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Asymmetric Effects of Exchange Rate Fluctuations on Poultry Meat Prices: A Time Series Analysis

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ABSTRACT

Fluctuations in the price of imported inputs cause sharp changes in chicken meat prices, harming society's welfare, especially for low-income groups that mainly buy food. Increased food insecurity and malnutrition have tragic consequences, particularly for children, the elderly, and other vulnerable members of society. The purpose of this study is to examine the symmetry of the effects of exchange rate fluctuations on chicken meat prices. For this purpose, time series data in daily frequency from March 21, 2018, to March 20, 2022, and Generalized Autoregressive Conditional Heteroskedasticity (GARCH) and nonlinear autoregressive distribution lag (NARDL) models were used. The results of estimating the model with NARDL showed that the variables of the daily price of chicken meat with one lag, daily price of chicken meat with four lags, and exchange rate fluctuations with two lags have a direct relationship with the price of chicken meat, and the variable of daily price of chicken meat with two lags has an inverse relationship with the price of chicken meat. The results of estimating the error correction coefficient showed that, in each period (day), approximately 0.96 percent of the imbalance in the daily price of chicken meat was adjusted. Similarly, research findings indicate that exchange rate fluctuations have asymmetric effects on the price of chicken meat. In this regard, to maintain household food security, support policies should be used in the short term to prevent a decrease in economic access to food.

KEYWORDS: Asymmetric, Nonlinear Autoregressive Distribution Lag, Daily data, Dollar, Generalized Autoregressive model

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1. Introduction

One of the most important subsectors of agriculture, which plays a crucial role in meat production and protein supply, is the livestock and poultry subsector (Hossein Zad & Rashid Ghalam, 2017). The lower price of this subsector's products compared to livestock meat has given them a special place in consumers' food baskets. The price of livestock feed is one of the main factors in determining the price of chicken meat, as approximately 70% of the production costs in the Iranian poultry industry are related to feed costs, with a large part of these inputs being imported and a portion being domestically produced (Shokoohi et al., 2021).

Therefore, domestic price levels cannot remain immune to external shocks, and any fluctuations and shocks in international markets can significantly affect domestic markets, leading to the price volatility of inputs in the domestic market (Kazemnejad & Gilanpour, 2014; Tayebi et al., 2015; Pishbahar et al., 2018; Baghestani et al., 2018). Fluctuations caused by the prices of imported inputs lead to severe changes in the final product price, that is, chicken meat in the poultry industry, and harm society's welfare, especially in low-income groups (Mashayekhi & Hajizadeh Fallah, 2011; Bahrami Fard et al., 2021). Among the factors affecting agricultural prices are macroeconomic factors, particularly exchange rates (Kal Kouhi et al., 2016). Developing countries are more reliant on agricultural trade when examining their economic compositions.

For example, when a country is a major exporter of agricultural products and the value of the dollar decreases against a specific foreign currency, exported products become more competitive with other countries, leading to increased demand and, consequently, higher food prices. This mechanism works in the opposite direction when the dollar value increases. The food crises of 2007-2008 and 2010-2011 demonstrated that sharp increases in food prices could have severe consequences for the poor in developing countries (Minot 2014). The increase in the prices of grains, cornmeal, bread, sugar, tea, oil, salt, flour, and other basic commodities forces the poor to economize on the quantity and quality of their meals. If the prices of these foods increase, poor households will be adversely affected, as most of them are net food buyers. Increased food insecurity and malnutrition result in tragic short- and long-term consequences, especially for children, the elderly, and other vulnerable members of society. In some cases, the most affected groups were poor in urban and rural areas, landless people, and female-headed households. Poor households' ability to cover important non-food expenses such as education and healthcare is limited by rising food prices. According to the World Bank, an increase in food prices from 2010 to 2011 pushed approximately 44 million people into poverty (Mkhawani et al. 2016). Consequently, greater food price variability affects purchasing power on a larger scale. The recent increase in food prices has significantly increased poverty, especially in food-importing countries (Ivanic et al., 2012). Additionally, severe fluctuations in recent decades are problematic because they jeopardize macroeconomic stability and disrupt food production (Lee & Park, 2013). Furthermore, rapid population growth worldwide and increased short-term supply side shocks owing to changing weather patterns exert additional pressure on food systems and long-term stability (FAO, 2021).

In Iran, over the past 15 years (2001–2015), the annual average import of eight main food groups, including meat, grains, dairy products, oils and fats, sugar, fruits, vegetables, tea, and coffee, has reached 12,430 million tons, representing a 54% increase over 15 years, with an annual growth rate of approximately 21.5%. For instance, Iran is a major importer of oilseeds and approximately 90% of the country's oil needs must be met through imports. Additionally, in 2018, nearly 20% of the meat and more than 40% of the grains supplied to the Iranian market were imported (FAO, 2016). This significant increase in import levels led to rising prices for many products. Vulnerability to rising global food prices has increased because of the high imports of agricultural products. The rise in global food prices has significant implications for the economic and social welfare of Iranian households, leading to increasing concern. In this context, urban households, which constitute approximately 75% of all Iranian households and whose budget composition is directly affected by the inflated prices of food purchases, are inevitably impacted (Ravallion and Chen, 2007; Robles and Keefe, 2011). As food price volatility increases, market uncertainty increases, sending fewer clear signals to producers and consumers. Under such conditions, consumers face reduced purchasing power and insecurity in accessing food, negatively impacting poverty and food security. However, producers turn to technologies with lower productivity. As a result, production costs increase, and producers' incentives to engage in productive work diminish, thus harming food security (Kal Kouhi et al., 2013).

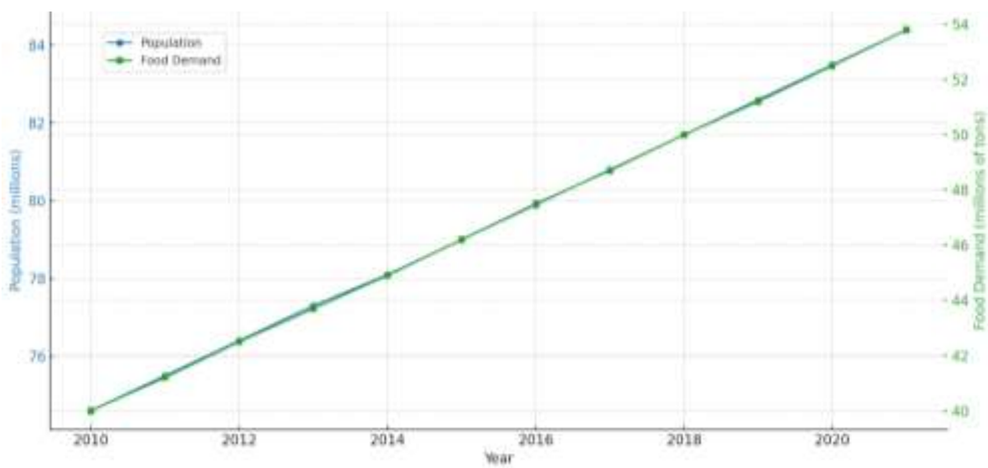

Figure 1 - Changes in Population Growth and Demand for Food in Iran from 2010 to 2021(FAO, 2022)

2. Research Background

Mohammadpour Kesvati & Khalilian (2017), examined the impact of exchange rate fluctuations on chicken meat prices using weekly data and the ARDL[1] method. The results indicate a long-term equilibrium relationship between the exchange rate and chicken meat prices. In other words, changes in the exchange rate have a significant long-term effect on chicken meat prices. The

[1] Autoregressive Distributed Lag (ARDL)

findings show that the exchange rate is a key factor in determining chicken meat prices in Iran. Sarabi et al. (2020), calculated the effect of the exchange rate increase on the production costs of products in five agricultural sub-sectors. Iran's Social Accounting Matrix (SAM) in 2011 was developed, and a price model based on this matrix was used. In addition, using the structural path decomposition method, the main paths through which the effect of the exchange rate increase is transmitted to the agricultural subsectors are identified. The results showed that the prices of livestock and poultry products were more affected by the exchange rate increase than other agricultural subsectors. The path decomposition results also indicate that the exchange rate increase in the imports of chemicals and products sector has a significant share in transmitting the exchange rate increase effect to agricultural product prices. Shabanzadeh-Khoshroudi et al. (2023), investigated the impact of free market exchange rate fluctuations on food consumption in rural areas of Iran using the ARDL PANEL method. Their results show that an increase in free-market exchange rate fluctuations led to a decrease in household consumption. The decline in food consumption in rural areas may be due to reduced purchasing power of households and increased living costs. Over the long term, exchange rate fluctuations continue to reduce food consumption in rural areas. This persistent effect shows that exchange rate fluctuations negatively impact household consumption. These results indicate that exchange rate fluctuations have short-term and long-term effects on food consumption and household consumption in rural areas, respectively. Toktas and Parlinska (2020) examined the relationship between Poland's real effective exchange rate and its exports of food and live animals using monthly data from 2012-2020 by the ARDL method. The results show that the real effective exchange rate has a long-term negative impact on Poland's food and live animal exports. Additionally, based on the results, a one percent increase in the real effective exchange rate in the long term reduced Poland's food and live animal exports by 3.091 percent. Sasaki et al. (2022), using seasonal data from Japan over the period 1988-2017 and employing the TVP-SVAR-SV model, examined how exchange rate shocks affect consumer and producer prices. The results indicate that the import price index is most affected by exchange rate changes compared with the other two indices. Furthermore, the degree of exchange rate pass-through has increased during the recent financial crisis in Japan. Turaki et al. (2023), using the MGARCH[1] and VAR[2] methods, examined the spillover effects of urban food price volatility on exchange rate fluctuations in Nigeria. The results obtained from the VAR model show that exchange rate fluctuations respond positively to urban food price shocks. This implies that fluctuations in urban food prices can lead to increased exchange rate volatility. Additionally, exchange rate fluctuations respond positively to money-supply fluctuations. In other words, changes in the money supply can impact exchange rate fluctuations, and this impact may be positive. These results indicate that urban food price volatility and money supply fluctuations can significantly affect exchange rate volatility in Nigeria.

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[1] Multivariate GARCH models (MGARCH)

[2] Vector autoregression (VAR)

A review of the literature shows that various ARDL and VAR methods have been used to examine the effects of exchange rate fluctuations on food prices, while ARCH and GARCH methods have been employed to calculate exchange rate fluctuations.

3. Research Methodology

Estimating Exchange Rate Fluctuations on a Daily Frequency

The Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model was used to measure and estimate daily exchange rate fluctuations. This model utilizes the conditional variance of the autoregressive and moving average terms in the error equation. The conditional variance of the error term in this model follows that of ARIMA[1]. Here, q represents the order of the moving average ARCH part and p represents the autoregressive GARCH part. The GARCH (p, q) model can be written as follows: (Heidari et al., 2010)

$$y_t = x_t'\gamma + \varepsilon_t \quad (1)$$
$$\sigma^2{}_t = \omega + \alpha_i \varepsilon^2{}_{t-i} + \beta_j \sigma^2{}_{t-j} \quad (2)$$

Where:

y_t: the dependent variable at time t

x_t : the independent variable at time t

ε_t: the residual at time t

Equation (1), which is a conditional mean model, is expressed as a function of the exogenous variables with the disturbance term ε_t . Because the variance of each period is predicted by the variance of the previous period, it is called the conditional variance. The conditional variance, determined by Equation (2), is a function of the following three terms:

1. The average ω
2. News about volatility in the previous period. given by the lagged squared residual $\varepsilon^2{}_{t-i}$ from equation (1). This term is referred to as ARCH.
3. Forecast of variance in the previous period. $\sigma^2{}_{t-j}$. This term is referred to as the GARCH part. The necessary condition for the conditional variance to be positive is that all coefficients of $\sigma^2{}_{t-1}$ and $\varepsilon^2{}_{t-1}$ must be positive, meaning:

$$\alpha_i > 0 \ \forall \ i = 1,2, \ldots., p \quad (3)$$
$$\beta_j > 0 \ \forall \ j = 1,2, \ldots\ldots, q \quad (4)$$

This must also be $\omega>0$. The sufficient condition for the GARCH (p, q) process to be weakly stationary is that if

$$\sum_{i=1}^{p} \alpha_i + \sum_{i=1}^{q} \beta_j < 1 \quad (5)$$

In this case, the effect of shocks in the model is unstable, and sufficient conditions are met (Abonori et al., 2009). GARCH models use an inflation equation with fixed parameters that allows the variance of the prediction error to change over time. If the variance is considered a substitute for

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[1] Autoregressive Integrated Moving Average (ARIMA)

exchange rate volatility, the exchange rate volatility in GARCH models is regarded as a time-varying process (Bidgoli & Bajalan, 2008). The Box–Jenkins method must be used to estimate the daily exchange rate fluctuations. Choosing the appropriate p and q values has a significant impact on the validity of GARCH model results. In fact, estimating the conditional variance of a variable involves the following three steps: (Kazerooni & Sojoodi, 2010)

1. The best ARMA model for the mean equation is usually selected using the Box-Jenkins method.
2. Diagnostic and ARCH-LM tests were performed on the residuals of the ARMA equation.
3. If the presence of conditional variance is confirmed, the GARCH model is estimated, and the conditional variance is calculated.

Nonlinear Autoregressive Distributed Lag (NARDL)

To examine the long- and short-term relationships between the dependent variable and other explanatory variables of the model, the Engle-Granger method can be used, which is not recommended for regressions with more than two variables because of its weaknesses. Other methods include the Johansen-Julius maximum likelihood method and error correction models, which have limitations, leading to the introduction of more favorable approaches for analyzing long-term and short-term relationships between variables, such as the ARDL approach (Pesaran, 1997). The advantage of using the ARDL method is that regardless of whether the explanatory variables are stationary at level (I(0)) or become stationary after first differencing (I(1)), the cointegration relationship between variables can be examined and resolved (Yousefi, 2000). An ARDL $(p, q_1, q_2, \dots\dots q_k)$ model can be represented as follows:

$$\alpha\,(\,\mathrm{L.P})\mathrm{Y_t} = \sum_{i=1}^{k} \beta_i\,(\mathrm{L.q_i})\mathrm{X_{it}} + \delta' \mathrm{w_t} + \mathrm{u_t} \quad (6)$$

where in this relation:

$$\alpha\,(\,\mathrm{L.P}) = 1 - \alpha_1 \mathrm{L} - \alpha_2 \mathrm{L}^2 - \cdots - \alpha_p \mathrm{L}^p \quad (7)$$

$$\beta_i\,(\,L.q_i) = 1 - \beta_{i1} L - \beta_{i2} L^2 - \cdots - \beta_{iq} L^q \quad (8)$$

L is the lag operator, w_i is a vector of deterministic (non-random) variables such as the intercept, trend variable, dummy variables, or exogenous variables with fixed lags. p is the lags applied to the dependent variable, and q_i is the lags used for the independent variables. The ARDL approach is conducted in two steps. First, the existence of a long-term relationship between the variables under study was tested. Thus, if the sum of the estimated coefficients of the lags of the dependent variable is less than one, the dynamic model tends towards a long-term equilibrium. Therefore, to test for cointegration, the following hypothesis test is necessary:

$$H_0 = \sum_{i=1}^{p} \alpha_i - 1 \geq 0 \quad (9)$$

$$H_0 = \sum_{i=1}^{p} \alpha_i - 1 < 0$$

The t-statistic required for the test is calculated as follows:

$$t=\frac{\sum_{i=1}^{p}\hat{\alpha_i}-1}{\sum_{i=1}^{p}\delta\hat{\alpha_i}} \qquad (10)$$

If the critical value provided by Banerjee, Dolado, and Mestre at the desired confidence level is smaller than the calculated t-statistic, the null hypothesis H0 is rejected, indicating a long-term equilibrium relationship between the variables in the model. In the second step, estimation and analysis of long-term coefficients and inferences about their significance were performed. The long-term coefficients of the explanatory variables were calculated based on the following relation:

$$\hat{\theta_i}=\frac{\hat{\beta_{i0}}+\hat{\beta_{i1}}+\hat{\beta_{i2}}+\cdots+\hat{\beta_{i2}}}{1-\hat{\alpha_1}-\hat{\alpha_2}-\cdots-\hat{\alpha_{p^\wedge}}} \qquad (11)$$

where $p^\wedge$ and $q_i{}^\wedge$ for i=1,2,3,…, k are the selected values of $p^\wedge$ and $q_i{}^\wedge$ based on one of the criteria for lag selection (Noferesti, 2010). An important aspect of the ARDL model is determining the optimal lag. Pesaran and Shin showed that if appropriate lags are considered for this model, the ordinary least squares estimators of the short-term parameters are consistent and the ARDL model estimates in the long term are consistent. We can determine the optimal number of lags for each explanatory variable using one of these criteria. using Akaike Information Criterion (AIC), Schwarz Bayesian Criterion (SBC), Hannan-Quinn Criterion (HQC), or Adjusted R^2 (Noferesti, 2010). The Nonlinear Autoregressive Distributed Lag (NARDL) model presented by Shin et al. (2011) is a nonlinear version of the ARDL model, which is one of the latest techniques introduced to examine the nonlinear relationships between economic variables in the short and long term. To formulate the NARDL model, Shin et al. (2011) present the following nonlinear long-term equilibrium relationship:

$$Y_t=\beta^+x_t^+ + \beta^-x_t^- + u_t \qquad (12)$$

In equation (12), u_t is the stationary residual variable with a mean of zero β^- and β^+ are the coefficients of the long-term nonlinear variables x_t. Additionally, x_t^+ and x_t^- represent the sum of positive and negative changes in x_t:

$$x_t=x_0+x_t^+ + x_t^- \qquad (13)$$

where x_0 is the initial value of the variable x_t. Similarly, x_t^+ and x_t^- are the cumulative positive and negative partial sums of x_t, which can be expressed as in Equation (14):

$$\begin{cases} x_t^+ = \sum_{i=1}^{t}\Delta x_t^+ = \sum_{i=1}^{t}\max\ (\Delta x_t, 0) \\ x_t^- = \sum_{i=1}^{t}\Delta x_t^- = \sum_{i=1}^{t}\min\ (\Delta x_t, 0) \end{cases} \qquad (14)$$

Shin et al. (2011), by combining Equation (12) and the linear ARDL (p, q) model presented by Pesaran and Shin (1999) and Pesaran and Shin (2001), expressed the NARDL (p, q) model as in equation (15):

$$\Delta Y_t = \alpha_0 + \rho y_{t-1} + \theta^+ X_{t-1}^+ + \theta^- X_t^- + \sum_{i=1}^{\rho-1} \varphi_i \Delta y_{t-i} + \sum_{i=0}^{q} (\pi_i{}^+ \Delta x_{t-i}^+ + \pi_i{}^- \Delta x_{t-i}^-) + u_t \quad (15)$$

where $\theta^+ = -\rho\beta^+$ and $\theta^- = -\rho\beta^-$

The study variables include the exchange rate (represented by the US dollar) and the price of chicken meat, where the dependent variable is the price of chicken meat and the independent variable is the exchange rate. The data for this study are time series and daily frequency, covering the period from March 21, 2018, to March 20, 2022. To collect the information and data, the Central Bank of Iran's database, Tehran fruit and vegetable market data, and the Food and Agriculture Organization (FAO) reports were used. Given the presented topics, this study examines the following two hypotheses to study the symmetry of the effects of exchange rate fluctuations on the price of chicken meat:
Hypothesis 1: An increase in exchange rate fluctuations leads to an increase in long-term fluctuations in chicken meat prices. Hypothesis 2: An increase in exchange rate fluctuations leads to an increase in short-term fluctuations in chicken meat prices.

2. Research Findings

The stationarity of the variables was first examined using the augmented Dickey-Fuller test to investigate the relationship between daily exchange rate fluctuations and chicken meat prices. Table 1 presents the results of the stationarity tests of the variables under study are presented in Table (1).

Table 1 - Examination of the Stationarity of the Variables Under Study

Results	First Difference Dickey		Level		Variable
	Critical Value	Dickey-Fuller Value	Critical Value	Dickey-Fuller Value	
Stationarity at First Difference	-3.4364 -2.8641 -2.5681	-18.45135	-3.4364 -2.8641 -2.5681	-0.5412	Daily Chicken
Stationarity at First Difference	-3.4364 -2.8641 -2.5681	-22.9295	-3.4364 -2.8641 -2.5681	-1.4269	Daily Dollar

Source: Research Findings

To estimate exchange rate fluctuations, the model used the Box-Jenkins method in various states, and the optimal lag was estimated using the Akaike criterion. The criterion for selecting the optimal lag is based on the lowest Akaike statistical value. One aspect that needs to be examined is the presence of ARCH effects in the model, which were assessed using the ARCH test. The ARCH test is a test for heteroscedasticity. The null hypothesis in this test is defined as such that the model has homoscedasticity, meaning that there is no heteroscedasticity issue in the model, whereas the alternative hypothesis suggests that the model has a heteroscedasticity problem. According to the results reported in Table (2), the null hypothesis of homoscedasticity is accepted at the 99% probability level, meaning that the model does not have heteroscedasticity in the residuals.

Table 2 – LM Test for Detecting ARCH Effect

F-Statistic	56.4342	Probability Level	0.000
Sum of Squares Observations	53.6248	Probability Level	0.000

Source: Research findings

Critical values *, **, and *** correspond to the 1 %, 5 %, and 10% levels, respectively.

To test the significance of the bounds, the estimated F-statistic must be greater than the upper and lower bounds at the specified probability level. After examining the stationarity of the variables under review and before estimating the model, it was necessary to ensure the existence of a long-term relationship among the variables. For this purpose, a bounds test was employed, and the results are presented in Table (3). According to the results, the calculated F-statistic for the chicken meat variable is greater than the critical values of the lower and upper bounds, indicating that at the 95% confidence level, there is a long-term equilibrium relationship among the model variables. However, regarding the variables for chicken meat, the results suggest that there is no long-term equilibrium relationship.

Table 3 - Bounds Test for Daily Chicken Meat Price

Model	**Status**	**Confidence Level**			**F-Statistic**
		10%	**5%**	**1%**	
	Lower Bound	4.040	4.940	6.840	7.376
	Upper Bound	4.780	5.730	7.840	

Source: Research findings

Based on the results in Table (4), the variables of daily chicken meat price with one lag, daily chicken meat price with two lags, daily chicken meat price with four lags, and exchange rate fluctuations with two lags are statistically significant, while the other variables are not statistically significant. The variables of daily chicken meat price with one lag, daily chicken meat price with four lags, and exchange rate fluctuations with two lags have a direct relationship with chicken meat price, while the variable of daily chicken meat price with two lags has an inverse relationship with chicken meat price.

Table 4 - Estimation Results of Exchange Rate Fluctuations on Daily Chicken Meat Price Fluctuations (4,3) NARDL

Variable	**Coefficient**	**Z-Statistic**	**Probability Level**
GARChicken (-1)	-0.0173	-3.882	0.0001
Cump P (GARDAY(-1))	0.0101	3.847	0.0001
Cump N (GARDAY(-1))	0.0086	3.195	0.0014
C	995.3869	3.010	0.0026
D(GARChicken(-1))	0.504	16.328	0.000
D(GARChicken(-2))	-0.0577	-1.677	0.0938
D(GARChicken(-3))	-0.0704	-2.2760	0.0228
Cump P (GARDAY)	0.0257	1.172	0.2412

Variable	Coefficient	Z-Statistic	Probability Level
Cump N (GARDAY)	-0.0115	-1.1949	0.2321
Cump P (GARDAY(-1)	-0.0061	-0.2757	0.7828
Cump N (GARDAY(-1)	0.0037	0.1728	0.8628
Cump P (GARDAY(-2)	0.0183	1.8399	0.0661
Cump N (GARDAY(-2)	0.0296	1.3775	0.1687
R^2= 0.2535 F-Stat= 28.9613 prob (f-stat) = 0.000 DW= 2.005			

Source: Research Findings

According to the results in Table (5), after estimating the model, a short-term estimation of the model was performed. The error correction results show that the variables of the first difference of the daily chicken meat price with one lag, the first difference of the daily chicken meat price with three lags, and the first difference of exchange rate fluctuations with one lag are statistically significant, while other variables are not statistically significant. The variables of the first difference of the daily chicken meat price with one lag have a direct relationship, whereas the first difference of the daily chicken meat price with three lags and the first difference of exchange rate fluctuations with one lag have an inverse relationship with the chicken meat price. The error correction coefficient is negative and statistically significant, indicating the speed of adjustment from short to long-term equilibrium. Accordingly, the error correction coefficient is estimated to be -0.0096, indicating that approximately 0.96% of the daily chicken meat price imbalance is adjusted in each period (day).

Table 5 - Estimation Results of Error Correction of Exchange Rate Fluctuations on Daily Chicken Meat Price Fluctuations (3 and 4) NARDL

Variable	Coefficient	t-Statistic	Probability Level
COINTEQ	-0.0173	-4.5913	0.000
D(GARChicken(-1))	0.504	16.411	0.000
D(GARChicken(-2))	-0.0577	-1.6817	0.0929
D(GARChicken(-3))	-0.0704	-2.2936	0.0220
DCump P (GARDAY)	0.0257	1.179	0.2385
DCump N (GARDAY)	-0.0115	-1.215	0.2245
DCump P (GARDAY(-1)	-0.0061	-0.2766	0.7821
DCump N (GARDAY(-1)	0.0037	0.1733	0.8624
DCump P (GARDAY(-2)	0.0183	1.8675	0.0621
DCump N (GARDAY(-2)	0.0296	1.3818	0.1673
R^2= 0.2535 F-Stat= 38.7283 prob (f-stat) = 0.000 DW= 2.005			

Source: Research Findings

The Wald test was used to examine the presence or absence of the asymmetric effects. The null hypothesis in the Wald test was the existence of identical positive and negative shocks. If the probability level is statistically significant, the hypothesis of identical effects is rejected and the alternative hypothesis of asymmetric effects is accepted. As shown in Table (6), the existence of asymmetric effects was confirmed.

Table 6 - Examination of the Presence or Absence of Asymmetric Effects

Criteria	Value	Probability Level
χ^2 Statistic	4.480	0.0343

Source: Research Findings

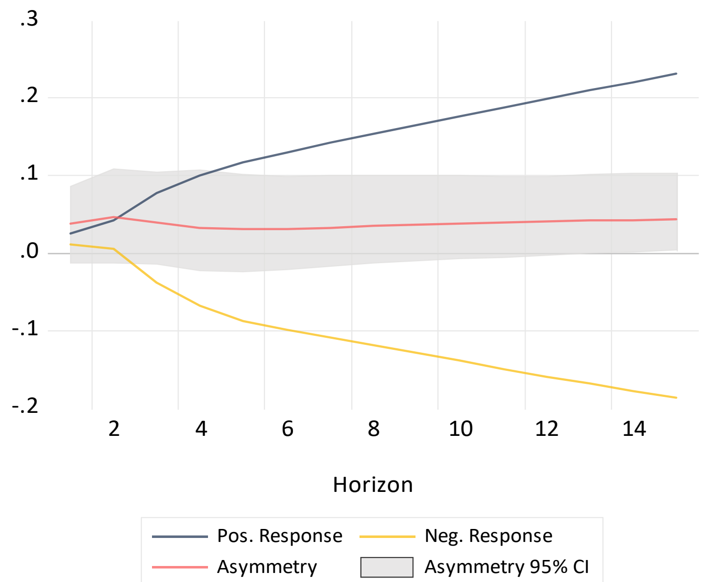

Figure 3 - Cumulative Dynamic Coefficient of Exchange Rate Fluctuations on Daily Chicken Meat Price

To examine the hypotheses of this study, the proposed cases were tested and the results are presented in Table (7). Based on the hypothesis tests, the first hypothesis of the study, which states that "increased exchange rate fluctuations cause an increase in the long-term price fluctuations of chicken meat," is confirmed for the data under review. Similarly, the second hypothesis of the study, which states that "increased exchange rate fluctuations cause an increase in the short-term price fluctuations of chicken meat," is also confirmed.

Table 7 - Results of Hypothesis Testing

Hypothesis	Type of Effect	Coefficient	Significance	Statistic	Hypothesis Test Result
first	Long-term	0.0101	0.0001	3.8693	Confirmed
Second	short-term	-0.0098	0.0000	-4.2559	Confirmed

Source: Research Findings

3. Discussion

This study aimed to examine the symmetry of the effects of exchange rate fluctuations on the price of chicken meat. Daily time-series data from March 21, 2018, to March 20, 2022, were used to achieve this. Two hypotheses are examined in this study:

a) Increased exchange rate fluctuations cause an increase in long-term price fluctuations of chicken meat.

b) Increased exchange rate fluctuations cause an increase in short-term price fluctuations of chicken meat.

To this end, exchange rate fluctuations were first calculated using the generalized autoregressive model and then included in the model as exchange rate fluctuations. Subsequently, the model was estimated using the Nonlinear Autoregressive Distributed Lag (NARDL) approach.

The short-term estimation results of the model showed that the variable of the first difference of the daily chicken meat price with one lag has a direct relationship, and the variables of the first difference of the daily chicken meat price with three lags and the first difference of exchange rate fluctuations with one lag have an inverse relationship with the chicken meat price. According to the research findings, the error correction coefficient was estimated to be -0.0096, indicating that approximately 0.96% of the daily chicken meat price imbalance was adjusted in each period (day).

The results confirmed the following research hypotheses: a) Increased exchange rate fluctuations cause an increase in long-term price fluctuations of chicken meat. b) Increased exchange rate fluctuations cause an increase in short-term price fluctuations of chicken meat. These findings are consistent with those reported by Kesvati and Khalilian (2017) and Turaki et al. (2023). The research findings also indicate that exchange rate fluctuations have asymmetric effects on chicken meat prices. This suggests that policymakers should consider the role of the exchange rate in the welfare of consumers and protein producers. Given the important role of proteins in household baskets, especially chicken meat, policymakers should prioritize protecting the prices of key food security items from exchange rate shocks. To this end, it is suggested that supportive policies should be implemented in the short term to prevent a reduction in economic access to food. Additionally, future research should compare the impact of exchange rate fluctuations on the prices of various protein items and other influencing factors.

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Authenticity of the texts, honesty and fidelity has been observed.

CONFLICT OF INTEREST

Author/s confirmed no conflict of interest.