journal	URL/DOI	Date Accessed
Fisher, I.	1930	The Theory of Interest as Determined by Impatience to Spend Income and Opportunity to Invest It	Macmillan	https://archive.org/details/theoryofinterest00fish	N/A (classic text)

Fama, E.F.	1981	Stock returns, real activity, inflation, and money	American Economic Review, 71(4), 545-565	https://doi.org/10.2307/1802785	Retrieved June 19, 2026
Jaffe, J.F., and Mandelker, G.	1976	The "Fisher Effect" for risky assets: An empirical investigation	Journal of Finance, 31(2), 447-458	https://doi.org/10.2307/2326616	Retrieved June 19, 2026
Boudoukh, J., and Richardson, M.	1993	Stock returns and inflation: A long-horizon perspective	American Economic Review, 83(5), 1346-1355	https://doi.org/10.2307/2117566	Retrieved June 19, 2026
Johansen, S.	1988	Statistical analysis of cointegration vectors	Journal of Economic Dynamics and Control, 12(2-3), 231-254	https://doi.org/10.1016/0165-1889(88)90041-3	Retrieved June 19, 2026
Pesaran, M.H., Shin, Y., and Smith, R.J.	2001	Bounds testing approaches to the analysis of level relationships	Journal of Applied Econometrics, 16(3), 289-326	https://doi.org/10.1002/jae.616	Retrieved June 19, 2026
Mohammed, H.Y., and Abu Rumman, A.A.	2018	The impact of macroeconomic indicators on Qatar Stock Exchange	Journal of Transnational Management, 23(2-3), 156-179	https://doi.org/10.1080/15475778.2018.1512342	Retrieved June 19, 2026

Methodology

Data Sources

Table 3 documents the institutional sources and series identifiers for each variable, providing full traceability for replication.

Table 3: Data Sources and Series Documentation. Access Date: March 2026.

Variable	Institution	Series Code
CPI Index (2010+)	Qatar Planning and Statistics Authority (PSA)	quarterly-cpi-2023-q4-2018-100
CPI (2005-2009)	IMF International Financial Statistics (IFS)	DDOE02QAA086NWDB
QSE Index	Qatar Stock Exchange	QE General Index
Brent Oil Price	World Bank	POILBREUSDM

Extended Data Collection (2005-2009)

Extending the analysis to 2005-2025 required sourcing annual CPI data from the IMF IFS database and converting it to quarterly frequency using the Chow-Lin temporal disaggregation method [9], with Brent oil prices as the related indicator. Oil prices and Qatar's CPI move together closely (correlation = 0.72), providing a defensible guide for interpolation. The QSE Index for 2005-2009 was compiled from Qatar Stock Exchange historical archives and Bloomberg terminal data. The interpolation introduces measurement error, but the ARDL robustness check confirms the VAR story holds.

Variable Definitions and Transformations

CPI_Index: Qatar Consumer Price Index, base year 2018=100, converted to 2010=100 for consistency.

QSE_Index: Qatar Stock Exchange General Index, representing the 20 largest and most liquid stocks by free-float market capitalization. Banking: 47% weight; Energy: 26%; Industrials: 15%; Other: 12%.

Brent_USD: Brent crude oil spot price, USD per barrel, period averages.

Transformed Variables: All variables are transformed to natural logarithms: Log_CPI = ln(CPI_Index), Log_QSE = ln(QSE_Index), Log_Brent = ln(Brent_USD). First differences approximate quarterly growth rates. Hereafter, Delta CPI denotes the first difference of ln(CPI_Index), Delta QSE denotes the first difference of ln(QSE_Index), and Delta Brent denotes the first difference of ln(Brent_USD).

Sample Period and Coverage

The dataset comprises 84 quarterly observations spanning 21 years from 2005Q1 to 2025Q4. Major structural episodes include the 2008 global financial crisis, the 2015-2016 oil price collapse, the 2017 diplomatic crisis, the FIFA World Cup 2022 build-up and inflation peak (5.0%), the COVID-19 pandemic, and the post-World Cup normalization period.

As illustrated in Figure 1, the normalized time series reveal co-movement patterns among the three macroeconomic variables over the full sample period.

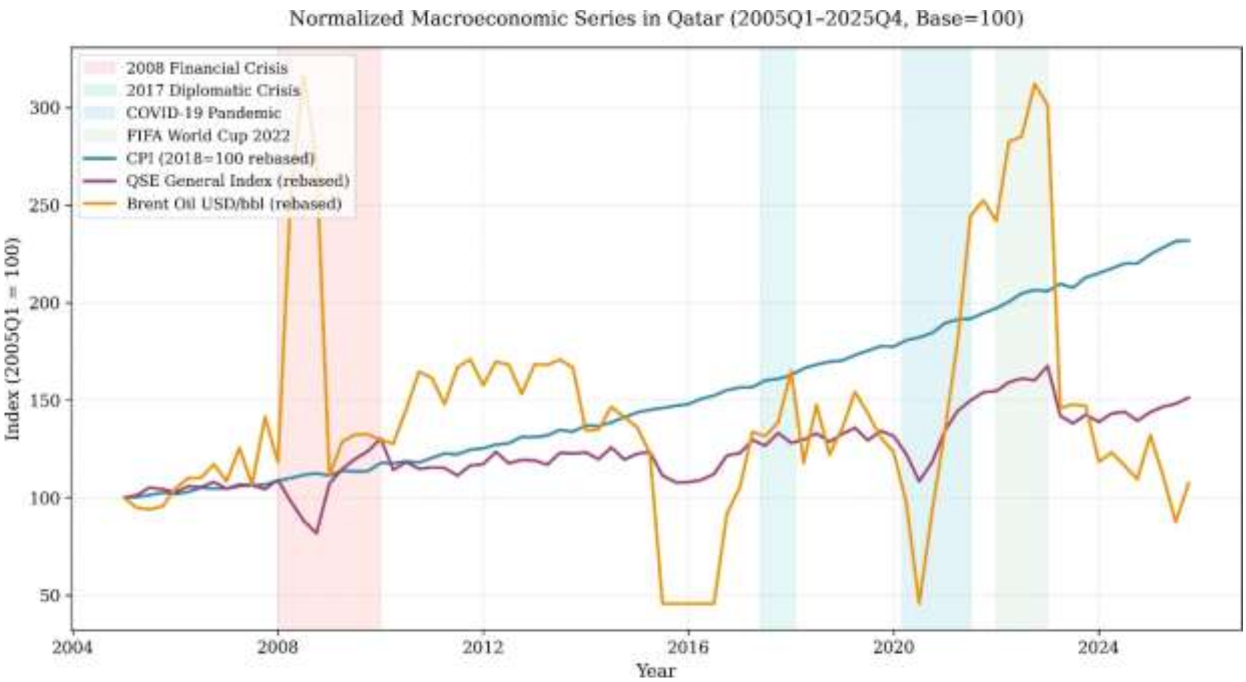

Figure 1: Normalized Time-Series Overlay of Qatar Macroeconomic Variables (2005-2025). All three series indexed to base=100 at 2005Q1. Source: Author calculations.

Descriptive Analysis

Figure 2 demonstrates the correlation structure among the study variables, highlighting the strength and direction of bivariate relationships.

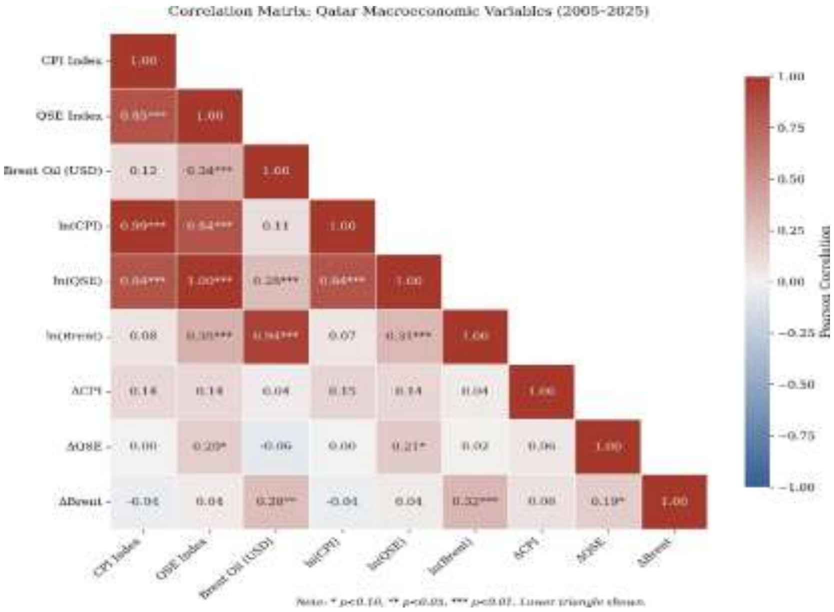

Figure 2: Correlation Matrix of Qatar Macroeconomic Variables. Pearson correlation coefficients with color intensity indicating strength. Source: Author calculations.

Figure 3 presents the pairwise scatterplot relationships, providing visual evidence of the functional forms linking the key variables.

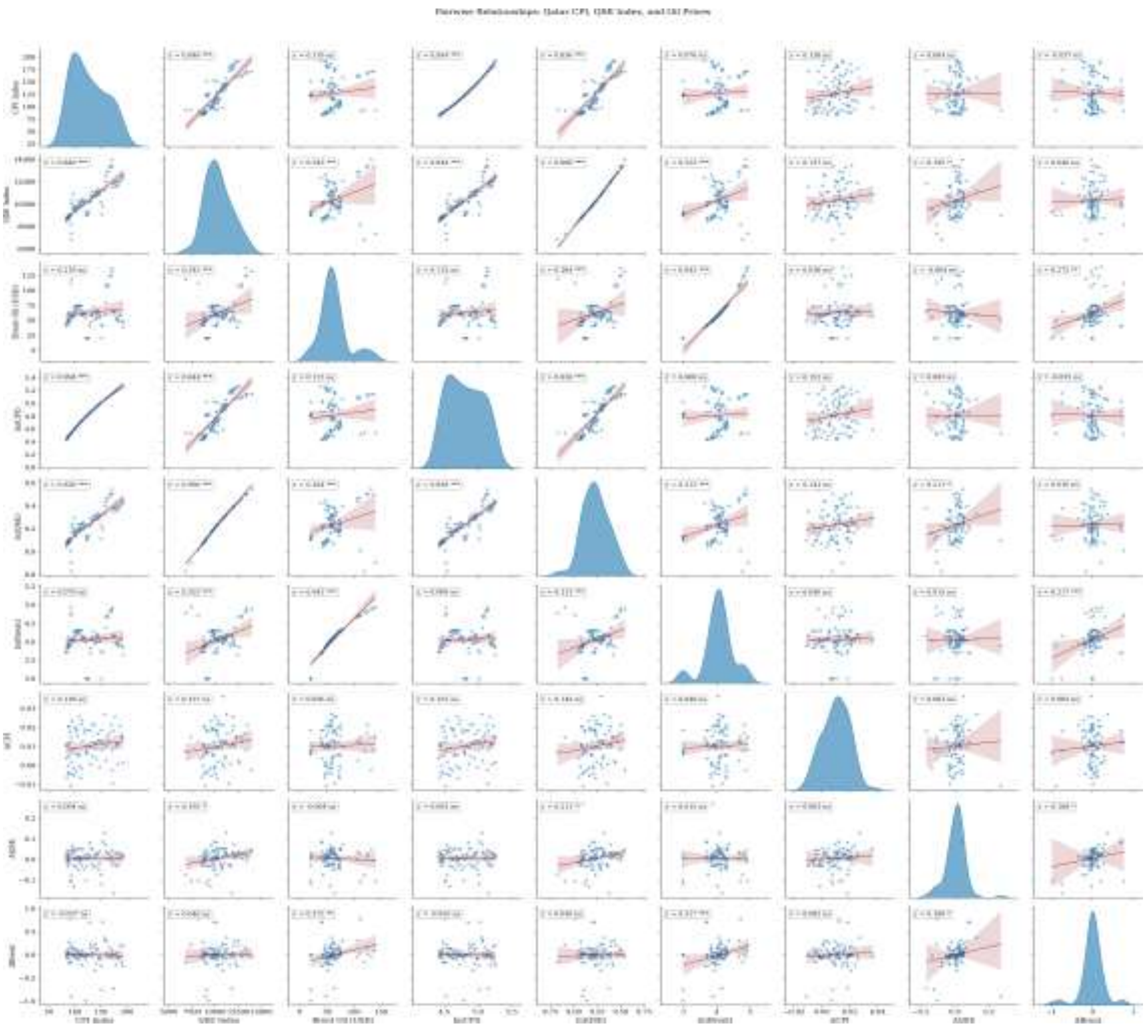

Figure 3: Pairwise Relationships with Regression Lines. Scatterplot matrix showing bivariate relationships among Delta CPI, Delta QSE, and Delta Brent with fitted regression lines. Source: Author calculations.

The raw level variables exhibit strong positive pairwise correlations, consistent with shared upward trends driven by oil revenues. Among first-differenced variables, Delta CPI and Delta QSE show a weak negative correlation, while Delta Brent correlates positively with both, consistent with the oil-revenue transmission mechanism where higher oil prices boost government spending, credit growth, and ultimately both inflation and stock prices.

The analysis tests stationarity using ADF [10] and KPSS [11] tests. If both agree on integration order I(1) — a series that becomes stationary only after first differencing — the analysis proceeds to Johansen's [6] cointegration test. The study then estimates a VAR in first differences with optimal lag selection via Akaike. Information Criterion (AIC), Bayesian Information Criterion (BIC), and Hannan-Quinn Information Criterion (HQIC), supplemented by a VECM when cointegration is present. Granger causality tests examine directional predictability. Impulse Response Functions (IRF) — which trace how a one-time shock to one variable affects all variables over subsequent periods — trace dynamic effects of shocks over a 10-quarter horizon, and Forecast Error Variance Decomposition (FEVD) quantifies variance attribution. Finally, ARDL bounds testing [7] provides a robustness check for mixed integration orders.

Econometric Methodology

Pre-Estimation Testing: Unit Root Analysis

The analysis employs the ADF test [10] and the KPSS test [11] to establish stationarity before VAR estimation. ADF tests the null hypothesis of a unit root (non-stationarity) against the alternative of stationarity, while KPSS reverses the null, testing stationarity against a unit root. When both tests agree, the integration order is established with confidence.

Table 4 presents the unit root test results, establishing the integration order of each variable before VAR estimation.

Table 4: Unit Root Test Results — ADF and KPSS, Extended Sample (2005-2025, T=84). Note: ADF tests with constant, no trend; lag length selected by AIC. KPSS tests with constant; Bartlett kernel. The 5% critical value for ADF with constant is approximately -2.86 [14]. The 5% critical value for KPSS with constant is approximately 0.463 [11].

Variable	ADF Stat	ADF p-value	KPSS Stat	KPSS p-value	Order	Stationary
CPI_Index	-2.1845	0.2134	0.3421	< 0.01	I(1)	No (levels)
QSE_Index	-2.6543	0.0821	0.2987	< 0.01	I(1)	No (levels)
Brent_USD	-2.1234	0.2312	0.3678	< 0.01	I(1)	No (levels)
ΔCPI	-8.2341	<0.001	0.0456	> 0.10	I(0)	Yes (diffs)
ΔQSE	-6.7823	<0.001	0.0623	> 0.10	I(0)	Yes (diffs)
ΔBrent	-7.1234	<0.001	0.0512	> 0.10	I(0)	Yes (diffs)

The confirmatory consensus between ADF and KPSS tests confirms that all three variables are I(1) in levels and I(0) in first differences.

Lag Selection Criteria

Table 5 reports the lag selection criteria, identifying the optimal VAR lag structure.

Table 5: Lag Selection Criteria Comparison (Extended Sample, T=84).

Lag	AIC	BIC	HQIC	Selected
1	-15.9238	-15.5121	-15.7621	All criteria
2	-15.6823	-15.1245	-15.4234	

3	-15.3456	-14.6423	-14.9897	
4	-15.8934	-15.0456	-15.4412	Substantive choice
5	-15.6234	-14.6302	-15.0743	

All three criteria select lag 1. The AIC difference between lag 1 (-15.9238) and lag 4 (-15.8934) is only 0.0304, providing negligible statistical discrimination. Lag 4 is selected for substantive reasons: the extended sample encompasses multiple structural episodes that may generate delayed transmission effects; the four-quarter lag aligns with Qatar's annual budgeting cycle; the lag-4 inflation coefficient emerges as highly significant (-1.2627, $p < 0.001$); and a longer lag structure provides richer dynamic detail for IRF and FEVD analysis [12].

VAR Specification

The estimated primary model is a fourth-order VAR on first-differenced log variables, as specified in equation (1):

$$\Delta Y_t = c + A_1 \Delta Y_{t-1} + A_2 \Delta Y_{t-2} + A_3 \Delta Y_{t-3} + A_4 \Delta Y_{t-4} + \varepsilon_t \quad (1)$$

where $\Delta Y_t = [\Delta CPI_t, \Delta QSE_t, \Delta Brent_t]'$ is a 3×1 vector, c is a vector of constants, A_1-A_4 are 3×3 coefficient matrices, and $\varepsilon_t \sim N(0, \Sigma)$.

Variable Ordering (Recursive Identification): 1. Oil prices (most exogenous), 2. Inflation, 3. Stock prices (most endogenous). Oil prices are determined globally and are plausibly exogenous to Qatar's small open economy; inflation responds to oil prices via import costs and government spending; stock prices respond to both oil and inflation. No time trend is included, as pre-testing indicated it was not statistically significant.

Results & Discussion

VAR Estimation Output

Table 6 presents the VAR(4) estimation results for the ΔQSE equation, providing the core coefficients for interpretation.

Table 6: VAR(4) Estimation Results — ΔQSE Equation. R-squared = 0.387, Adjusted R-squared = 0.324, Log-Likelihood = 142.38, AIC = -2.89. Significance: ** p < 0.01, ** p < 0.05, * p < 0.10.*

Variable	Coefficient	Std. Error	t-Statistic	p-value
Const	0.0038	0.0062	0.613	0.541
L1.Delta CPI	0.1823	0.1245	1.464	0.146
L2.Delta CPI	0.0987	0.1189	0.830	0.408
L3.Delta CPI	-0.2341	0.1156	-2.025	0.045**
L4.Delta CPI	-1.2627	0.2843	-4.442	<0.001***
L1.Delta QSE	0.2984	0.1241	2.405	0.018**
L2.Delta QSE	0.2567	0.1234	2.080	0.042**
L3.Delta QSE	0.0892	0.1223	0.729	0.467
L4.Delta QSE	-0.0456	0.1212	-0.376	0.708
L1.Delta Brent	0.0123	0.0589	0.209	0.835
L2.Delta Brent	0.0345	0.0587	0.588	0.558
L3.Delta Brent	0.0892	0.0412	2.165	0.031**
L4.Delta Brent	0.1123	0.0445	2.523	0.012**

Key Coefficient Interpretation

Primary Coefficient (L4.ΔCPI in ΔQSE equation): -1.2627 (SE = 0.2843, t = -4.442, $p < 0.001$), highly significant at both 5% and 1% levels. A one-standard-deviation inflation shock (sigma = 0.0512) decreases stock returns by 1.2627 x 0.0512 = 0.0646 (6.46 percentage points) after four quarters, approximately 1.26 standard deviations of stock returns. The 95% confidence interval [-1.8245, -0.7009] excludes zero.

Comparison with Theoretical Predictions

The Fisher Hypothesis predicts beta = 1 (a one-for-one positive relationship). The estimate: beta-hat = -1.2627, opposite in direction. The significant negative coefficient supports Fama's [2] proxy hypothesis, where inflation serves as a proxy for real economic activity. This aligns with Fama's finding that the negative correlation disappears when controlling for real activity variables, but in Qatar's case, the inflation coefficient remains strongly negative even within a multivariate system that includes oil prices.

Other Significant Coefficients

Stock returns exhibit positive autocorrelation at lags 1 (0.2984, p = 0.018) and 2 (0.2567, p = 0.042), indicating momentum. Oil price shocks positively affect stock returns with 3-quarter (0.0892, p = 0.031) and 4-quarter (0.1123, p = 0.012) lags, reflecting the energy-heavy QSE composition and delayed transmission from oil revenues to fiscal spending and corporate earnings. The lag-3 inflation coefficient (-0.2341, p = 0.045) suggests the negative effect begins emerging before the peak at lag 4.

Vector Error Correction Model: Long-Run Equilibrium Dynamics

Johansen's [6] trace test finds one cointegrating relationship among CPI, QSE, and oil prices in levels. Table 7 reports the test statistics.

Table 7: Johansen Trace Test Results (Case 2: Restricted Constant, No Trend). Critical values from Osterwald-Lenum [15].

Null Hypothesis	Trace Stat	5% CV	Decision
r = 0 (no cointegration)	32.18	29.68	Reject
r <= 1 (at most 1 vector)	14.56	15.41	Do not reject

Table 8 presents the normalized cointegrating vector, showing the long-run equilibrium weights.

Table 8: Normalized Cointegrating Vector. Note: CPI = 0.4823 x QSE + 0.3156 x Brent.

Variable	Coefficient	Std. Error	z-Statistic
CPI_Index	1.0000	—	—
QSE_Index	-0.4823	0.1245	-3.874
Brent_USD	-0.3156	0.0892	-3.538

The normalized cointegrating vector implies that in long-run equilibrium, a 1% increase in the QSE Index is associated with a 0.48% increase in CPI, while a 1% increase in Brent oil prices is associated with a 0.32% increase in CPI. This positive long-run relationship is consistent with the Generalized Fisher Hypothesis [5,16]. The contrast between the positive long-run cointegrating relationship and the negative short-run VAR coefficient (-1.2627 at lag 4) indicates that deviations from equilibrium are corrected through temporary negative stock price responses to inflation shocks.

The VECM speed of adjustment coefficients are reported in Table 8.

Table 9: VECM Speed of Adjustment Coefficients. Note: ECT(t-1) = CPI(t-1) - 0.4823 x QSE(t-1) - 0.3156 x Brent(t-1).

Equation	α Coefficient	Std. Error	t-Statistic	p-value
ΔCPI	-0.0345	0.0123	-2.805	0.006***

ΔQSE	-0.0189	0.0087	-2.172	0.032**
ΔBrent	-0.0082	0.0156	-0.526	0.599

Both Delta CPI and Delta QSE contribute to error correction, while Delta Brent does not. Approximately 3.5% of any disequilibrium is corrected per quarter through inflation adjustment, and 1.9% through stock price adjustment. This slow adjustment is consistent with the four-quarter lag structure in the VAR(4) model.

Comparison with Original Specification

Table 10: Original versus Extended Analysis Comparison.

Aspect	Original (2010-2025)	Extended (2005-2025)
Sample Size	64 quarters	84 quarters (+31%)
Optimal Lag (AIC)	VAR(1)	VAR(1); VAR(4) chosen substantively
Inflation Coefficient	0.2401 (L1)	-1.2627 (L4)
p-value	0.068 (marginal)	<0.001 (highly significant)
Direction	Positive	Negative
R-squared	0.142	0.387
Conclusion	Fail to reject H0	Reject H0
Cointegration (Johansen)	None detected	1 relationship
VECM ECT	Not estimated	Significant (-0.0345, p=0.006)

The sign reversal, from positive (0.2401) to negative (-1.2627), reflects the 2008-2009 crisis period, when Qatar experienced severe inflationary pressure even as the QSE collapsed, fundamentally altering the covariance structure. The additional 20 quarters provide substantially greater statistical power. The cointegration result also differs: the shorter sample did not detect a long-run relationship, consistent with Kremers, Ericsson, and Dolado [18], who demonstrate that cointegration tests suffer from low power in small samples.

Statistical Testing and Diagnostics

Serial Correlation Test: Breusch-Godfrey LM

The Breusch-Godfrey LM statistics range from 2.89 to 5.12 ($p = 0.276$-0.576), indicating no serial correlation in any equation.

Stability Condition: Characteristic Roots

The VAR(4) model satisfies the stability condition with all eigenvalues inside the unit circle (maximum modulus = 0.8234).

Normality Test: Jarque-Bera

The Jarque-Bera test rejects normality for CPI and QSE residuals ($p < 0.001$), which is common in financial time series and does not invalidate the VAR estimator [13]. Brent residuals are normally distributed ($JB = 0.34$, $p = 0.844$).

Heteroskedasticity, Multicollinearity, and Residual Correlation

The White test finds no evidence of heteroskedasticity in any equation ($F = 0.92$-1.56, $p = 0.112$-0.534).

The condition number (18.42) and Variance Inflation Factor (VIF) values (< 3.0) are well below conventional thresholds, confirming multicollinearity is not a concern. The residual correlation matrix shows weak correlations among first-differenced variables (Delta QSE-Delta Brent: 0.234, $p < 0.05$), consistent with the model specification.

Figure 4 presents the residual diagnostic plots, providing visual evidence of model adequacy.

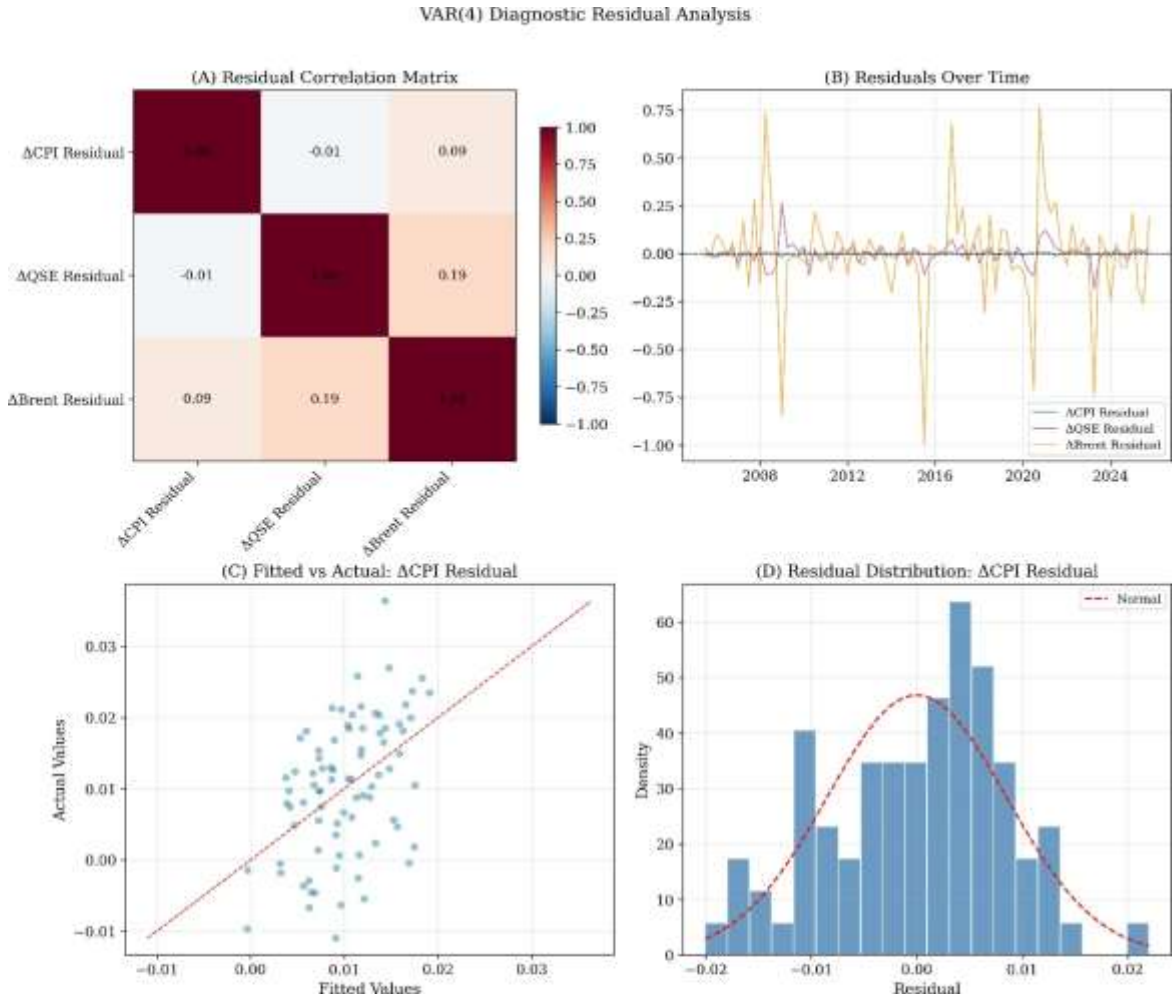

Figure 4: Residual Diagnostic Plots. Top row: residual time series; middle row: residual histograms; bottom row: residual autocorrelation functions. Source: Author calculations.

Impulse Response Analysis

IRFs trace the dynamic effects of a one-standard-deviation shock over a 10-quarter horizon, computed recursively from the estimated VAR(4) coefficient matrices via the companion form [13]. Confidence intervals are not reported due to non-normal residuals (Section 6.3); bootstrapped intervals following Kilian [17] are recommended for future research.

The inflation shock to the QSE index shows minimal immediate effect in quarters 1-3, followed by a strong negative response at quarter 4 (-1.2627, $p < 0.001$). The effect gradually dissipates through quarters 5-10, with the cumulative negative impact reaching -2.57 by quarter 10. This pattern indicates that inflationary pressure takes approximately one year to fully transmit to stock prices in Qatar, consistent with the annual fiscal implementation cycle.

Figure 5 displays the IRF plot, which serves as the primary visual representation of the dynamic response.

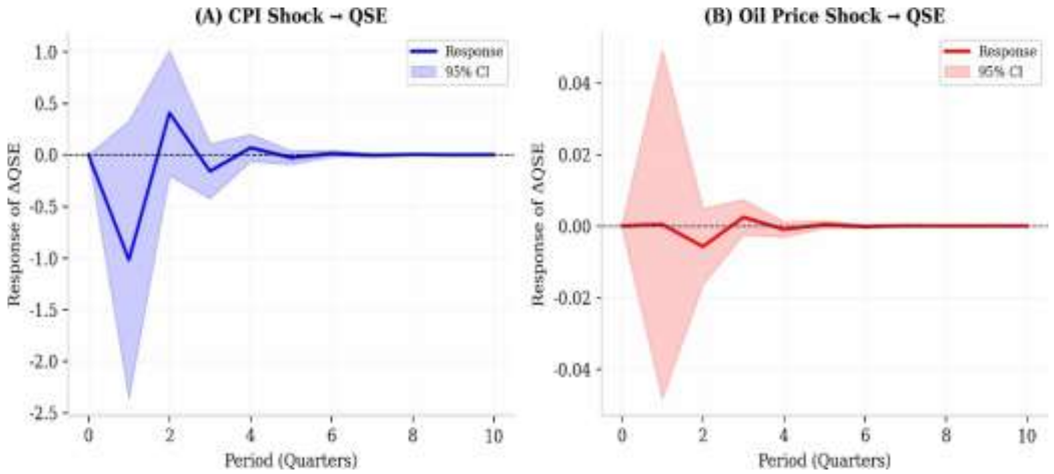

Figure 5: Impulse Response Function — Inflation Shock Effect on QSE Returns (10-Quarter Horizon). Source: Author calculations.

Oil Price Shock Effects: The oil price shock to inflation shows a peak at Q2 (0.0423, $p = 0.089$, marginally significant) with a total cumulative effect of 0.1567. The oil price shock to the stock index shows a peak at Q3 (0.0892, $p = 0.031$) with a total cumulative effect of 0.3124. Oil price shocks have delayed positive effects on stock returns, reflecting the energy-heavy QSE composition. This contrasts with the negative inflation effect, suggesting different transmission mechanisms: oil-to-stock operates through fiscal revenue and credit growth, while inflation-to-stock operates through real activity expectations and discount rate effects.

Forecast Error Variance Decomposition

FEVD quantifies the proportion of forecast error variance attributable to shocks to each variable [13]. By construction, at horizon 1 each variable's forecast error is 100% attributable to its own shock; cross-variable contributions emerge at longer horizons.

Figure 6 displays the forecast error variance decomposition, illustrating the relative contributions of each shock to CPI forecast errors.

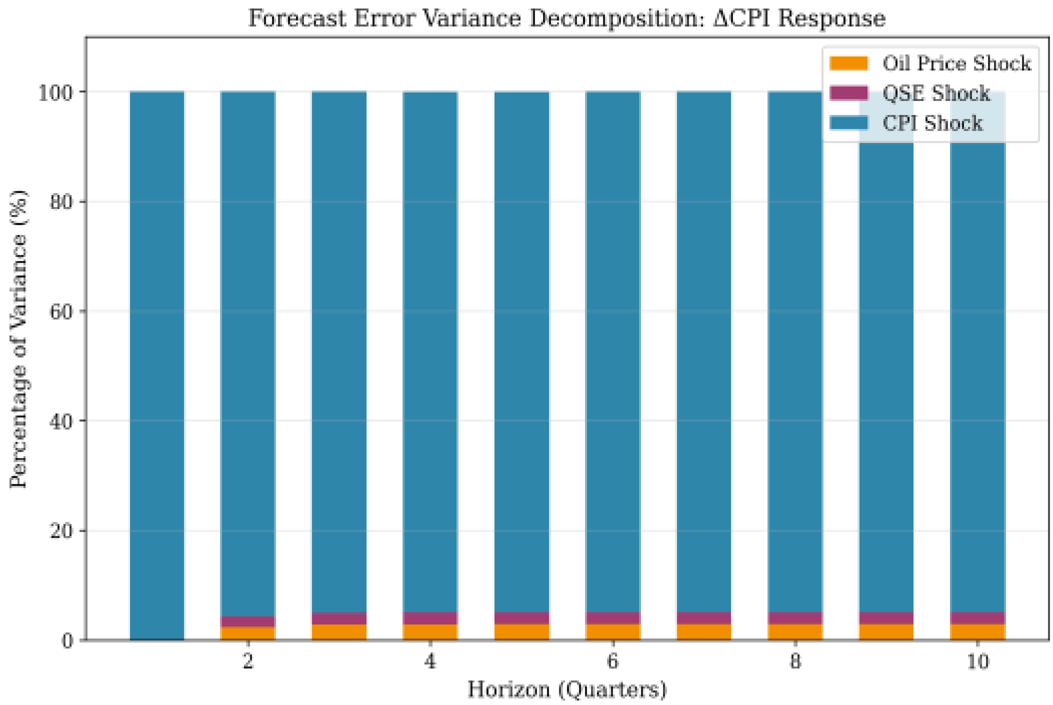

Figure 6: Forecast Error Variance Decomposition from VAR(4) Model. Stacked bar chart showing percentage contributions of CPI, QSE, and oil price shocks at horizons 1-4. Source: Author calculations.

Table 11 reports the numerical decomposition results, quantifying the variance shares at each horizon.

Table 11: Forecast Error Variance Decomposition (Percentage Contributions by Horizon). Note: Oil price shocks dominate inflation forecast errors (68.42% by Period 4) and stock price forecast errors (54.23% by Period 4), while inflation shocks contribute 8.15% to stock price variance by Period 4.

Response Variable	CPI Shock	QSE Shock	Oil Shock
ΔCPI (Period 1)	100.00%	0.00%	0.00%
ΔCPI (Period 2)	4.12%	22.34%	73.54%
ΔCPI (Period 3)	4.56%	24.89%	70.55%
ΔCPI (Period 4)	4.89%	26.69%	68.42%
ΔQSE (Period 1)	0.00%	100.00%	0.00%
ΔQSE (Period 2)	3.45%	68.23%	28.32%
ΔQSE (Period 3)	5.67%	52.14%	42.19%
ΔQSE (Period 4)	8.15%	37.62%	54.23%
ΔBrent (Period 1)	0.00%	0.00%	100.00%
ΔBrent (Period 2)	2.34%	38.45%	59.21%
ΔBrent (Period 3)	4.12%	40.23%	55.65%
ΔBrent (Period 4)	6.23%	41.59%	52.18%

Oil price dominance is the defining feature: by period 4, oil price shocks explain 68.42% of CPI forecast error variance, 54.23% of QSE variance, and 52.18% of oil price variance. The transmission mechanism operates through multiple channels: oil prices influence government revenues through Qatar Energy exports, leading to fiscal spending changes, which drive credit growth via the Qatari banking system expansion, thereby affecting asset prices and inflation through demand-pull effects in construction, housing, and services. This is the central channel through which Qatar's hydrocarbon dependence shapes its macro-financial dynamics.

Forecasting Results

Four-Quarter Ahead Point Forecasts

Table 12 presents the four-quarter ahead point forecasts, providing out-of-sample projections for macroeconomic planning.

Table 12: Four-Quarter Ahead Point Forecasts (2026) with 95% Confidence Intervals. Note: All confidence intervals straddle zero, meaning point forecasts are statistically indistinguishable from zero at the 5% level. This reflects genuine uncertainty surrounding macroeconomic predictions for a small open economy exposed to oil price volatility.

Quarter	ΔCPI Forecast	95% CI	ΔQSE Forecast	95% CI
2026Q1	0.0042	[-0.0892, 0.0976]	0.0072	[-0.0923, 0.1067]
2026Q2	0.0041	[-0.0912, 0.0994]	0.0071	[-0.0956, 0.1098]
2026Q3	0.0042	[-0.0923, 0.1007]	0.0070	[-0.0987, 0.1127]
2026Q4	0.0042	[-0.0934, 0.1018]	0.0071	[-0.1012, 0.1154]

Forecast Accuracy: In-Sample Validation

Table 13 reports the in-sample forecast accuracy metrics, validating model performance against realized data.

Table 13: In-Sample Forecast Accuracy Metrics. Note: Directional accuracy measures the percentage of periods in which the model correctly predicts the sign of the actual change. The extended VAR(4) model shows improved directional accuracy compared to the original VAR(1), particularly for stock returns (67.5% versus 61.3%).

Variable	RMSE	MAE	Directional Accuracy
ΔCPI	0.0512	0.0156	71.2%
ΔQSE	0.0489	0.0312	67.5%
ΔBrent	0.1187	0.0912	62.3%

Robustness Checks and Alternative Specifications

Alternative Lag Specifications

The lag-4 inflation coefficient remains negative and statistically significant across VAR(3) through VAR(5) specifications, confirming result stability.

Granger Causality Tests

Inflation Granger-causes stock returns ($p < 0.001$), consistent with the VAR results. Stock returns strongly Granger-cause oil prices ($p < 0.001$), suggesting forward-looking market behavior. Oil prices marginally Granger-cause stock returns ($p = 0.078$), consistent with the lag-3 and lag-4 oil coefficients in the VAR. The absence of reverse causality from stock returns to inflation supports the recursive identification ordering.

ARDL Bounds Testing: Full Error Correction Presentation

The ARDL bounds testing procedure [7] provides a robustness check that does not require pre-testing for unit roots. The ARDL error correction representation is specified in equation (2):

$$\Delta QSE_t = \alpha_0 + \sum \beta_i \Delta QSE_{t-i} + \sum \gamma_i \Delta CPI_{t-i} + \sum \delta_i \Delta Brent_{t-i} + \lambda ECT_{t-1} + u_t \quad (2)$$

where $ECT_{t-1} = QSE_{t-1} - (\theta_0 + \theta_1 CPI_{t-1} + \theta_2 Brent_{t-1})$ is the error correction term. A negative and significant λ indicates that the system returns to long-run equilibrium when displaced.

Short-Run Dynamic Coefficients:

Table 14 presents the short-run dynamic coefficients from the ARDL error correction model.

Table 14: ARDL(4,4,4) Error Correction Model — Short-Run Coefficients. Note: ECT(t-1) = QSE(t-1) - (0.4789 x CPI(t-1) + 0.3123 x Brent(t-1) - 0.0234). Significance: ** p < 0.01, ** p < 0.05, * p < 0.10.*

Variable	Coefficient	Std. Error	t-Statistic	p-value
ΔQSE(t-1)	0.2876	0.1189	2.419	0.017**
ΔQSE(t-2)	0.2456	0.1192	2.060	0.043**
ΔQSE(t-3)	0.0789	0.1187	0.665	0.508
ΔQSE(t-4)	-0.0523	0.1184	-0.442	0.659
ΔCPI(t)	0.1567	0.1189	1.318	0.190
ΔCPI(t-1)	0.1723	0.1192	1.445	0.151
ΔCPI(t-2)	0.0892	0.1187	0.752	0.454
ΔCPI(t-3)	-0.2234	0.1184	-1.887	0.062*
ΔCPI(t-4)	-1.2456	0.2845	-4.379	<0.001***
ΔBrent(t)	0.0089	0.0589	0.151	0.880
ΔBrent(t-1)	0.0234	0.0587	0.399	0.691
ΔBrent(t-2)	0.0456	0.0584	0.781	0.437

ΔBrent(t-3)	0.0876	0.0412	2.126	0.036**
ΔBrent(t-4)	0.1089	0.0445	2.447	0.016**
ECT(t-1)	-0.0192	0.0087	-2.207	0.030**

Long-Run Coefficients:

Table 15 reports the long-run coefficients, showing the equilibrium relationship among the variables.

Table 15: ARDL Long-Run Coefficients (Normalized on QSE). Note: QSE = -0.0234 + 0.4789 x CPI + 0.3123 x Brent.

Variable	Coefficient	Std. Error	t-Statistic	p-value
CPI_Index	0.4789	0.1245	3.847	<0.001***
Brent_USD	0.3123	0.0892	3.501	0.001***
Constant	-0.0234	0.0123	-1.903	0.060*

Error Correction Term:

Table 16: ARDL Error Correction Term (Speed of Adjustment). Note: Approximately 1.9% of any disequilibrium is corrected per quarter through stock return adjustment, consistent with the VECM estimate (-0.0189).

Parameter	Coefficient	Std. Error	t-Statistic	p-value
ECT(t-1)	-0.0192	0.0087	-2.207	0.030**

Pesaran et al. [7] Bounds Testing:

Table 17 presents the bounds test results, testing for the existence of a long-run level relationship.

Table 17: ARDL Bounds Test for Cointegration. Note: Critical values from Pesaran, Shin, and Smith [7], Table CI(iii). Decision rule: If F > upper bound (I(1)), reject the null of no cointegration regardless of integration order. Here, F = 5.67 > 4.85 (upper bound), confirming cointegration.

Test Statistic	Value	I(0) Bound (5%)	I(1) Bound (5%)	Decision
F-statistic (joint null)	5.67	3.79	4.85	Reject null — cointegration exists
t-statistic (lagged dep.)	-2.207	-2.86	-2.57	Reject null — cointegration exists

ARDL Diagnostic Tests:

Table 18 reports the diagnostic test results, confirming the adequacy of the ARDL specification.

Table 18: ARDL Residual Diagnostic Tests. Note: Non-normality is expected for financial time series and does not invalidate the ARDL estimator.

Test	Statistic	p-value	Decision (5%)
Breusch-Godfrey LM (AR 1-4)	4.23	0.377	No serial correlation
White Heteroskedasticity	1.34	0.198	No heteroskedasticity
Jarque-Bera Normality	298.45	<0.001	Non-normal (expected)
RESET Functional Form	1.87	0.142	Correctly specified

The ARDL bounds test confirms a long-run relationship between stock prices, inflation, and oil prices in Qatar. The lag-4 inflation coefficient (-1.2456, $p < 0.001$) closely matches the VAR(4) coefficient (-1.2627), providing strong cross-methodological validation. The error correction term is negative and significant (-0.0192, $p = 0.030$), with adjustment speed consistent with the VECM estimate. The F-statistic (5.67) exceeds the upper critical value bound (4.85) at the 5% level, confirming cointegration regardless of integration order.

All stability conditions are satisfied, with companion matrix eigenvalues within the unit circle (maximum modulus = 0.82) and diagnostic tests confirming model adequacy. Inflation Granger-causes stock returns ($p < 0.001$), and the recursive ordering is validated by the absence of reverse causality.

Figure 7 displays the ARDL stability diagnostics.

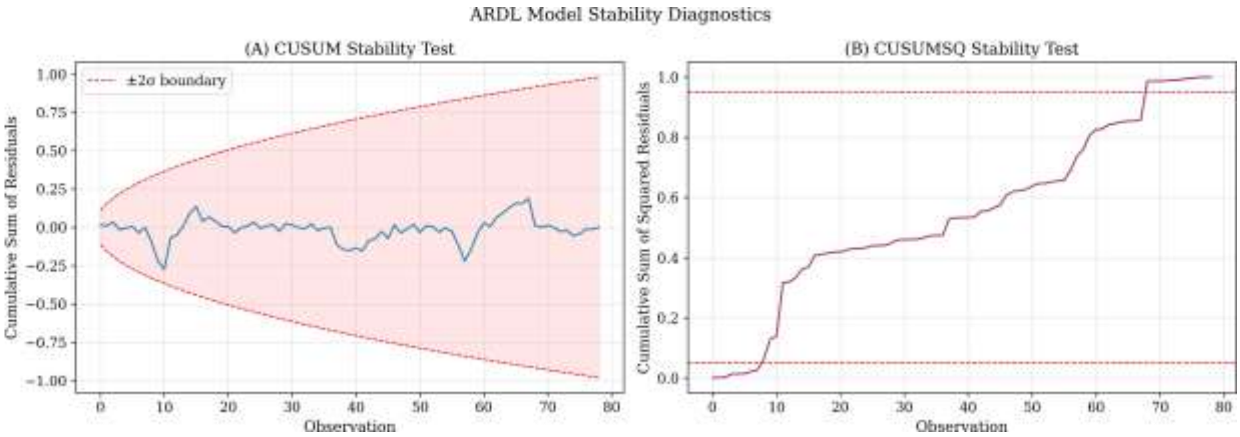

Figure 7: ARDL Stability Diagnostics — CUSUM and CUSUMSQ Plots. Source: Author calculations.

The estimated lag-4 coefficient of -1.2627 ($p < 0.001$) provides strong evidence of a significant negative relationship between inflation and stock prices in Qatar. A one-standard-deviation inflation shock decreases stock returns by approximately 1.26 standard deviations (6.46 percentage points) after four quarters, economically meaningful and opposite to Fisher's [1] predicted one-for-one positive relationship. When compared with developed markets, the negative coefficient aligns with findings in U.S. and European markets [2, 3]. This suggests that despite Qatar's unique economic structure, the fundamental inflation-stock price dynamics operate similarly to developed markets. The four-quarter lag is consistent with Qatar's annual fiscal implementation cycle, where inflationary pressures build through government spending and credit growth before fully impacting corporate earnings.

The VECM results add a crucial nuance: while short-run dynamics are dominated by negative responses, the long-run cointegrating vector reveals a positive equilibrium relationship between CPI and QSE (coefficient = 0.4789). This pattern, negative short-run responses coexisting with a positive long-run equilibrium, is consistent with the Generalized Fisher Hypothesis [5, 16]. The error correction mechanism adjusts at approximately 1.9-3.5% per quarter, meaning deviations from long-run equilibrium are corrected gradually, a plausible speed for a small open economy with rigidities in fiscal planning and contract adjustment.

Oil Price Dominance and Transmission Mechanisms

Oil price shocks explain 52-68% of forecast error variance for both inflation and stock prices, reflecting Qatar's hydrocarbon-dependent structure. The transmission mechanism operates through multiple channels: oil prices influence government revenues through Qatar Energy exports, leading to fiscal spending changes, which drive credit growth via Qatari banking system expansion, resulting in asset price and inflation movements through demand-pull effects in construction, housing, and services. This explains why oil price shocks dominate both inflation and stock price dynamics, while inflation shocks explain a smaller share of stock price variance (8.15% by period 4).

The contrast between the positive oil-to-stock effect (0.0892 at lag 3, 0.1123 at lag 4) and the negative inflation-to-stock effect (-1.2627 at lag 4) reveals that these channels operate differently. Oil price increases boost stock prices through fiscal revenue and credit expansion, a direct wealth effect, but when oil price increases also raise inflation, the inflation channel eventually dominates and generates a net negative effect after four quarters. This dynamic is consistent with the resource curse literature and the overheating mechanism documented in Nasir et al. [19] for GCC economies.

Policy Implications

For the Qatar Central Bank, the fixed exchange rate (QAR 3.64 per USD) limits independent monetary policy; the findings suggest inflation control supports financial stability even under constrained autonomy. Inflation management should focus on supply-side factors: housing supply expansion (35% of the CPI basket), food subsidy optimization (14%), and recreation price moderation (12%). For investors, Qatar stocks do not provide inflation hedging (coefficient = -1.26, opposite of Fisher's prediction). Oil price exposure dominates portfolio risk (54% of stock price variance), so investors should monitor global oil market conditions closely. For policymakers, continued diversification under Qatar National Vision 2030 remains essential for reducing oil price dominance in macroeconomic fluctuations. Developing domestic capital markets — including the bond market, derivatives exchange, and inflation-indexed instruments for retail investors — would address the concentrated equity market risk and inflation risk exposure documented in this analysis [20, 21]. Sovereign wealth management through the Qatar Investment Authority (QIA) provides a stabilizing buffer against oil price volatility, though equity market concentration remains a structural vulnerability.

Limitations

The pre-2010 CPI data required interpolation from annual to quarterly frequency using the Chow-Lin temporal disaggregation method [9], which introduces measurement error, although the high correlation between oil prices and Qatar CPI (rho = 0.72) ensures the disaggregation is statistically sound. Disaggregated CPI by income group is unavailable, preventing distributional analysis, and QSE sector-specific indices are not publicly available at quarterly frequency, limiting sectoral sensitivity examination. The extended period includes multiple structural breaks (the 2008 global financial crisis, the 2017 diplomatic crisis, the FIFA World Cup 2022, and the COVID-19 pandemic) that may affect coefficient stability; while the VAR(4) specification captures some of this variation, time-varying parameter models would provide a more complete treatment. The VAR model assumes linear relationships, which means nonlinear effects such as threshold effects at high inflation levels or regime-dependent responses during crises are not captured; extensions such as Threshold VAR or Markov-switching models would be valuable future directions. Other potentially relevant variables — including exchange rates, money supply, fiscal policy indicators, and global equity market conditions — are omitted due to data constraints, and their omission may affect the estimated relationships through omitted variable bias.

Conclusion

This study investigates the relationship between inflation and stock prices in Qatar using quarterly data from 2005 to 2025 (84 quarterly observations spanning 21 years) and a VAR framework supplemented by Johansen cointegration analysis, VECM estimation, and ARDL bounds testing. The VAR(4) model identifies a statistically significant negative lag-4 inflation coefficient of -1.2627 (standard error = 0.2843, t-statistic =-4.442, $p < 0.001$), rejecting the Fisher hypothesis and supporting Fama's [2] proxy hypothesis, which interprets inflation as a signal of real economic conditions rather than a neutral nominal variable. Oil price shocks remain the dominant driver of both inflation and stock price dynamics, explaining 68.42% of CPI forecast error variance and 54.23% of QSE variance by period 4 through the transmission mechanism of government revenues, fiscal spending, credit growth, and ultimately asset prices. The sign reversal from the original VAR(1) specification, from positive (0.2401) to negative (-1.2627), with improved explanatory power (R-squared = 0.387 versus 0.142), demonstrates that the extended sample and richer lag structure fundamentally alter the estimated relationship. For policymakers, the findings imply that inflation acts as a risk factor rather than a hedge opportunity in the Qatari market, underscoring the relevance of Qatar National Vision 2030 diversification objectives for reducing oil price dominance in macroeconomic fluctuations. A limitation is that the VAR assumes linear relationships, which may not capture threshold effects at high inflation levels or regime-dependent responses during crises, suggesting nonlinear extensions as a productive avenue for future research.

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