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Research Article

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Do Global Oil Prices Explain Inflation in Bangladesh? Evidence from Annual Data, 1990–2025

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1. Abstract

This study examines whether changes in global oil prices are associated with consumer price inflation in Bangladesh once exchange-rate depreciation, money growth, real GDP growth and import openness are taken into account. Annual data for 1990–2025 (36 observations) are analyzed with Dickey–Fuller tests and OLS regression. Inflation, oil-price growth, exchange-rate depreciation and real GDP growth are stationary in levels, while M2 growth and the import-to-GDP ratio are not and enter in first differences, which leaves 35 observations. The model has little explanatory power: it is not jointly significant ($F(5, 29) = 0.74$, $p = 0.603$) and the adjusted R-squared is negative (−0.040). Oil-price growth has a small negative coefficient (−0.009, $p = 0.635$), and no other regressor is significant. A Durbin–Watson statistic of 0.98 points to positive serial correlation, so Newey–West standard errors with two lags are also reported, and they leave the conclusions unchanged. The results do not show that world oil prices explain year-to-year inflation in Bangladesh over this period. Administered fuel prices, annual data and omitted domestic factors are possible reasons. The study offers a baseline for later work with monthly data and a richer model.

Keywords: inflation; oil prices; exchange rate; money supply; Bangladesh; time series

2. Introduction

2.1 Background

Bangladesh relies heavily on imported fuel, so movements in world oil prices can reach households and firms through several channels. They change the cost of transport and energy, raise or lower the import bill, and put pressure on the taka. Each of these can feed into consumer prices. Inflation in Bangladesh has also been far from stable. In the annual data used here it ranges from 1.94 percent to 10.62 percent, with a mean of 6.36 percent, while annual oil-price growth swings between −47 percent and +63 percent.

Inflation matters for ordinary households and for policy. It erodes the purchasing power of wages and savings, it hits lower-income households hardest, and it shapes decisions on interest rates and money growth. If world oil prices were a major driver of Bangladeshi inflation, policy would need to focus on shielding the economy from external energy shocks. If they were not, attention should shift to domestic factors.

2.2 Research Problem

Public discussion often links Bangladesh's inflation to global energy prices. Yet inflation also depends on monetary conditions, the exchange rate, domestic demand and the import share of the economy, and these move together with oil prices at times. It is not clear how much of the variation in annual inflation is associated with oil prices once these other factors are held constant.

2.3 Research Gap

Evidence on oil-price pass-through comes mostly from large advanced economies, where studies have documented that the inflationary effect of oil shocks has weakened over time. Evidence for a small, import-dependent developing economy such as Bangladesh is thinner in the sources reviewed here, and few studies set oil prices beside money growth, depreciation and openness in one transparent time-series model that reports the diagnostics and the weak results openly.

2.4 Research Objectives and Questions

The general objective is to examine the association between global oil-price changes and consumer price inflation in Bangladesh using a time-series OLS framework. The specific objectives are to (i) estimate the association between oil-price growth and inflation; (ii) assess the role of exchange-rate depreciation; (iii) assess the role of money growth; (iv) assess the roles of real GDP growth and import openness as controls; and (v) test whether the model passes standard diagnostic checks.

The research questions are: (1) Is faster growth in world oil prices associated with higher inflation in Bangladesh? (2) Do exchange-rate depreciation, money growth, real GDP growth

and import openness help explain inflation? (3) Do the results hold when standard errors allow for serial correlation?

2.5 Contribution of the Study

The study makes three contributions. First, it provides a simple, replicable estimate of the association between oil prices and inflation in Bangladesh over 36 years. Second, it tests each series for a unit root before estimation and reports a negative adjusted R-squared and insignificant coefficients as they are. Third, it shows that standard errors should allow for serial correlation, since the Durbin–Watson statistic is low, and it reports Newey–West results beside the OLS ones.

2.6 Structure of the Article

Section 3 reviews the literature and develops the hypotheses. Section 4 describes the data and methodology. Section 5 presents the results. Section 6 discusses the findings, implications and limitations, and concludes.

3. Literature Review and Hypothesis Development

3.1 Previous Literature

The modern literature on oil and the economy starts with Hamilton (1983), who showed that oil price increases preceded most US recessions after the Second World War. Later work asked how much of the 1970s stagflation oil really explained. Barsky and Kilian (2004) argued that the role of oil was smaller than often claimed and that monetary conditions and other forces also mattered. Blanchard and Galí (2010) found that oil shocks had much smaller effects on inflation and output in the 2000s than in the 1970s, and they pointed to smaller shocks, more flexible labor markets and better monetary policy. Hooker (2002) found that the pass-through of oil price changes into US inflation fell sharply after the early 1980s. Kilian (2009) showed that the effects differ with the source of the shock: a rise in oil prices driven by global demand has different macroeconomic effects from one driven by a supply disruption.

A second strand studies how a weaker currency passes into prices. Campa and Goldberg (2005) found that exchange-rate pass-through into import prices is often incomplete in the short run and larger in the long run, and that it differs across countries and sectors. Taylor (2000) argued

that pass-through falls when inflation is low and stable, because firms expect cost increases to be temporary. For a country that imports fuel, food and intermediate goods, depreciation can raise domestic prices even when world prices are flat.

A third strand is monetary. Friedman (1963) argued that inflation is, in the end, a monetary phenomenon driven by money growing faster than output. This view makes money growth and real output growth natural regressors in any inflation equation.

3.2 Theoretical Background

Four channels link the regressors to inflation. The cost-push channel says higher oil prices raise energy and transport costs, which firms pass into prices. The imported-inflation channel says a depreciating taka makes imports more expensive in local currency, and a larger import share makes the economy more exposed to this. The monetary channel says faster money growth adds demand and raises prices. The demand-pull channel says that when output grows faster than capacity, prices rise. The sizes of these effects depend on how much of the price level is administered, how quickly firms reprice, and whether inflation expectations are anchored.

3.3 Research Gap

Most of the evidence above comes from advanced economies with market-set fuel prices and credible monetary regimes. In Bangladesh, fuel prices are set by the government and do not necessarily move with world prices, so the oil-inflation link may be weaker or may work with long lags. A model for Bangladesh that tests stationarity first, includes the main competing explanations and checks serial correlation fills a modest but useful gap.

3.4 Hypothesis Development

H1. Faster growth in world oil prices is associated with higher inflation in Bangladesh (cost-push channel). *H2.* Faster exchange-rate depreciation is associated with higher inflation (imported-inflation channel). *H3.* Higher growth in broad money (M2) is associated with higher inflation (monetary channel). *H4.* Faster real GDP growth is associated with higher inflation (demand-pull channel). *H5.* A rising import-to-GDP ratio is associated with higher inflation, because a more import-exposed economy transmits external price changes more strongly.

4. Data and Methodology

4.1 Data and Sample

The study uses annual data for Bangladesh from 1990 to 2025, giving 36 observations. The series were compiled in a single workbook (Bangladesh_macro_data_1990-2025.xlsx) and analyzed in Stata 18 using the dataset and do-file described in Talha (2026a, 2026b). Inflation, the exchange rate, M2, real GDP growth and imports are standard series from the World Development Indicators (World Bank, n.d.-b), and the world oil price is from the World Bank Commodity Price Data (World Bank, n.d.-a). The sample includes the 2007–08 global food and fuel price spike, the pandemic years and the recent period of rising prices.

4.2 Variables

The dependent variable is *CPI inflation*, the annual percentage change in consumer prices. The key independent variable is *oil-price growth*, the annual percentage change in the world oil price. The other regressors are *exchange-rate depreciation* (the annual percentage change in taka per US dollar, so a positive value means a weaker taka), *M2 growth*, *real GDP growth* and *import-to-GDP* (imports of goods and services as a percentage of GDP).

4.3 Model Specification

The estimated equation is:

$$INF_t = \beta0 + \beta1\ OIL_t + \beta2\ DEP_t + \beta3\ \Delta M2_t + \beta4\ GDP_t + \beta5\ \Delta IMP_t + \varepsilon_t$$

where INF is CPI inflation, OIL is oil-price growth, DEP is exchange-rate depreciation, M2 is money growth, GDP is real GDP growth, IMP is the import-to-GDP ratio, and Δ is the first difference. M2 growth and the import ratio enter in first differences because they have unit roots in levels (Section 5.2); the other variables are stationary and enter in levels.

4.4 Econometric Method

Each series was first examined with a Dickey–Fuller test (Dickey & Fuller, 1979) run under Stata's default settings, with no augmentation lags, and judged against the 5 percent critical value of −2.972 (−2.975 for the differenced series). Series with a unit root were differenced once. The equation was estimated by ordinary least squares (Wooldridge, 2020) in Stata 18 (StataCorp, 2023). The fitted model was then checked with the Breusch–Pagan test (Breusch &

Pagan, 1979) for non-constant error variance, variance inflation factors for overlap among the regressors, and the Durbin–Watson statistic (Durbin & Watson, 1950) for first-order autocorrelation. Because the Durbin–Watson value was low, the model was estimated again with Newey–West standard errors with two lags (Newey & West, 1987), which stay valid when the errors are serially correlated.

5. Results and Empirical Findings

5.1 Descriptive Statistics

Table 1 summarizes the data. CPI inflation averages 6.36 percent with a standard deviation of 2.26, ranging from 1.94 to 10.62 percent. Oil-price growth is by far the most volatile series: it averages 7.63 percent with a standard deviation of 26.96 and ranges from −47.0 to +63.0 percent. Exchange-rate depreciation averages 3.81 percent and is right-skewed (skewness 0.97), with a maximum of 15.2 percent and a minimum of −2.8 percent. M2 growth averages 14.13 percent, real GDP growth averages 5.70 percent with little spread (standard deviation 1.14), and imports average 17.67 percent of GDP, rising from 11.3 to 26.6 percent.

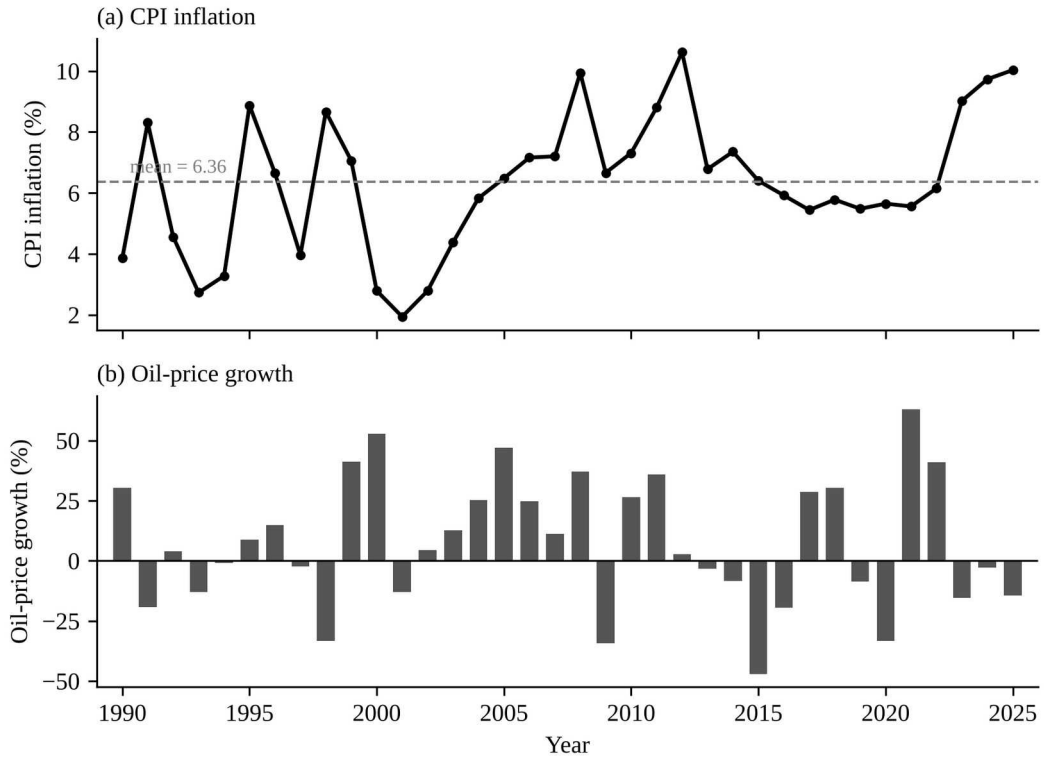
Table 1
Descriptive Statistics, 1990–2025

Variable	Obs.	Mean	SD	Min	Max
CPI inflation (%)	36	6.365	2.260	1.940	10.620
Oil-price growth (%)	36	7.626	26.964	−46.999	63.033
Exchange-rate depreciation (%)	36	3.806	3.959	−2.763	15.245
M2 growth (%)	36	14.125	3.904	6.954	22.439
Real GDP growth (%)	36	5.701	1.135	3.340	7.880
Import/GDP (%)	36	17.672	4.133	11.253	26.627

Note. Author’s calculations in Stata.

Figure 1 plots the two series. Inflation stays between about 2 and 11 percent and peaks at 10.62 percent in 2012, while oil-price growth swings from −47.0 percent in 2015 to +63.0 percent in 2021. The latest years stand out. Inflation rose from 6.1 percent in 2022 to 10.0 percent in 2025, even though oil-price growth was negative in each of 2023, 2024 and 2025, which suggests that factors other than world oil prices drove the recent rise.

Figure 1
CPI Inflation and Oil-Price Growth, 1990–2025



Note. Author's calculations from the study dataset. The dashed line is the mean inflation rate (6.36 percent).

5.2 Correlation and Preliminary Analysis

Table 2 shows the correlations in levels. Inflation is most strongly correlated with the import-to-GDP ratio (0.324) and with exchange-rate depreciation (0.259), and is almost uncorrelated with oil-price growth (−0.079), M2 growth (−0.032) and real GDP growth (0.040). Among the regressors, M2 growth and the import ratio are fairly strongly correlated (0.570), and oil-price growth correlates with real GDP growth (0.376). The weak link between oil and inflation is the first sign that oil-price growth may not explain inflation in this sample, and Figure 2 shows the same weak link in a scatter plot.

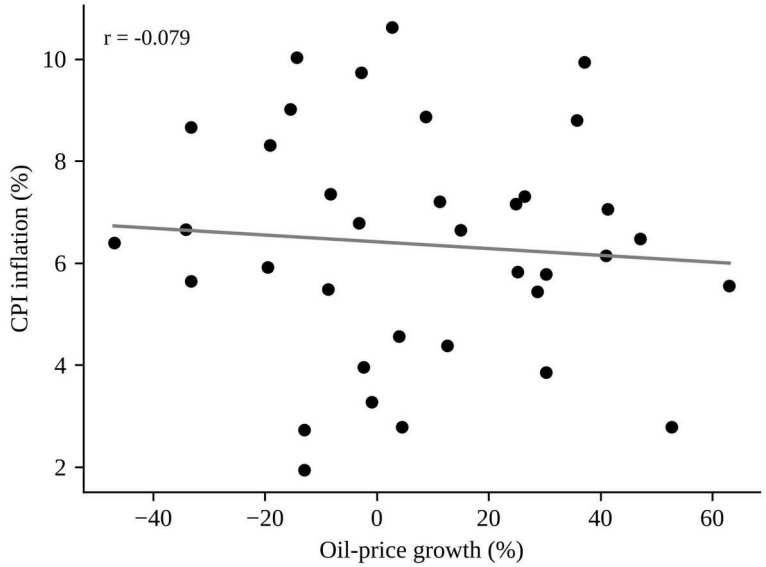
Table 2
Correlation Matrix (Levels)

Variable	(1)	(2)	(3)	(4)	(5)	(6)
(1) CPI inflation	1.000					
(2) Oil-price growth	−0.079	1.000				
(3) Exchange-rate depreciation	0.259	−0.134	1.000			
(4) M2 growth	−0.032	0.251	−0.264	1.000		
(5) Real GDP growth	0.040	0.376	−0.175	0.175	1.000	

Variable	(1)	(2)	(3)	(4)	(5)	(6)
(6) Import/GDP	0.324	0.127	−0.153	0.570	0.357	1.000

Note. N = 36.

Figure 2
CPI Inflation against Oil-Price Growth



Note. Author's calculations from the study dataset. The line is the simple OLS fit; r = −0.079.

Table 3 reports the Dickey–Fuller tests. Inflation (p = 0.014), oil-price growth (p = 0.000), exchange-rate depreciation (p = 0.007) and real GDP growth (p = 0.001) reject a unit root in levels. M2 growth (p = 0.188) and the import-to-GDP ratio (p = 0.416) do not, but both are stationary after one difference (p = 0.000 in each case). The regression therefore uses levels for four variables and first differences for M2 growth and the import ratio, and the loss of one observation leaves 35.

Table 3
Dickey–Fuller Unit Root Tests

Variable	Level (P value)	First difference (P value)	Treatment
CPI inflation	0.0139	–	Level
Oil-price growth	0.0000	–	Level
Exchange-rate depreciation	0.0070	–	Level
M2 growth	0.1878	0.0000	First difference
Real GDP growth	0.0006	–	Level
Import/GDP	0.4155	0.0000	First difference

Note. Cells show the MacKinnon (1996) approximate p-value. The 5% critical value is −2.972 (−2.975 for differenced series).

5.3 Main Empirical Results

Table 4 reports the regression. The model fits poorly. R-squared is 0.113 and the adjusted R-squared is −0.040, which means the model does worse than simply using the average inflation rate. The overall F-test cannot reject that all slopes are zero (F(5, 29) = 0.74, p = 0.603), and the root mean squared error of 2.30 is close to the standard deviation of inflation itself.

Table 4
Regression Results (Dependent Variable: CPI Inflation)

Variable	Coef.	OLS SE	OLS p	N–W SE	N–W p
Oil-price growth	−0.0093	0.0194	0.635	0.0115	0.425
Exchange-rate depreciation	0.1464	0.1005	0.156	0.1002	0.155
Δ M2 growth	−0.0879	0.1362	0.524	0.0812	0.288
Real GDP growth	0.2735	0.3806	0.478	0.3212	0.402
Δ Import/GDP	0.1140	0.2279	0.621	0.1604	0.483
Constant	4.3561	2.2342	0.061	1.9997	0.038

Note. N = 35. R^2 = 0.113; adjusted R^2 = −0.040; OLS F(5, 29) = 0.74, p = 0.603; Newey–West (N–W) F(5, 29) = 1.09, p = 0.386; root MSE = 2.296. N–W standard errors use two lags.

No coefficient on a regressor is significant. The oil-price coefficient is small and negative (−0.009; 95 percent confidence interval −0.049 to 0.030), which is the opposite of H1 but also statistically indistinguishable from zero. The interval is informative: it rules out an effect larger than about 0.03 percentage points of inflation per percentage point of oil-price growth, so even a 30-point jump in oil-price growth would move inflation by less than one point. Exchange-rate depreciation has the expected positive sign (0.146; p = 0.156): one extra point of depreciation goes with about 0.15 points more inflation, but the estimate is imprecise. Money growth, real GDP growth and the import ratio are also insignificant. None of H1 to H5 is supported at conventional levels.

5.4 Robustness and Additional Analysis

The Breusch–Pagan test does not reject constant variance (chi-square(1) = 0.68, p = 0.408), and the variance inflation factors are low (mean 1.37, maximum 1.78). The Durbin–Watson statistic is 0.98, well below 2, which signals positive serial correlation in the residuals. This is common with annual macroeconomic series and means the OLS standard errors may be too small. Table 4 therefore also reports Newey–West standard errors with two lags. They change the individual p-values moderately. The largest change is for oil-price growth, whose standard error falls from

0.0194 to 0.0115 and whose p-value falls from 0.635 to 0.425, but no slope comes close to significance. The joint test is still insignificant ($F(5, 29) = 1.09$, $p = 0.386$). The conclusion does not depend on how the standard errors are computed.

5.5 Other Findings

Inflation itself is stationary ($p = 0.014$), which means it tends to return to its long-run mean of about 6.4 percent instead of drifting. The constant is the only significant term in the Newey–West model (4.36, $p = 0.038$), which fits the picture: inflation hovers around a baseline that none of the five regressors shifts reliably. Oil-price growth is the most volatile variable in the data, so its failure to show up in inflation is not the result of a lack of variation.

6. Discussion and Conclusion

6.1 Summary of Main Findings

Over 1990–2025 the data show no statistically reliable association between world oil-price growth and consumer price inflation in Bangladesh. The same holds for exchange-rate depreciation, money growth, real GDP growth and import openness. The model explains little, with a negative adjusted R-squared. It passes the heteroskedasticity and multicollinearity checks, and shows positive serial correlation, which does not change the conclusions once Newey–West standard errors are used.

6.2 Theoretical and Practical Implications

The result is consistent with the finding in other countries that oil pass-through into consumer prices has weakened (Blanchard & Galí, 2010; Hooker, 2002), and with the view that oil effects depend on the source of the shock (Kilian, 2009). One possible reason specific to Bangladesh is that domestic fuel prices are administered and adjusted infrequently, so world price movements reach consumers with delays or not at all. Practically, the results suggest that policymakers should not treat world oil prices as the main driver of annual inflation, and that domestic factors such as food prices, supply constraints and market structure deserve attention. They also suggest that holding domestic fuel prices steady may shift costs to public finances instead of removing them.

6.3 Limitations

The study has several limits. Annual data and 35 observations give low power, and the model is contemporaneous, so effects that appear with a lag of several months would be missed. The consumer price index is an aggregate and hides energy and food components. Important determinants such as food prices, administered fuel prices, interest rates and supply shocks are omitted. The Dickey–Fuller tests use no lags or trend, and mixing levels and differences complicates interpretation. Structural breaks around 2007–08 and the pandemic are not modeled, and the data sources should be checked against the original publications.

6.4 Future Research

Future work could use monthly data with distributed lags or an ARDL or VAR framework, separate food and energy inflation, include the domestic fuel price directly, test for asymmetric responses to oil price rises and falls, and add dummies or break tests for 2007–08 and 2020–22.

6.5 Conclusion

This study asked whether global oil prices help explain inflation in Bangladesh. On annual data for 1990–2025 they do not, and neither do the other four regressors. The result may reflect administered fuel prices and the limits of annual data more than a true absence of pass-through, so it should be read as a baseline for richer, higher-frequency work.

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