Relation Between variations Price Agriculture of Iran With Inflation And GDP

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ABSTRACT: Agricultural prices play a vital role in the allocating recourses among competing activities. In this context, the main purpose of this paper is to present a measure of relative price variability (RPV) among 58 agricultural products and to investigate the relationship between the fluctuations price of product agriculture with inflation and GDP is investigated. The range variance of total price of agriculture product of Iran had high fluctuations in period 1348 to1383 and maximum variance total price of agriculture product of Iran was fourteen percent in 1371 year. The result of this study shows that between coefficient inflation variable and variance of relative price of agriculture product of Iran had positive and significant relative. In addition coefficient GDP variable with variance relative price of agriculture product of Iran had positive and significant relative.

Keywords: Variance total price of agriculture product, inflation, GDP

INTRODUCTION

The agricultural is among the major sectors of Iran's economy and 14 percent value-added benefit is belonging itself (Central Bank of Iran, 2005) .Agricultural sector in the economy in terms of having the capability and capacity is very important and significant role in supplying food to the people and provide raw materials for some industries, it is noteworthy (Moghadasi and Farhadi ,2003).

On the other hand, given the importance of food supply in the economic development process and the role of food price, food security has always been a hot topic in developing countries. Accordingly, food price has received much attention as a key variable affecting supply and demand of food and agricultural products by policy makers (Ghatmiri and Harati, 2003).

Based on what was mentioned, the present study aims to examine the relationship between the price relative variability of agricultural products and inflation and GDP. To do so, the following hypothesis can be formulated:
There is a positive relationship between the general price level and the price relative variability of agricultural products.

MATERIALS AND METHODS

Theoretical Framework and Methodology

Given the objective of the study, first a criterion of the price relative variability of agricultural products was presented. Then the relationship between macroeconomic variables and price volatility was examined. The most common definition for the Price Relative Variability (PRV) among a group of commodities is single nominal price variance i.e. the deviation of product prices from the inflation rate (Dumberger, 1978 and Fisher, 1981). In order to

measure PRV for 58 agricultural products in Iran the method introduced by (Parks ,1978) was used in the present study as did by (Rositi ,2005). In this method, the price relative variability of ith product within the period t and t-1 shown by $DP_{i,t}$ was calculated as follows:

$$DP_{i,t} = \ln P_{i,t} - \ln P_{i,t-1} \tag{1}$$

Then the changes in the general price index for 58 agricultural products under study were calculated which is in fact weighted average, DPi, of the products in question:

$$DP_t = \sum_{i=1}^{n} w_{i,t} DP_{i,t} \tag{2}$$

Where, $w_{i,t}$ is the weight given to the product i which is equal to the average expenditure share of commodity i in years t and t-1. In fact, DP_t is the average inflation rate for agriculture. Thus, the variance of price relative variability can be obtained from the following equation:

$$RV_t = \sum_{i=1}^{n} w_{i,t} (DP_{i,t} - DP_t)^2 \tag{3}$$

Where, the term $(DP_{i,t} - DP_t)$ is the rate of ith price relative variability i.e. the logarithmic price relative variability (P_{it}/P_t). Therefore, the price relative variance will measure asymmetric price movements are measured. Relative variance will increase by a rise in crops price dispersion rates. Besides, the relative variance is equal to zero when all the prices are changing at the same rates. The sample of 58 products under study includes:

Wheat, rice, maize, millet, barley, beans, peas, lentils, legumes, almonds, peanuts, hazelnuts, nutmeg, pistachios, sesame seeds, soybeans, walnuts, sunflower, olive, flax, anise, cotton, apple, apricots, dates, figs, fresh fruits, grapes, pears, stone fruits, chinos, oranges, tea, tobacco, beetroot, sugarcane, cantaloupe, onions, peppers, tomatoes, vegetables, melons, potatoes, eggs, honey, silk, raw wool, buffalo milk, cow milk, goat milk, sheep milk, hunting meat, goat meat, buffalo meat, buffalo meat, chicken, mutton, and camel meat.

The Relationship between the Price Relative Variability of Agricultural Products, Inflation, and GDP

Following (Rositi ,2005), the relationship between the price relative variability of agricultural products, inflation rate, and GDP was examined in this study using equations (4) and (5):

$$SRV = \alpha + \beta_1 (GDP) + \beta_2 D_1 + \beta_3 D_2 + ... + \beta_n D_n + \varepsilon_t \tag{4}$$

$$SRV = \alpha + \beta_1 (INFL) + \beta_2 D_1 + \beta_3 D_2 + ... + \beta_n D_n + \varepsilon_t \tag{5}$$

Where, D_1, D_2 …, D_n are dummy variables and GDP and $INFL$ are GDP and the inflation rate respectively while SRV is the square of the price relative variance of agricultural products.

RESULTS AND DISCUSSION

To assess the price relative variability of agricultural products efficiently, the average inflation rate in the agricultural sector and the price relative variance of agricultural products were used (See, Table 1). The table provides valuable information about the price relative variability in the agricultural sector which is derived from the production volume and prices of 58 horticultural and agricultural products under study.

Table 1. Price relative variance and the average inflation rate in the agricultural sector

Variable Year	Price relative variance	Average inflation rate
1349	02441.0	06778.0
1350	0161.0	01441.−0
1351	0551.0	1089.0
1352	0074.0	1376.0
1353	0115.0	1019.0
1354	0079.0	1189.0
1355	0056.0	1373.0
1356	0065.0	0904.0
1357	0068.0	1239.0
1358	075521.0	0956.0
1359	0293.0	1944.0

1360	0176.0	2040.0
1361	0062.0	3300.0
1362	0680.0	2345.0
1363	0154.0	2940.0
1364	0231.0	0893.0
1365	0207.0	1503.0
1366	05780.0	0314.0
1367	06808.0	1441.0
1368	0345.0	2263.0
1369	03966.0	0514.0
1370	0471.0	2588.0
1371	2726.0	0258.0
1372	0282.0	4913.0
1373	07503.0	2083.0
1374	04739.0	2585.0
1375	0832.0	2650.0
1376	09011.0	5346.0
1377	05978.0	1055.0
1378	1608.0	1107.0
1379	0692.0	3155.0
1380	03905.0	2434.0
1381	03365.0	1622.0
1382	03571.0	0663.0
1383	0020.0	1850.0

Source: Research findings

The average inflation rate in the agricultural sector in the agricultural sector is the same as the weighted average rate for the 58 crops under study. As shown in Table 1, during the 1990s the agricultural products experienced the highest rate of price variability (0.4913 and 0.5346) from 1993 to 1997. Prior to the 1978 Islamic Revolution in Iran, the average inflation rate variation in the agricultural sector was very insignificant which can be analyzed by considering the changes made in the price indexes and macroeconomic variables both before and after the revolution. Generally, Iranian economy passed through the prices stability period until the beginning of the Fourth Socioeconomic Development Program followed by a gradual rise in the inflation rate which happened because of the oil shock in 1974. The shock led to the increased currency revenues caused by oil exports and the sharp rise in liquidity. The problem exacerbated by the increased credits granted to different sectors intensified the domestic demand for oil. After the revolution, the price index of goods and services raised in an ascending order to the extent that we have been always seeing a two digit inflation rate (except for a few years). The incidence of the 1978 Islamic Revolution in Iran, the second oil shock in 1979, and the rage of a war by Iraq against Iran in 1980 were among the most important factors, each playing a role in the sharp rise of prices. During the time period from 1991 to 1993, the imposition of inappropriate policies on different sectors especially inappropriate currency policies paved the way for the emergence of a new crisis in Iranian economy. The main policies during this period included monetary and financial expansionary policies, measures taken concerning the realization of the single rate currency, and import liberalization. The imposition of such policies and the creation of some problems such as mature foreign liabilities caused an economic crisis in Iran from 1994 to the early 1975. A reduction in oil revenues began in the late 1993 which create major problems in the payment of short and long term liabilities which were mainly due in 1994. These conditions together made Iranian economy face an unexpected inflation rate of nearly 50%. In 1998, the oil price reduction once again created a number of problems in the form of the government budget deficiency, leading to a sharp increase in prices in the same year. However, the effects of the economic movement began to appear from 1999 on and the general price level started to go down (Abbassi Nejad and Tashkini, 2004). So as can be seen, in the 1990s Iranian economy has suffered from a couple of different structural problems which have been also a main cause of the high average inflation rate in the agricultural sector.

The price relative variance (RV) has been addressed in this section. The price relative variance measures the price imbalanced movements. The price relative variance will increase by a rise in crops price dispersion rates. Besides, the relative variance is equal to zero when all the prices are changing at the same rates. The value of price relative variance for agricultural products in Iran has been obtained for the 58 horticulture, livestock, and farming products in this study. The range of price relative variance for agricultural products in Iran indicates that from 1969 to 1974 the maximum variation occurred in 1972. During the time period from 1974 to 1978, the price relative variance for agricultural products in Iran experiencing a steady tend was close to zero. From 1978 to 1982 the maximum variation was observed in 1979. Similarly, the maximum variation was observed from 1983 to 1988 over the time period from 1982 to 1989. However, the maximum price relative variance of all periods occurred during 1989 to 1994 which culminated in 1992. The price relative variance had almost an upward from 1974 to 1999. However, it had a

downward trend from 1999 to 2004. Generally speaking it can be said that the price relative variance in the period under steady was relatively consistent with the maximum change in 1972 (Table 1) which can be attributed to different factors such as the implementation of inappropriate policies in different sectors, the adoption of unsuitable currency policies during 1991 to 1993, a decline in oil revenues, and inability to pay foreign liabilities. As a result, the relationship between macroeconomic variables (inflation rate and GDP) the price relative variance of agricultural products is discussed here.

The stationary test was performed on the variables in question in order to select appropriate estimation methods. A time series will be stationary when its mean, variance, covariance and correlation coefficient are constant over time or to be independent of time. Accordingly, whether time series variables are reliable or unreliable can be determined through a variety of tests. The reliability of the data used in this study has been examined through a nine stage technique (See Table 2).

Table 2. Results of the variables reliability test

Variables		Reliability	Sig.	Stationary
Crop price variance	SRV	With intercept and trend	1%	I(0)
Inflation rate	INF	With intercept and trend	1%	I(0)
GDP	GDP	With intercept and no trend	5%	I(0)

Source: Research findings

The relationship between the price variance of agricultural products and the inflation rate was estimated using the Ordinary Least Squares (OLS) Technique. As the results show, the coefficient of inflation rate is positive and significant suggesting that there is a positive and significant relationship between the inflation rate and the price variance of agricultural products. Besides, the dummy variable coefficient (r = 0.1142) is positive and significant. As can be seen, F value in the model is significant, suggesting that the model was selected correctly and it is also significant.

In the section, Equation (5) which shows relationship between the price variation of agricultural products and the inflation rate has been estimated. As the time series under study are stationary, the relationship between the two variables was estimated using was estimated using the Ordinary Least Squares (OLS) Technique. As shown in Table 4, the significance of the model is confirmed by F value. The value of R^2 explains 60% of the dependent variable changes by the explanatory variables. Besides, the value of Durbin-Watson Test shows that there is no correlation between the variables. As shown in Table 3, there is a positive and significant relationship between the square root of inflation rate and the price relative variability of agricultural products a the significance level of 10% suggesting that the instability of general price level and the inflationary volatility have a positive effect on the variation of crop prices. In the 1990s, Iranian economy went through inappropriate policies in different sectors, especially the adoption of unsuitable currency policies during 1991 to 1993 besides a decline in oil revenues, inability to pay foreign liabilities, and many inflationary ups and downs. As a result, a dummy variable was included in the model concerning the special conditions in 1992. The value of the dummy variable is 1 for this year with the highest price variation and 0 for the other years. In addition, the dummy variable coefficient (r = 0.1142) is positive and significant at the significance level of 1%, indicating that variations in agricultural prices are closely related to the policies adopted and the particular conditions of that year. Therefore, it can be said that there is a positive relationship between the general price level and the variability of agricultural prices.

Table 3. The relationship between crops price relative variability and the inflation rate

Variables		Coefficients	Std. Error
C	Intercept	* 0.0137	0.0055
INF	Inflation	* 0.0003	0.0002
DSRV	Dummy variable	* 0.1142	0.0167
D.W = 1.3739	0.5820	$R^2 = 0.6059$	F = 25.37(0.0000000)

Source: Research findings

Note: *, **, and *** represent significance level of 1, 5, and 10 percents, respectively

Equation (4) shows relationship between the price variation of agricultural products and GDP. As the time series under study are stationary, the relationship between the two variables was estimated using was estimated using the Ordinary Least Squares (OLS) Technique. As shown in Table 4, the significance of the model is confirmed by F value. The value of R^2 explains over 62% of the dependent variable changes by the explanatory variables. Besides, the value of Durbin-Watson Test shows that there is no correlation between the variables. As shown in Table 4, there

is a positive and significant relationship between GDP and the price relative variability of agricultural products at the significance level of 5%, indicating that GDP has a positive effect on the variation of crop prices. A mentioned earlier, a dummy variable was added into the model to make up for the special conditions in 1992. The value of the dummy variable is 1 for this year with the highest price variation and 0 for the other years. In addition, the value of dummy variable (r = 0.1142) is positive and significant at the significance level of 1%, indicating that there is a direct relationship between the volatility of agricultural prices and the adoption of inappropriate policies in the 90s (especially in 1992).

Table 4. Relationship between crops price relative variability and GDP

Variables		Coefficients	Std. Error
C	Intercept	0.0030	0.0096
GDP	GDP	* 0.0000007	0.0000004
DSRV	Dummy variable	* 0.1151	0.0162
D.W = 1.34	$\overline{R}^2 = 0.6014$	$R^2 = 0.6241$	F = 2.4 (0.000000)

Source: Research findings
Note: *, **, and *** represent significance level of 1, 5, and 10 percents, respectively

The following recommendations are presented according to the findings of the present study:
1. The results indicated that monetary policies affect PRV and as this measure plays a significant role in the allocation of resources to different activities, therefore; the effects of macro-policies especially the effects of monetary policies on the PRV and on the resource allocation should be considered when making decisions.
Since the price relative variability of agricultural products is dependent on the volatility of GDP and inflation and also given the effects of macroeconomic instabilities and fluctuations on the Iranian agricultural sector, it is recommended special attention be paid on management policies in order to reduce the price variability of agricultural products.

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