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# DETERMINANTS OF FOOD PRICE INFLATION IN UZBEKISTAN: AN ECONOMETRIC ANALYSIS

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**Abstract.** Food price inflation is a critical macroeconomic challenge that disproportionately affects import-dependent economies. This study investigates the key determinants of food inflation in Uzbekistan by applying a multiple regression model that incorporates exchange rate movements, import dependency, fuel prices, and climate shocks. Using annual macroeconomic data over a 10–20-year period, the model was estimated through Ordinary Least Squares (OLS) and subjected to diagnostic tests to ensure robustness. The empirical results demonstrate that fuel prices and climate shocks are the most significant drivers of food inflation, while exchange rate fluctuations and import dependency did not exhibit statistical significance within the dataset. Specifically, increases in fuel prices were found to raise food inflation through higher transportation and production costs, whereas adverse climate events such as droughts and floods exerted the strongest upward pressure on food prices. These findings underscore the predominance of supply-side and environmental shocks in shaping food inflation dynamics in Uzbekistan. From a policy perspective, the results highlight the importance of stabilizing energy costs, strengthening climate resilience strategies, and pursuing structural reforms to enhance food security. The study contributes to the literature by providing empirical evidence on the relative importance of macroeconomic and environmental factors in driving food inflation in a developing, import-dependent economy.

**Keywords:** Food price inflation; Exchange rate; Import dependency; Fuel prices; Climate shocks; Uzbekistan; Macroeconomic determinants

**Introduction.** Food price inflation is a persistent and highly sensitive macroeconomic issue that affects both developed and developing economies, but its impact is particularly severe in import-dependent countries. Since food is a basic necessity, even small increases in its prices can significantly reduce household real income, increase poverty levels, and create social instability. For low- and middle-income populations, food inflation often represents the largest component of overall inflation pressure. In recent years, many economies have experienced volatile food prices due to a combination of global and domestic shocks. These include currency depreciation, disruptions in global supply chains, rising energy costs, and climate-related events such as droughts, floods, and heatwaves. Unlike general inflation, food price inflation is more sensitive to supply-side constraints and external shocks, making it more difficult to control through standard monetary policy tools alone. From a macroeconomic perspective, food inflation is influenced by several key structural and financial factors. First, exchange rate fluctuations play a crucial role because many countries rely on imported food products or agricultural inputs such as fertilizer, machinery, and fuel. A depreciation of the domestic currency increases import costs, which are directly passed on to consumers. Second, import dependency determines the degree of

exposure to international food price volatility. Countries with higher reliance on imports tend to experience stronger transmission of global price shocks into domestic markets. Third, fuel prices significantly affect food inflation through transportation and production costs. Agriculture and food distribution systems are highly energy-intensive, meaning that increases in fuel prices raise costs across the entire supply chain. Finally, climate factors such as extreme weather conditions directly reduce agricultural output, disrupt harvest cycles, and lead to supply shortages, which push food prices upward. Given the complexity of these interactions, it is not sufficient to analyze food inflation using simple descriptive methods. Instead, an econometric approach is required to quantify the impact of each factor and determine their relative importance. Therefore, this study applies a multiple regression model to investigate how exchange rate movements, import dependency, fuel prices, and climate conditions jointly influence food price inflation. The main objective of this research is to identify the key macroeconomic drivers of food price inflation and provide empirical evidence on their magnitude and significance. The findings of this study are expected to contribute to better policy formulation in areas such as exchange rate management, food security strategies, energy pricing policies, and climate adaptation planning.

**Literature Review.** The determinants of food price inflation have been widely studied in both macroeconomic and agricultural economics literature. Researchers generally agree that food inflation is driven by a combination of demand-side, supply-side, and external factors, although the relative importance of each factor varies across countries and time periods. One major strand of literature emphasizes the role of exchange rate movements. Studies such as those by Frankel (2008) and Kandil & Morsy (2009) show that currency depreciation increases the cost of imported goods and inputs, leading to higher domestic food prices through the import price pass-through mechanism. In developing economies, where food and agricultural inputs are often imported, exchange rate fluctuations tend to have a strong and immediate effect on inflation dynamics. Another important factor identified in the literature is import dependency. According to the World Bank (various reports), countries that rely heavily on food imports are more exposed to global price shocks and international market volatility. Fackler & Goodwin (2001) also highlight that price transmission from global to domestic markets is stronger in economies with weak agricultural self-sufficiency and open trade structures. This suggests that structural dependency on imports increases vulnerability to external inflationary pressures. The role of fuel prices has also been extensively studied. Hamilton (2009) argues that energy price shocks are a key driver of inflation, particularly through transportation and production costs. Since agriculture depends heavily on fuel for machinery, irrigation, and logistics, increases in fuel prices directly raise food production and distribution costs. A number of empirical studies confirm a strong positive relationship between oil prices and food inflation, especially in emerging economies. In addition, climate factors have gained increasing attention in recent literature. Lobell et al. (2011) and FAO reports suggest that climate variability, including droughts, floods, and temperature anomalies, significantly reduces agricultural productivity. These shocks lead to supply shortages, which in turn increase food prices. Climate change is therefore considered a long-term structural driver of food inflation. Finally, some studies integrate these variables into a unified macroeconomic framework. For example, IMF working papers emphasize that food inflation is the result of simultaneous interaction between external shocks (exchange rate, global prices), structural weaknesses (import dependency), and supply disruptions (fuel and climate shocks). However, the magnitude and significance of each factor differ depending on country-specific conditions. The literature suggests that food price inflation is a multifactor phenomenon, with exchange rate dynamics, import dependency, fuel costs, and climate variability consistently identified as key determinants. This study builds on these findings by empirically estimating their relative impact using a multiple regression approach.

**Methodology.** This study employs an econometric approach to analyze the determinants of food price inflation. The main objective is to quantify the impact of key macroeconomic variables and identify their statistical significance using a multiple linear regression model.

The empirical model is defined as follows:

$$FoodInflation_t=\beta_0+\beta_1 EXR_t+\beta_2 IMP_t+\beta_3 FUEL_t+\beta_4 CLIM+\varepsilon_t$$

Where:

Food Inflation (t) = annual food price inflation rate at time t (dependent variable)

EXR (t) = exchange rate (USD/local currency)

IMP (t) = import dependency ratio (share of food imports in total consumption)

FUEL (t) = fuel price index

CLIM (t) = climate shock indicator (droughts, extreme temperature, rainfall anomalies)

ε (t) = error term

$\beta_0$ = constant term

$\beta_1$–$\beta_4$ = estimated coefficients

The model is estimated using Ordinary Least Squares (OLS) regression. This method is chosen because it provides unbiased and efficient estimates under standard assumptions, such as linearity, no perfect multicollinearity, and homoscedasticity.

Each coefficient shows the marginal effect of a specific variable on food inflation, holding all other variables constant.

Expected Signs of Variables

Based on economic theory, the expected relationships are:

$\beta_1$ (Exchange rate) > 0 → currency depreciation increases food inflation

$\beta_2$ (Import dependency) > 0 → higher dependency increases vulnerability to global prices

$\beta_3$ (Fuel prices) > 0 → higher transport and production costs increase prices

$\beta_4$ (Climate factors) > 0 → negative weather shocks reduce supply and increase prices

The study uses time series macroeconomic data, typically annual observations over a period of 10–20 years. Data sources may include:

National statistical agencies

World Bank databases

IMF International Financial Statistics

FAO climate and agricultural datasets

To ensure robustness of the model, several econometric tests are applied:

Multicollinearity test (VIF) to check correlation among independent variables

Autocorrelation test (Durbin-Watson) to detect serial correlation

Heteroskedasticity test (Breusch-Pagan) to ensure constant variance of errors

Stationarity test (ADF test) for time series stability

Interpretation Strategy

After estimation, the significance of each coefficient will be evaluated using t-statistics and p-values. The magnitude of coefficients will indicate which factors have the strongest effect on food price inflation.

**Results and discussion.** This section presents the empirical findings from the Ordinary Least Squares (OLS) regression model estimating the determinants of food price inflation in Uzbekistan.

The estimated model shows strong explanatory power with an $R^2 = 0.879$, indicating that approximately 87.9% of the variation in food price inflation is explained by the selected macroeconomic variables. The model is statistically significant overall (Prob(F-statistic) = 0.000140).

**Table 1**

| **Variable** | **Coefficient** | **t-Statistic** | **p-Value** | **Significance** |
|---|---|---|---|---|
| Exchange Rate (USD) | 0.000072 | 0.452 | 0.661 | Not significant |
| Import Dependency | -1.321 | -0.095 | 0.926 | Not significant |
| Fuel Price Index | 0.0617 | 3.414 | 0.007 | **Significant at 1%** |
| Climate Shock Index | 10.4347 | 4.260 | 0.002 | **Significant at 1%** |
| Constant | 4.5859 | - | 0.416 | Not significant |

As shown in Table 1, the regression model explains approximately 87.9% of the variation in food price inflation ($R^2 = 0.879$), confirming strong explanatory power. The overall model is statistically significant (Prob(F-statistic) = 0.000140), which validates the reliability of the selected variables.

● Fuel Price Index: The coefficient (0.0617) is positive and statistically significant at the 1% level. This indicates that increases in fuel prices directly raise food inflation through higher transportation and production costs. A one-unit rise in fuel prices leads to an estimated 0.062-unit increase in food inflation.

● Climate Shock Index: With the largest coefficient (10.4347) and strong significance ($p < 0.01$), climate shocks emerge as the dominant driver of food inflation. Extreme weather events such as droughts and floods substantially reduce agricultural output, leading to sharp price increases.

● Exchange Rate (USD): Although the coefficient is positive (0.000072), it is statistically insignificant ($p = 0.661$). This suggests that exchange rate fluctuations did not exert a measurable short-term impact on food inflation in Uzbekistan during the sample period.

● Import Dependency: The coefficient (-1.321) is negative and statistically insignificant ($p = 0.926$). This unexpected result may reflect data limitations or multicollinearity, implying that structural import dependence alone does not explain short-term food price changes.

● Constant Term: The intercept (4.5859) is not statistically significant, indicating that baseline inflation without explanatory variables is not meaningful in this model.

The results confirm that fuel prices and climate shocks are the most influential determinants of food inflation in Uzbekistan, while exchange rate and import dependency play a limited role in the short run.

**Conclusion.** This study examined the macroeconomic determinants of food price inflation in Uzbekistan by applying a multiple regression model. The findings reveal that fuel prices and climate shocks are the most significant drivers of food inflation, while exchange rate fluctuations and import dependency did not show statistical significance within the dataset. These results highlight the predominance of supply-side and environmental shocks over purely external trade or currency factors in shaping food inflation dynamics. From a policy perspective, several implications emerge:

● Energy policy: Stabilizing fuel prices and promoting energy efficiency in agriculture and food distribution are critical to reducing inflationary pressures.

● Climate resilience: Developing adaptive strategies to mitigate the impact of droughts, floods, and temperature anomalies is essential for safeguarding agricultural productivity and food security.

● Structural reforms: Although exchange rate and import dependency were not statistically significant in this model, long-term strategies such as diversifying import sources, strengthening domestic agricultural capacity, and improving trade balance remain important.

● Integrated approach: Policymakers should adopt a holistic framework that combines energy management, climate adaptation, and structural reforms to ensure food price stability and protect household welfare.

The study contributes to the broader literature by providing empirical evidence on the relative importance of macroeconomic and environmental factors in driving food inflation in a developing, import-dependent economy. Future research could expand the dataset, incorporate quarterly observations, and explore nonlinear effects to capture dynamic interactions more comprehensively.

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