CONFERENCE PRESENTATION

Assessment of Factors Affecting the Cost of Agricultural Products in Surkhandarya Region

A Multivariate Regression Analysis • 2012–2024

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Prepared for the ICEBEF Conference

Why This Study Matters

Agrarian Region

Agriculture plays an important role in the economy of Surkhandarya.

Cost Pressures

Fertilizers, fuel, machinery, spare parts and some feed products are imported or dollar-priced.

Exchange-Rate Channel

Soum depreciation can increase the cost of imported agricultural inputs.

KEY RESEARCH QUESTION

Which factor better explains changes in agricultural prices: general consumer inflation or currency depreciation?

Agricultural Profile of Surkhandarya

UZS 36,655.9 bn

2024 output: agriculture, forestry and fisheries

7.8%

Share of Uzbekistan’s national total

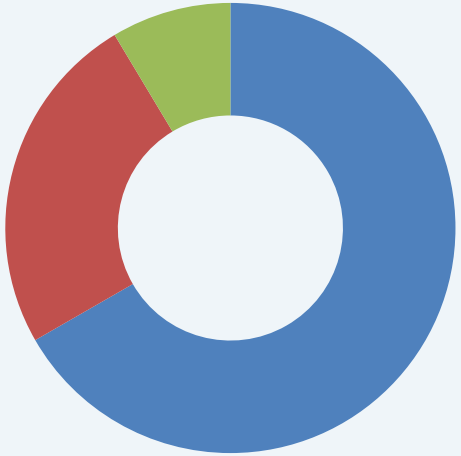
66.7%

Dehqan and household plots

24.7%

Farms

Structure of Producers



Small producers have limited capacity to absorb sharp increases in input costs without passing them on.

Research Aim and Objectives

Aim

To estimate how consumer inflation and exchange-rate depreciation affected agricultural price growth in Surkhandarya during 2012–2024.

Research Focus

Annual changes in the implicit price deflator of regional agricultural output.

- Calculate a proxy indicator for agricultural price growth.
- Estimate the relationship with consumer inflation and soum depreciation.
- Build a multiple linear regression model using OLS.
- Evaluate model diagnostics and develop practical recommendations.

Literature and Research Gap

International Evidence

Energy, the US dollar and fertilizer costs influence agricultural price movements (Baffes & Haniotis; Mitchell).

Import-Price Channel

Exchange-rate changes are passed through to import prices (Campa & Goldberg).

Regional Evidence

Studies of Surkhandarya have examined production volumes and selected crop prices, but the macroeconomic drivers of overall agricultural prices remain underexplored.

CONTRIBUTION OF THIS STUDY

The study uses regional data to estimate the separate effects of currency depreciation and consumer inflation within one transparent regression framework.

Data and Sample

2012–2024
Study period

13
Annual observations

OLS
Estimation method

- Regional agricultural output at current prices — National Statistics Committee of Uzbekistan.
- Real agricultural output volume index — National Statistics Committee of Uzbekistan.
- Consumer price inflation — December-to-December rate.
- Annual change in the average official UZS/USD exchange rate — World Bank data.

Dependent Variable: Implicit Price Deflator

Because a consistent regional producer-price or cost series is unavailable, the implicit price deflator is used as a proxy for agricultural price growth.

CALCULATION

$$P_t = [\,(N_t / N_{t-1}) / (G_t / 100) - 1\,] \times 100$$

N_t

Agricultural output at current prices.

G_t

Agricultural output volume index at comparable prices.

P_t

Annual change in the implicit price level of agricultural output.

Note: the deflator is close to, but not identical with, unit production cost.

Explanatory Variables and Model

INF — Consumer Inflation

Annual consumer price inflation in Uzbekistan, December over December (%).

DEP — Soum Depreciation

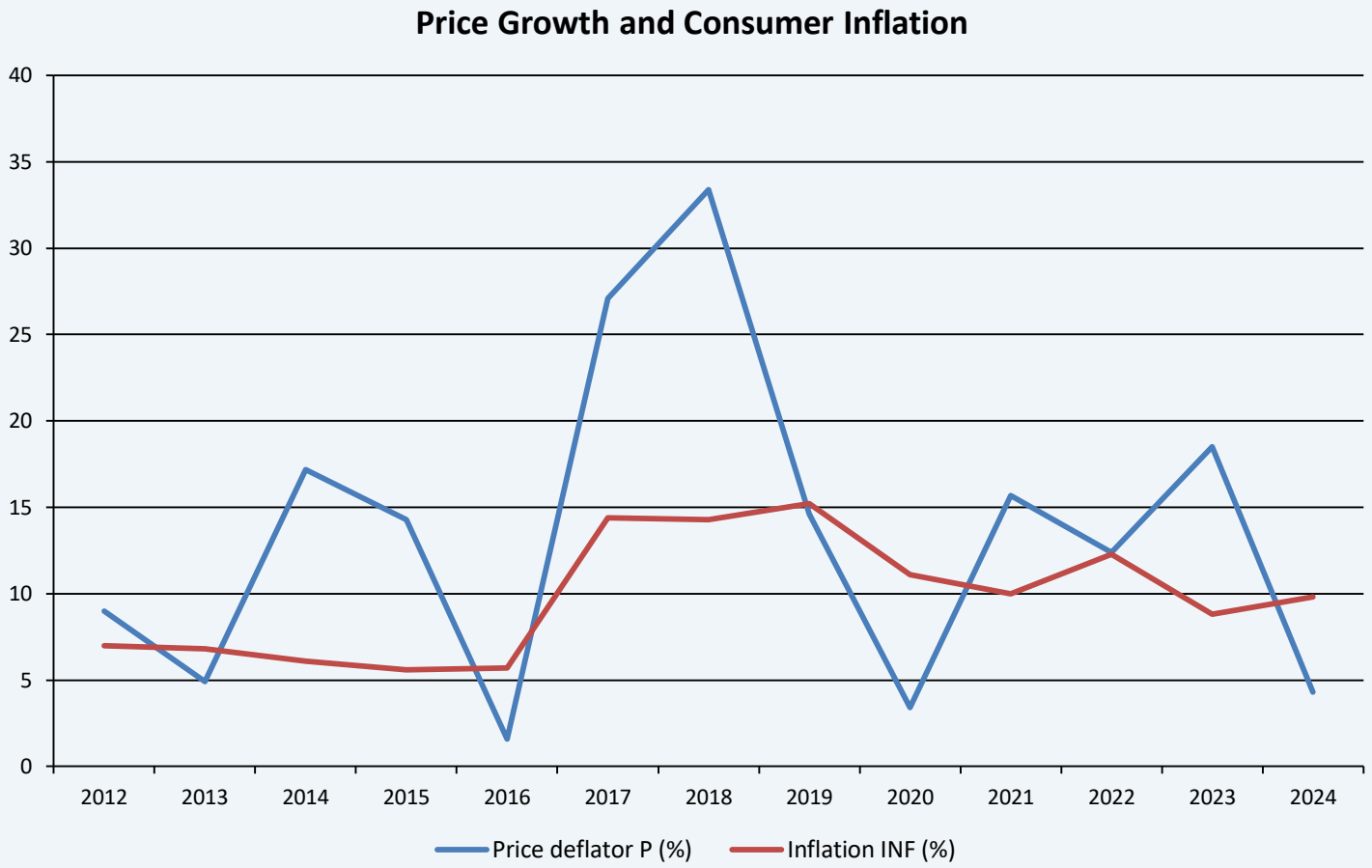
Annual percentage change in the average official UZS/USD exchange rate (%).

ESTIMATED MODEL

$$P_{□} = \beta_0 + \beta_1 \cdot INF_{□} + \beta_2 \cdot DEP_{□} + \varepsilon_{□}$$

A third candidate — real growth in national agricultural output — was excluded because of high correlation with inflation ($r = -0.88$) and an increased VIF of 5.9, without added explanatory power.

Trends in Prices and Macroeconomic Factors



2017

Soum depreciation: 72.5%; agricultural price deflator: 27.1%.

2018

Soum depreciation: 57.8%; agricultural price deflator: 33.4%.

The highest deflator value was recorded in 2018.

Initial Correlations and Descriptive Statistics

r = 0.70

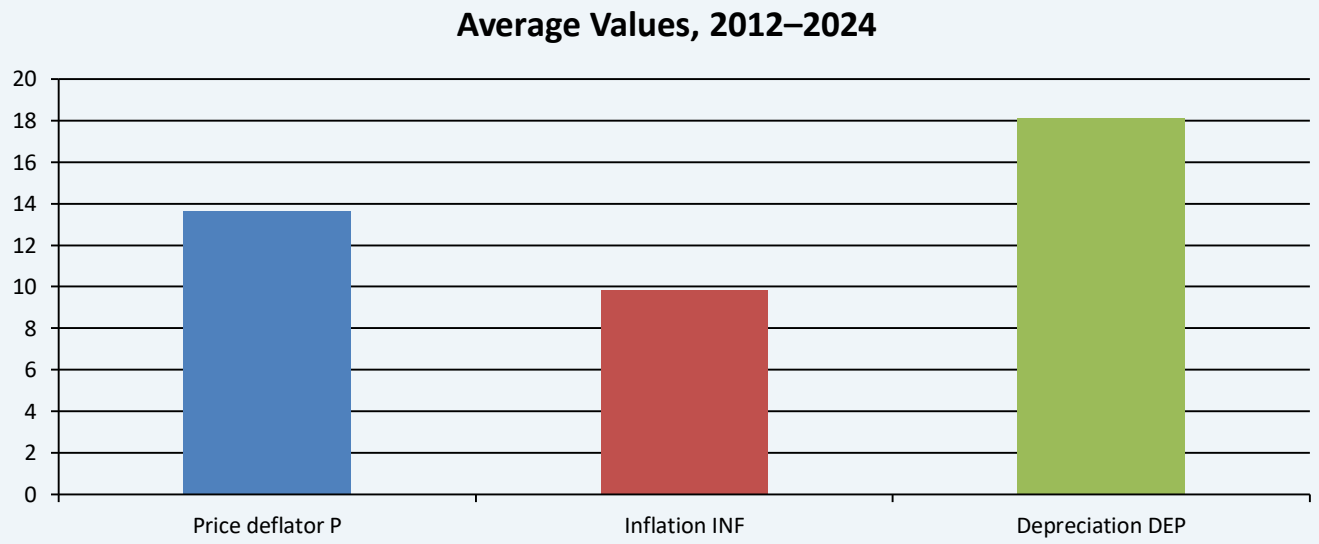
Deflator and depreciation

r = 0.53

Deflator and inflation

13.6%

Average annual deflator



The deflator is more strongly correlated with currency depreciation than with consumer inflation. Regression analysis tests their independent associations.

Regression Results

Variable	Coefficient	p-value	Robust p-value (HC1)
Constant	2.931	0.647	0.622
INF	0.614	0.391	0.271
DEP	0.256	0.045	0.002

$R^2 = 0.531$

Model explanatory power

$p = 0.023$

Overall model significance

DEP is statistically significant; INF is not significant after controlling for the exchange rate.

Regression Equation and Economic Interpretation

ESTIMATED REGRESSION EQUATION

$$\hat{P}_t = 2.931 + 0.614 \cdot INF_t + 0.256 \cdot DEP_t$$

Exchange Rate

A one-percentage-point depreciation of the soum is associated with an approximately 0.26-percentage-point increase in agricultural price growth.

Inflation

The coefficient is positive (0.614), but statistically insignificant once depreciation is controlled for.

Standardized coefficients: DEP = 0.58; INF = 0.23.

Model Diagnostics

Durbin–Watson • 2.44

No serious evidence of autocorrelation.

Breusch–Pagan • p = 0.528

Homoskedasticity is not rejected.

Jarque–Bera • p = 0.612

Residuals do not significantly depart from normality.

VIF • 1.38

Multicollinearity is low.

HC1 heteroskedasticity-robust standard errors were also calculated because of the small sample.

Policy Recommendations and Limitations

1. Exchange-Rate Stability

Consider the pass-through from sharp depreciation to regional agricultural prices.

2. Local Input Production

Expand domestic production of mineral fertilizers and animal feed to reduce import dependence.

3. Support Small Producers

Use machinery leasing and short-term input credit during periods of rapid depreciation.

4. Improve Regional Statistics

Develop regular regional producer-price or production-cost data series.

LIMITATIONS

- Small sample: only 13 annual observations.
- The deflator is not a direct measure of production cost.
- Wages, water and energy tariffs, and weather were not included.

CONCLUSION

The Exchange Rate Is the Key Factor

The model explains 53.1% of the variation in agricultural price growth over 2012–2024. Soum depreciation is statistically significant, while general consumer inflation is not significant once the exchange rate is taken into account.

KEY MESSAGE

Through the cost of imported inputs, exchange-rate stability also matters for regional food prices.

Thank you! • Questions and Discussion

Source: Ravshanova Makhliyobonu, “Assessment of Factors Affecting the Cost of Agricultural Products in Surkhandarya Region through Multivariate Regression.”