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**NOTE**

# GOVERNMENT MARKET INTERVENTIONS INTO RICE, WHEAT AND COTTON IN IRAN

**M. BAKHSHOODEH AND B. NAJAFI**[1]

Department of Agricultural Economics, College of Agriculture, Shiraz University, Shiraz, I.R. Iran.

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**ABSTRACT**

To evaluate government intervention effects on growth of rice, wheat and cotton production in Iran, nominal protection rates (NPR) were calculated and separate Nerlovian supply models were applied to time series data for 1983-1998. The results showed that, for most years, producers had not been supported and as a result, there were not been sufficient incentives for exporters. Therefore, redirecting the rice, wheat and cotton markets is recommended in order to improve economic efficiency for these products. In this context, diminishing the share of the government in markets and strengthening the private sector may be listed at the top of a list that could be regarded as a plan for making staple agricultural production profitable.

**Key words**: Nominal protection rate, Market liberalization, Rice, Wheat, Cotton, Iran.

**تحقیقات کشاورزی ایران**

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# دخالت دولت در بازار برنج، گندم و پنبه در ایران

**محمد بخشوده و بهاءالدین نجفی**

به ترتیب، استادیار و استاد بخش اقتصاد کشاورزی دانشکده کشاورزی دانشگاه شیراز، شیراز، جمهوری اسلامی ایران.

1. Assistant Professor and Professor, respectively.

## چکیده

برای بررسی تأثیر دخالت دولت بر رشد تولید برنج، گندم و پنبه در ایران، نرخهای حمایت اسمی (NPR) محاسبه و با بکارگیری داده‌های سری زمانی ۷۷-۱۳۶۲، مدل عرضه مزبور برای این محصولات برآورد شد. نتایج نشان داد که در بیشتر سالها، تولید کنندگان مورد حمایت قرار نگرفته بودند و در نتیجه، انگیزه کافی برای صادرات وجود نداشته است. بنابراین، برای بهبود کارآیی اقتصادی تولید این محصولات، جهت دهی دوباره بازارهای برنج، گندم و پنبه توصیه می‌شود. کاهش سهم دولت در بازار و تقویت بخش خصوصی را می‌توان به عنوان مهمترین اقدام در راستای سودآور کردن تولید این محصولات، پیشنهاد کرد.


## INTRODUCTION

According to the World Bank (http://www.worldbank.org), agriculture in Iran contributes to one fifth of the country's GDP, one-third of employment, four-fifths of food needs and one-third of non-oil exports. It is considered by the government as a key sector in the national development process, not only because of increasing demand for food resulting from rapid population growth, but also to support agribusiness sectors. The government believes that developing this part of economy is the most appropriate approach to achieve the long-run objectives of economic development. Despite the general policy of redirecting the economy towards a more market-oriented sector, there are still markets such as rice, wheat and cotton in which the government has a significant role.

As discussed below, the Iranian government intervenes in agricultural markets in various ways. Among the policies for economic adjustment, liberalization and privatization of economic enterprises have been implemented from 1989 in Iran. The possible outcomes of these policies in Iran are reviewed by Pajuyan (19), Mizani (12), Shojaei (22) and Kimia and Bakhshoodeh (9), where the theoretical basis of these policies is also discussed.

According to Bale and Lutz (2), political intervention of various types is one of the reasons for the scarcity of food in developing countries. Various policies such as import quotas and guaranteed prices, have been adopted worldwide mainly to support producers. However, market-oriented sectors are believed to be more efficient methods of price stabilization (7). A variety of programs, such as price support, was adopted by the Iranian government in the 1980s in an effort to achieve and maintain national self-sufficiency in basic agricultural products. Within a strategy of achieving economic liberalization and a market-oriented sector, policy has been recently directed toward gradual abolition of government intervention in agriculture. However, there are still markets such as rice, wheat and cotton where the government plays a significant role in pricing and in the supply side of the markets.

This paper focuses on evaluating the effects of government intervenentions in wheat, rice and cotton markets in Iran. In this context, nominal protective rates (NPRs) were calculated, and Nerlovian supply models were applied to time series data for 1982-1998 for these products.

## The Iranian rice, wheat and cotton industry and policy

Rice is a main food in Iran, particularly in the northern areas where most of the rice is produced. Farmers traditionally produce rice particularly in the northern areas, and so they most likely cannot easily adopt a new cropping pattern in which rice is excluded. Moreover, some varieties of domestic rice, e.g. *Taromi*, are highly acceptable to Iranian consumers, and therefore can compete with imported rice. However, producing rice is believed to be undesirable due to the lack of water caused by successive droughts in recent years, and because of the lack of comparative advantage (4).

According to the FAO database, the per capita consumption of rice in Iran was 18.6 kg in 1961 and reached around 34 kg in 1999, an average growth of 1.6% per annum. As shown in Fig. 1, while the gap between domestic production and consumption of rice fluctuated between 1961 and 1999, and although the production of rice has increased during the last few years, a sustainable share of consumption, e.g. a little over 20% in 1995, is imported into Iran each year.

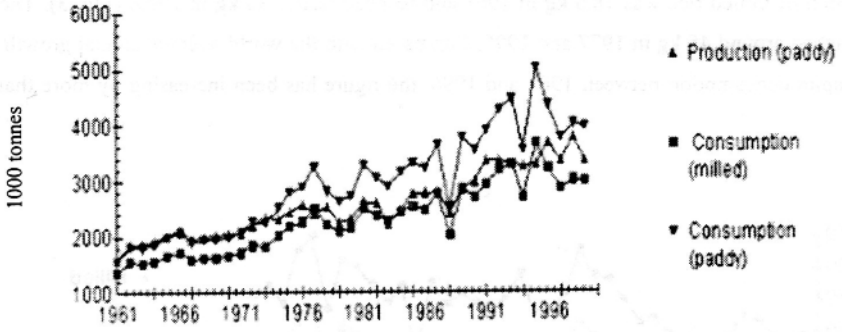


**Fig. 1. Production and consumption of rice in Iran**

The Iranian government intervenes in the rice market by controlling imports to prevent rises in the price of rice. Among the factors affecting the increasing gap between production and consumption of rice are the direct and indirect policies of the government. These policies include input subsidies, credit programs, a guaranteed price, distribution of rice coupons and importing rice using foreign exchange evaluated at special cheap rate allocated for food. Najafi (17), argued that most of these programs have been inefficient and have caused a widening in the self-sufficiency gap. As a result, shortages of the product exist each year and thus, the government imports rice by spending the official exchange at a rate of approximately $1 = 3000 Rials in 1998, by which the imported rice is apparently cheaper than the domestic rice. However, the imported rice is more expensive than the domestic rice when the prices are evaluated at the exchange rate in the black market, i.e. $1 = 8000 Rials in 1998.

According to Bakhshoodeh and Akbari (1), the consumer price of rice in Iran is higher than the producer price and the world price evaluated at the exchange rate in the black market. They argued that the multiple rate system of foreign exchange could lead to some ambiguous policies and misleading evaluation of basic economic figures such as prices. As shown in Fig. 2, the price received by the farmers is lower than the imported price, which reflects the fact that farmers are taxed.

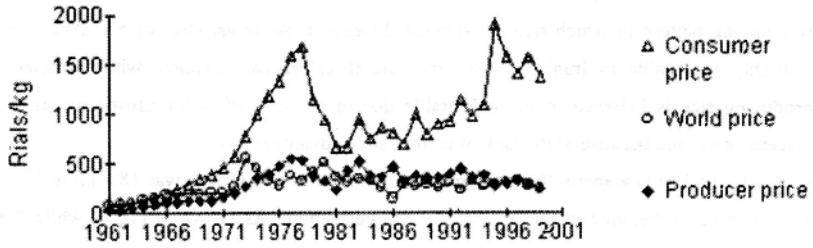


**Fig. 2. Real prices of rice in Iran**

Despite the increasing real price of rice, the per capita consumption is high; the average per capita consumption of milled rice was 18.6 kg in 1961 and reached nearly 34 kg in 1999, (Fig. 3). The recorded figure reached around 45 kg in 1977 and 1995. Compared with the world average annual growth of 0.08% for per capita consumption between 1961 and 1996, the figure has been increasing by more than 2.6% in Iran.

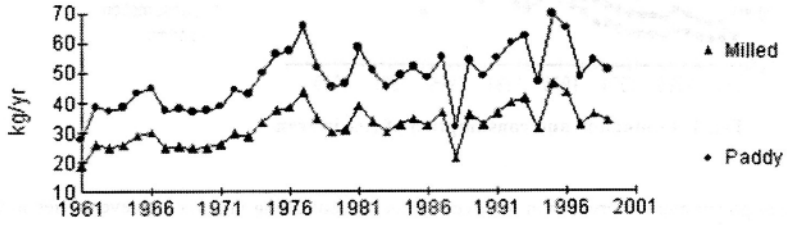


**Fig. 3. Per capita consumption of rice in Iran**

Wheat is also a common agricultural enterprise in Iran, and almost all farmers allocate part of their land to this crop each year. For reasons of food security, the Iranian government encourages the farmers to produce more wheat both by increasing their productivity and by increasing the area under cultivation.

The Iranian government has paid more attention to the production of wheat than to that of other crops. Farmers prefer to allocate land and other resources to more profitable enterprises than wheat. In the light of the general objective of attaining national self-sufficiency in agricultural products, those strategies

that would lead to higher levels of production, given current inputs particularly of land and water, have been sought by the government. As shown in Fig. 4, while the gap between domestic production and consumption of wheat fluctuates, and although the production of wheat has increased during recent years, a significant share of consumption, e.g. a little over 20% in 1995, is imported into Iran each year.

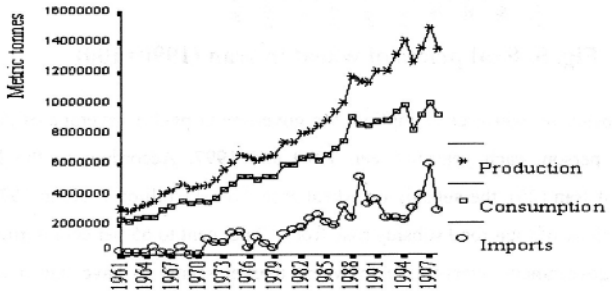


**Fig. 4. Production, consumption and import of wheat, Iran**

According to the Iranian Ministry of Agriculture (6), the low wheat yield in Iran is due mainly to the fact that most of the cultivated land in Iran is rain-fed (64% of the total wheat area in 1996, for instance) where the yield is less than 1000 kg per hectare. Although the cultivated wheat area rose from 3.6 million ha in 1961 to 5.4 million ha in 1979, 7.2 million ha in 1993 and 5.5 ha in 1999, the increase in the production of wheat in recent years has been due mainly to improvement in yield resulting from technological progress. Moreover, the more the production of wheat, the less the imports. For instance, the import of wheat decreased from nearly 6 million metric tonnes in 1997 to 3 million in 1998, during which the production of wheat reached from 10 million metric tonnes to 12 million.

Demand for wheat and its products, expressed by the private sector as well as the government, is increasing due to the rapid growth of the urban population of Iran. The guaranteed farm-level wheat price is almost the same as the world price evaluated at the official exchange rate but lower when gray market exchange rate is used. Consumers are supported by subsidy so that the consumer price is much lower than the world prices. The real prices of wheat in Iran are illustrated in Fig. 5.

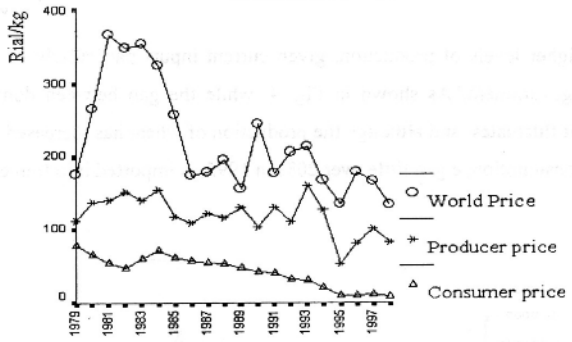


**Fig. 5. Real prices of wheat in Iran (1990=100)**

In terms of subsidy on wheat consumption, the government paid an average of 2010 billion Rials, i.e. 33400 Rials per person, each year between 1979 and 1997. According to the Plan and Budget Organization (PBO) of Iran (25), the subsidy on wheat rose from 11 billion Rials in 1977 to 3800 billion Rials in 1996, and its share of total food subsidy rose from 17 per cent to 65 per cent during this period.

Although the government intervention in wheat market seems to have had a positive effect on production of wheat, it has also caused the consumption of wheat to increase, not only as a food but also for other purposes such as feeding animals, since buying subsidized wheat and its products, particularly bread, is much cheaper than the cost of producing wheat. As indicated in Fig. 6, the per capita consumption of wheat including feed and seed increased from 140 kg in 1961 to nearly 200 kg in 1999. Per capita consumption of wheat as a food increased from almost 105 kg in 1961 to 140 kg in 1999, reflecting the fact that people in the rural areas located near cities have substituted wheat and bread in animal rations.

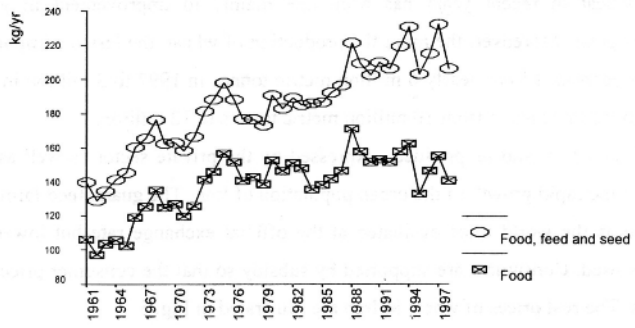


**Fig. 6. Per capita consumption of wheat in Iran**

In general, many agricultural economists in Iran believe that abolishing the wheat subsidy could control the waste of wheat, improve the quality of wheat products, especially bread, create job opportunities and redistribute income (e.g., 13, 16, 18). However, there are arguments in favor of maintaining the

intervention in the wheat market in order to support the poor. The government tries to remove or reduce the difference between the guaranteed price and that in the world level gradually and to abolish the consumption subsidy. So, although government intervention is a sign of distortion in wheat market, it is expected that in the future, government will appear in the market as does the private sector.

Cotton is another major agricultural product in Iran and in terms of annual cultivated land is the third after wheat and rice. As an input for textile and oil factories, it is a strategic product used in feeding animals. The normal excess supply of cotton has led to foreign exchange earnings each year. From a policy point of view, and comparing the domestic and world price, cotton is in a similar category to rice.

The Iranian government controls the cotton market through both pricing and trade policies. Despite the existence of a guaranteed price, farmers do not gain all the time from the policy, mainly due to the out-of-harvest timing of the price announcement. The quantity of export is determined by several organizations such as the Iranian Ministries of Agriculture, Industry and Trade as well as the Plan and Budget Organization of Iran, and is controlled by the Cotton and Oilseeds Organization of Iran. The aim of government is to assure that exported cotton is higher than the domestic demand for this product. Therefore, the government imposes export quotas on raw cotton to support domestic production of textiles and oils.

Although the cultivated area of cotton has decreased in recent years, total production has gone up, indicating an improvement in cotton yield per hectare. However, the relative low rise in cotton production is due mainly to its low relative price.

The nominal and real prices of cotton are illustrated in Fig. 7. As shown, the nominal price of cotton increased from 16.4 Rials/kg in 1974 to 1600 Rials/kg in 1996, while its real price fluctuated during this period. Whilst the real price increased between 1974 and 1976, it decreased during the first few years of the revolution. However, with ups and downs, it has had an increasing growth since then. The low real price of cotton is due mainly to the export restrictions imposed by the government. It is worth mentioning that the domestic price of cotton increased by 1.67 percent per annum between 1974 and 1997, but the average growth of the world price of cotton is said to be -4.1 percent per year (17).

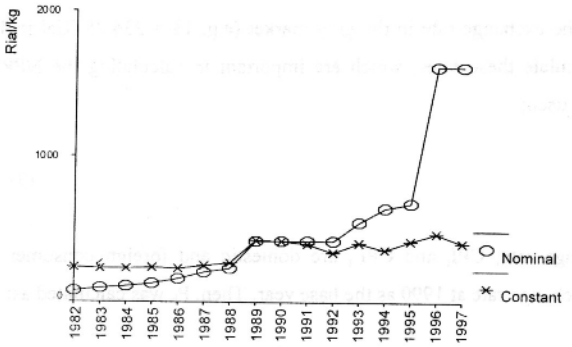


**Fig. 7. The nominal and constant prices of cotton in Iran**

The rest of this paper is structured as follows: the methods and theoretical basis are given below, followed by a short description of the data and variables. The findings are then discussed, and policy implementations are recommended at the end.

## MATERIALS AND METHODS

In order to evaluate the impact of the government policies on agricultural production, supply function need to be estimated (e.g. 3, 10, 11, 28, 29).

In this study, the nominal protection rate (NPR) is first used to evaluate the effects of the government intervention in the rice market. With no intervention, the domestic price of rice ($P_d$) is expected to be around that at the border ($P_b$). Thus, NPR is defined as:

$$NPR = (P_d/P_b) - 1 \qquad (1)$$

With protection, the NPR is expected to be positive.

A partial adjustment model introduced by Nerlove (18) is then used to evaluate the effects of government intervention in the rice market in Iran. Following Houck and Ryan (5) and Lin (11), NPR was included into the model as indicated in equation 2:

$$Y_t = \alpha_{0i} + \alpha_1 P_{t-1} + \alpha_2 NPR_{t-1} + \alpha_3 T + \alpha_4 Y_{t-1} + \varepsilon_t \qquad (2)$$

where $Y_t$ and $Y_{t-1}$ are the production of rice in years *t* and *t-1*; $P_{t-1}$ is the lagged price of the product at period *t-1* and T exhibits the trend variable; $\alpha$s are the coefficients to be estimated and $\varepsilon_t$ is the usual error term.

The data used in this study are time series of farm-level prices and production tonnages for the period 1983 to 1998, published by the Plan and Budget Organization (PBO) of Iran. The nominal prices were deflated using input price index for producers provided by the Statistical Center of Iran. Because the largest share of rice is imported from Thailand, the price of rice from that country is considered as the world price ($P_w$). These prices were collected from the annual FAO database and converted to the border-equivalent price ($P_b$) using the exchange rate in the gray market (e.g. 1$ = 234.25 Rial in 1980 and 1$ = 8657 Rial in 1999). To calculate these rates, which are important in calculating the NPR, the adjusted purchasing power parity was used:

$$E_t = (CPI_t / CPI^*_t)\, E_o \qquad (3)$$

where $E_t$ is the real exchange rate, $CPI_t$ and $CPI^*_t$ are domestic and foreign consumer price indices, respectively, and $E_o$ is the exchange rate at 1990 as the base year. Then, $P_b$ was calculated as:

$$P_b = (P_w + T_w) + T_d - C_d \quad (4)$$

in which $T_w$ is freight cost and "$(P_w + T_w)$" indicates the CIF price converted to the local currency, Rials, using the exchange rate in the gray market; $T_d$ and $C_d$ are the costs of transporting from the port to domestic markets and from farm to domestic market, respectively.

The auto-correlation Function (ACF) plot and the ADF unit root test were used to test the stationarity of the time series data. On the basis of LB-test and cointegration test results, some variables were excluded from the final models.

## RESULTS AND DISCUSSION

As indicated in Table 1 and Fig. 8, the NPR for rice was negative for most years, and always negative for wheat and cotton. Therefore, it may be said that there have not been enough incentives for exports of these products.

Table 1. NPRs for rice, wheat and cotton in Iran during 1982-98.

| | Rice | Wheat | Cotton |
|---|---|---|---|
| 1982 | -0.14 | -0.75 | -0.64 |
| 1983 | -0.26 | -0.56 | -0.68 |
| 1984 | -0.21 | -0.59 | -0.66 |
| 1985 | -0.08 | -0.53 | -0.57 |
| 1986 | +0.13 | -0.55 | -0.53 |
| 1987 | +0.12 | -0.60 | -0.68 |
| 1988 | -0.40 | -0.63 | -0.60 |
| 1989 | -0.21 | -0.46 | -0.39 |
| 1990 | -0.01 | -0.45 | -0.49 |
| 1991 | +0.03 | -0.59 | -0.55 |
| 1992 | -0.02 | -0.44 | -0.66 |
| 1993 | -0.15 | -0.53 | -0.39 |
| 1994 | -0.37 | -0.66 | -0.41 |
| 1995 | -0.58 | -0.68 | -0.26 |
| 1996 | -0.44 | -0.60 | -0.42 |
| 1997 | -0.48 | -0.53 | -0.39 |
| 1998 | -0.45 | -0.54 | -0.34 |

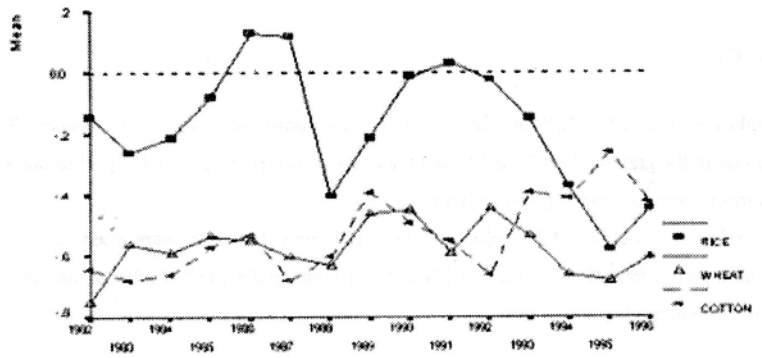


**Fig. 8. NPRs for rice, wheat and cotton in Iran.**

A stationarity test showed that some variables were not stationary and a subsequent cointegration test revealed that the lagged nominal price of rice $P_{t-1}$ and production level $Y_{t-1}$ should be included in the model. The estimated coefficients and the related statistics are summarized in Table 2.

Table 2. Supply function parameters of rice, wheat and cotton in Iran.

| | Coefficients† | | |
|---|---|---|---|
| | Rice | Wheat | Cotton |
| Constant | 801.895 | 3233.091 | 176.621 |
| | (260.010) § | (1139.590) | (81.832) |
| $P_{t-1}$ | 2.995 | - | - |
| | (1.211) | - | - |
| $Y_{t-1}$ | 0.102 | 0.429 | 0.472 |
| | (0.296) | (0.220) | (0.114) |
| $NPR_{t-1}$ | - | 24.265 | 134.289 |
| | - | (8.554) | (86.693) |
| Trend | - | -42.263 | -2.851 |
| | - | (69.609) | (2.160) |
| $R^2$ | 0.689 | 0.792 | 0.713 |
| F | 16.653 | 34.692 | 12.451 |

† Exclusion of variables is based on cointegration tests.

§ Figures in parentheses are standard errors of the coefficients.

The NPR and the real price of rice were excluded as not being co-integrated with the dependent variable. However, a Nerlove model including these two variables exhibited an unexpected negative sign for both of them. Covariance analysis and correlation test confirmed these signs. Thus, it may be said that rice producers consider factors beyond the price of rice and NPR in production. These factors may be listed as the relative profitability of the product, crop rotation possibilities at least in some areas, the high relative price of rice, and weather conditions in favor of producing rice rather than the other potential competitive products.

In contrast with the rice supply model, lagged NPR and the trend variable are included in the wheat and cotton models. As shown in Table 2, the NPRs are found to be statistically significant, indicating that producers decisions is affected by the degree of governmental support.

## CONCLUSIONS AND POLICY IMPLICATIONS

Based on the results, it may be said that the Iranian government's policy to achieve a stable price has not been successful in the rice market. The negative NPR for the majority of the studied years indicates that rice producers have not been supported. Therefore, the increased level of production is due to other factors such as its relative profitability. Although rice production has increased, consumption has gone up with deficits imported using a subsidized foreign exchange rate. In general, the implemented policies for supporting rice producers in order to achieve a stable price and income, has ended up with an unwanted outcome mainly against the general objective of self-sufficiency in agricultural products.

The evidence shows that, whilst the cultivated land and the production of basic crops such as rice and wheat have increased, the degree of domestic self-sufficiency has decreased due to the rapid increase in population and as a result of implementing policies such as supplying cheap rice by coupon.

The NPR was calculated to be negative for all three products in most years. Thus, while consumers have benefited from rice and wheat subsidies, the producers seem to be implicitly taxed. Moreover, as the supply model indicates, there was no significant relationship between NPR and production of rice, wheat and cotton. The highly fluctuated NPRs reflect an inflexible price policy in varying conditions.

Based on partial equilibrium analyses (1), the welfare effects of market liberalization depend on the policy applied to a market. Whilst the absolute loss in rice producers' surplus may be relatively higher than the gain of rice consumers, wheat producers may gain from market liberalization and a loss in consumers' surplus is expected to occur. As far as foreign exchange is concerned, the policy causes an increase in rice imports but a decrease in wheat imports resulting from the changes in domestic supply and demand of these products. Since the decrease in government revenue from the taxes imposed on rice producers is much less than the reduction in subsidy costs, rice and wheat market liberalization also causes a notable reduction in treasury costs. In general, the society as a whole seems to gain from liberalization.

With regard to improving the situation, the following may be recommended:

1. The government should buy 10 to 20 per cent of rice at harvest time at an agreed price in order to address shortages in other seasons.

2. Considering the deficiency of water due to recent droughts, the consumption of rice should be redirected in such a way that per capita consumption decreases close to what is expected to be at the world price. For this purpose, abolishing coupon distribution can be considered as a policy by which the consumption can be controlled.
3. The use of subsidized foreign exchange devoted to rice imports is considered to act against domestic producers, and therefore should be abolished.
4. Despite the fact that domestic rice is not considered an export commodity, some varieties may be potentially considered for the purpose of exports. In this regard, removing exporting barriers is highly recommended.
5. Pricing policy should be flexible enough to accommodate changes in production costs.
6. The general subsidy on consumption of bread results in wastes and the high demand should be controlled by targeted subsidies.
7. In the case of exported products such as cotton, improved technology and qualities are recommended in order to provide competitiveness in the world market.
8. The foreign trade policy affecting products such as cotton should be stabilized in order to reduce the fluctuation in domestic prices and producers' income.
9. Considering the generally low efficiency of government activities, the role of the government in agriculture markets should be diminished.

It is believed that implementing the above recommendations could improve the efficiency of agriculture markets in Iran. Various policies may be examined according to the type of product. As many other studies confirm, the private sector should be strengthened and wherever possible substituted for government in the markets.

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