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Consideration the Effect of Exchange Rate Volatility on Agricultural Products Export Price, the Case Study of Iran's Saffron

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Abstract: Iran as the major producer and exporter of Saffron in the world has devoted a considerable production, cultivated area andworld export value of Saffron to itself. In this study, the effects of short and long-run fluctuations of exchange rate were considered on Saffron export price by Autoregressive Distributed Lag model (*ARDL*). Results showed that the fluctuations of exchange rate have affected Saffron export price more than other variables under study. The effect of exchange rate and quantity of export, on Saffron export price was positive and significant in long-run. Furthermore there was no significant relationship between export price and domestic production of Saffron. According to finding, some policies such as control and stabilization exchange rate come into sight constructive in order to increase Saffron export.

Key words: Saffron % Exchange rate % Saffron export price % *ARDL* model

INTRODUCTION

The exported goods of developing countries are limited to a single or a set of agricultural products and natural raw materials which estimated by 80-90 percent of total export value. In the wake of price fluctuations in the global market of the respective products, the balance of payments in these countries, therefore, suffers imbalance. Having the major product of oil, Iran is considered among the mentioned countries. This very fact necessitates further attention to non-oil exports including agricultural products specially those with more exportability while available to new markets [1-7]. Saffron is an instance. With more than 45000 hectares of cultivated area and an average annual production of 120-170 tons, Iran is the largest saffron producer in the world and obviously 65-85 percent of the world's saffron is produced in Iran. It is also the largest exporter of saffron, wielding 64 percent of the global market [1]. Regarding the susceptibility of various products especially agricultural goods to fluctuating exchange rates, it is deemed as an influential factor in the global trade which plays a remarkable role in this regard. Taking into consideration the current uncompetitiveness in the international saffron market and the great impact its export price which exerts on decision-making process of the exporters, this study investigates the influence of exchange rates on the export price of saffron [7-10].

MATERIALS AND METHODS

The export price of each product which is calculated by the nation's currency, is a function of the exchange rates and the products price based on the foreign currency, therefore, it can be inferred that a change in exchange rates may lead to a different export price.Thus, the relationship between the exchange rate and the export price is called Exchange Rate Pass Through [2]. To assess how changes in the exchange rates affect the export price of saffron, the following equation has been applied which is called the export price equation:

$$Ln(EP_t) = ß_0 + ß_1 \ln(E_t) + ß_2 \ln(X_t) + ß_3 \ln(PR_t) \qquad (1)$$

It is extracted with regard to the conditions for maximizing profit in an exclusive market conditions. *EP* is the export price index, *E* the official exchange rate, *X* the export volume and *PR* is domestic saffron production. Equation no.1 indicates the saffron export price is a function of real exchange rate, export volume and domestic saffron production. Export elasticity on real exchange rate and export volume is expected to be a positive value [4]. To examine the long and short term relationship between dependant variable and other explanatory variables, Engle and Granger [5] and Johansen and Juselius [6] reported that the error-correction methods can be applied but due to the

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constraints in these methods, more appropriate techniques have been suggested among which is *ARDL* that outlined and elaborated by Pesaran and Shin [9]. The advantage of this method as Sezgin and Yildirim [10] point out the main advantage of the *ARDL* methodology employed here is that it can be applied regardless of the stationary properties of the variables involved i.e. Whether they are *I(0)* or *I(1)*. This approach involves two stages, at the first stage we examine if there is or not a long-run relation between the variables under investigation. The second stage is to estimate the coefficients of the long-run relations and the associated error-correction model. Based on what has been brought up earlier, *ARDL* dynamic model for saffron export price function is as follows:

$$LnEP = a_0 + \sum_{i=1}^{m} ß_i LnEP_{t-i} + \sum_{i=1}^{n} e_i LnE_{t-i} + \sum_{i=1}^{k} ?LnX_{t-i} + \sum_{t-i}^{f} \mu LnPR_{t-i} + e_0 LnE_t + ?_0 LnX_t + \mu_0 LnPR_t + u \quad (2)$$

In this equation m, n, k and f are optimum lags for *LnEp(t)*, *LnE(t)*, *LnX(t)* and *LnPR(t)* variables respectively.

RESULTS AND DISCUSSION

Considering the *ARDL* dynamic model for saffron export price dynamic model of *ARDL* (*2,0,0,0*) for saffron export price has been estimated.The results are shown in Table 1.

The statistic needed to test the existence of a long term relationship has been calculated as -3.49 and taking into account the critical value presented by Banerjee, Dolado and Mestre. in a 90 percent level (-3.45) and a greater absolute value for computational statistic than the absolute value of critical value, the null hypothesis is refuted, hence, it is approved that a long-run balance equation exists among the variables of the model. Once we established that a long-run cointegration relationship existed, long-run equation was estimated using the following *ARDL* (*2,0,0,0*) specification.

Based on the obtained results in Table 2, on the long run, saffron export price has a positive relationship with the real exchange rate i.e., one percent increase (decrease) in real exchange rate can lead to 0.39 percent increase (decrease) in saffron export price. It can be stated that following the rise in the exchange rate, the exporters which are in an uncompetitive market, will increase their final profit to gain greater profits, which as a result will increase the saffron export price. On the other hand, with the decreasing exchange rates, exporting corporations which deal with decreasing demand function, will lessen the final profit to avoid inconvenient impact of a decrease in exchange rates which results in a decrease in saffron export price.Regarding Table 2, saffron export price has a positive relationship with export volume while it does not have a meaningful relationship with domestic production with respect to its meaningfulness level at 10 percent. After estimating the long-run coefficients, we obtain the error correction representation for the selected *ARDL* model. Table 3 reports the short-run coefficient estimates obtained from the *ECM* version of the *ARDL* model.

The error correction term indicates the speed of the adjustment which restores equilibrium in the dynamic model. The *ECM* coefficient shows how quickly variables return to equilibrium and it should have a statistically significant coefficient with a negative sign. Holds that a highly significant error correction term is further proof of the existence of a stable long-run relationship. Considering to *ECM* estimation results, the equilibrium

Table 1: *ARDL(2,0,0,0)*Model dynamic estimation Results

Parameter	Coefficient	Standard Error	t-Ratio
C	0.604	0.752	0.8
LEP(-1)	0.302***	0.042	7.1
LEP(-2)	0.166	0.11	1.4
LE	0.564***	0.019	2.94
LX	0.467**	0.221	2.11
LPR	-0.185*	0.092	-2.01
F=382.4(0.00)	*R^2=0.82*		

Table 2: *ARDL(2,0,0,0)*Model Long-Run Results

Parameter	Coefficient	Standard Error	t-Ratio
C	1.02	0.802	1.27
LE	0.392***	0.062	6.24
LX	0.186**	0.067	2.77
LPR	0.231*	0.112	2.06

Table 3: Error Correction Representation for the Selected *ARDL(2,0,0,0)* Model

Parameter	Coefficient	Standard Error	t-Ratio
DLE	0.564***	0.143	3.94
DLX	0.467***	0.221	2.11
DLPR	-0.185*	0.092	-2.01
DC	0.354	1.440	0.24
ECM(-1)	-0.176	0.040	-4.40
F=34.1(0.00)	*R^2=0.78*		

***, **,* Significant at 1, 5 and 10% level, respectively

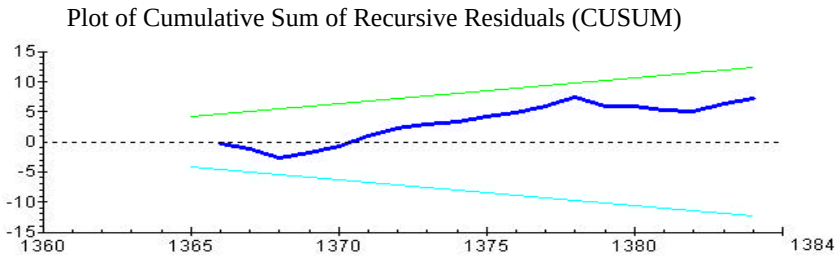

Fig. 1: Plot of *CUSUM* for Coefficients Stability for *ECM* Model

correction coefficient, ECM_{t-1} estimated *-0.17* is highly significant, has the correct sign andimply a fairly high speed of adjustment to equilibrium after a shock. Approximately *17%* of disequilibrium from the previous year's shock converges back to the long-run equilibrium in the current year.

According to Pesaran and Pesaran [8], the stability of the estimated coefficients of the error correction model should also be empirically investigated. A graphical representation of *CUSUM* statistic is shown in Figure 1. Bahmani-Oskooee [3] stated that the null hypothesis (i.e. that the regression equation is correctly specified) cannot be rejected if the plot of these statistics remains within the critical bound of the 5% significance level. As it is clear from Figure 1, the plots of the *CUSUM* are within the boundaries and hence this statistic confirms the stability of the long-run coefficients in the model.

CONCLUSION

In the current study, long term and short term impacts of exchange rate fluctuations on saffron export price have been investigated using *ARDL* model. Results suggest that compared to other variants, exchange rate has a greater impact on saffron export price both in the long run and the short run. Therefore the enforcement of control policies and fixing the exchange rate is among the important steps to stabilizing the export prices. In other words, extraordinary fluctuations in exchange rate out of a defined scope can be prevented with the implementation of a controlled and fixed exchange rate system. In this system, the exchange rate has no fluctuations and whenever economic pressures are high on exchange rate, it rarely changes which in return decreases export price fluctuations and as a result the fluctuation of saffron export supply. Having a stable economic environment as an influential policy and providing clear information regarding the forthcoming changes in exchange rate can increase the profits which results to an increase in saffron export supply and preserves Iran's position in the global markets preparing the ground to enhance this exclusive status [9-12].

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