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The Wheat Pricing Policies in Pakistan: Some Alternative Options

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The purpose of this paper is to evaluate the impact on wheat production, consumption, and trade of changing the input subsidy and output price subsidy policies. A model of the wheat market in Pakistan is developed to examine the likely effects of alternative wheat pricing policies in Pakistan. A recursive econometric simulation model was used to project production, consumption, and trade under the baseline and two other scenarios. The baseline scenario is designed to predict the evolution of production, consumption, and trade if agricultural policies are maintained until the year 2000. In scenario one, the effects of complete subsidy removal are assessed while in scenario two the subsidies are assumed to be phased out gradually. The results of the study indicate that there will be a greater decline in wheat production if the government eliminates the input subsidies at once than if there is a gradual phasing out of these. The results suggest that there will be a little impact on the consumption of wheat due to the increase in consumer price of wheat. However, the lower-income household with the higher number of family members will be affected more with the increase in the price of staple wheat. Imports of wheat are greater if the subsidies are eliminated at once, as compared to phasing them out gradually.

1. INTRODUCTION

The Government of Pakistan extensively intervenes in the production, marketing, and pricing of wheat with the twin objectives of maintaining adequate incentives for producers and ensuring supplies of wheat-flour to consumers at affordable prices. The present wheat pricing policy is based on a system of official wheat procurement and releases of wheat at officially-regulated procurement and

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release prices. It involves a significant cost to the public exchequer on account of marketing and storage of wheat by the public sector. In addition, the Government of Pakistan has tried to keep the price of wheat below the international levels in order to subsidise domestic consumers. This has resulted in a subsidy on imported wheat that involves the difference between the import parity price and the issue price in addition to expenses on the handling of imported wheat. These costs are further compounded by the provision of input subsidies to wheat producers.

A number of studies have argued that government interventions in the wheat market have resulted in inefficiencies and that the wheat subsidy rarely accrues to the target group, e.g., low-income consumers.[1] Against this backdrop, the Government of Pakistan is under pressure to dismantle its wheat operations, thus paving the way for the determination of wheat prices in the open market. The present paper attempts to determine the likely consequences of changes in wheat pricing policies (triggered by changes in input and output subsidies) for production, consumption, and wheat trade in Pakistan. The paper is organised as follows. Section 2 provides some stylised facts pertaining to the present wheat pricing policy in Pakistan. Section 3 specifies the model while Section 4 discusses the estimation results. Section 5 uses the model to construct different scenarios wherein the impacts of different pricing policies are examined on the consumption, production, and trade of wheat. Finally, Section 6 provides the summary and conclusions.

2. WHEAT MARKET IN PAKISTAN: SOME STYLISED FACTS

Table 1 provides key indicators of wheat-crop for the period 1990-91 to 1995-96. The table shows that wheat production increased from 14565 thousand tons in 1990-91 to 16907 thousand tons in 1995-96, recording a modest average annual growth rate of 3.03 percent. Area under wheat-crop fluctuated between 7911 thousand hectares and 8377 thousand hectares during the period 1990-91 to 1995-96. Wheat yield steadily increased from 1841 kgs. per hectare in 1990-91 to 2100 kgs. per hectare in 1995-96. On average, wheat accounted for 29.60 percent of the value-added of major crops during the period 1990-91 to 1995-96, whereas the average share of wheat in the value-added of the agriculture sector stood at 13.55 percent during the same period.

In view of the importance of wheat-crop in Pakistan's economy, the Government of Pakistan has extensively intervened in the production, marketing, and distribution of wheat. Government intervention in the wheat market takes the form of public procurement and releases of wheat at officially-regulated support and issue prices, often resulting in huge financial subsidy. Table 2 provides data on average wheat prices as well as the magnitude of subsidy on domestic and imported wheat. The procurement price of wheat increased steadily from Rs 2800 per ton in 1990-91

[1]See, for instance, Qureshi (1987); Greene and Roe (1989); Cornelisse and Naqvi (1989); Hamid *et al.* (1991); Barkley (1992); Ender (1992) and Mellor (1993).

Table 1

Key Indicators of Wheat Crop

Year	Percent Share of Wheat in Value-added of Major Crops	Percent Share of Wheat in Value-added of Agriculture	Percent Share of Wheat in Total Cropped Area	Area under Wheat (000 Hec.)	Yield (Kg./Hec.)	Wheat Production (000 Tons)
1990-91	29.18	13.95	36.26	7911.00	1841.00	14565.00
1991-92	27.05	13.63	36.27	7878.00	1990.00	15684.00
1992-93	31.79	14.28	36.99	8300.00	1946.00	16157.00
1993-94	30.03	12.98	36.74	8034.00	1893.00	15213.00
1994-95	31.36	13.82	36.90	8170.00	2081.00	17002.00
1995-96	28.19	12.65	37.08	8377.00	2100.00	16907.00
Average	29.60	13.55	36.71	8111.67	1975.17	15921.33
Average Annual Growth (%)	–0.69	–1.94	0.45	1.15	2.67	3.03

Source: Economic Survey: 1995-96.

Table 2

Average Wheat Prices and the Extent of Subsidy

Rs/Ton

Year	Procurement Price	Release Price	Import Parity Price	Open Market Price	Provincial Subsidy	Federal Subsidy	Total Subsidy
					(Million Rs)		
1990-91	2800.00	2550.00	3208.00	2687.25	2158.00	1609.00	3767.00
1991-92	3100.00	3100.00	4205.00	3085.00	1765.00	3671.00	5436.00
1992-93	3250.00	3400.00	4212.00	3608.25	979.00	2000.00	2979.00
1993-94	4000.00	3550.00	3804.00	3726.00	6006.63	1187.29	7193.92
1994-95	4000.00	4375.00	4874.00	4368.25	3352.44	2811.31	6163.75
1995-96	4375.00	4375.00	7718.00	4685.25	3565.08	6648.00	10213.08
1996-97	6000.00	6500.00	7572.00	7500.00	4282.65	5761.00	10043.65

Sources: 1. *Economic Survey: 1996-97.*
2. *Agricultural Statistics of Pakistan: 1995-96.*

to Rs 6000 per ton in 1996-97. The release price of wheat also followed a rising trend over time, increasing from Rs 2550 per ton in 1990-91 to Rs 6500 per ton in 1996-97. The import parity price of wheat rose from Rs 3208 per ton in 1990-91 to Rs 7718 per ton in 1995-96, and then it declined to Rs 7572 per ton in 1996-97. For

most of the years, the procurement price has remained equal to or above the release price during the period 1990-91 to 1996-97, whereas it has remained below the open market price for some of the years during the same period. It is interesting to note that the three domestic prices of wheat have remained lower than the import parity price of wheat during the period 1990-91 to 1996-97.

Owing to the fact that the release price was not set sufficiently high to cover incidental expenses pertaining to the handling and storage of wheat, a huge financial subsidy was involved on domestic wheat procurement and wheat imports. According to Table 2, provincial subsidy increased from Rs 2158 million in 1990-91 to Rs 4282.65 million in 1996-97. Federal subsidy on imported wheat showed wide fluctuations during the period 1990-91 to 1996-97, owing primarily to wide swings in the import parity price of wheat. The total subsidy bill stood at Rs 3767 million in 1990-91, rising almost threefold to Rs 1043.65 million in 1996-97.

3. THE MODEL

In this section, we specify a model to analyse the implications of different policy scenarios for production, consumption, and trade of wheat. The partial equilibrium model is a basic analytical tool that is most often used to model commodity markets where the market price is determined by the equilibrium of supply and demand. However, the situation is different in the case of Pakistan, where there is no free interplay of supply and demand due to government intervention in wheat production and trade. Due to the fact that domestic prices of wheat in Pakistan are largely determined by the government, through policies like the procurement price and release prices, the wheat market is modelled as a recursive system with exogenous prices. For expository purposes, the model has been divided into three sectors: production, consumption, and trade. A detailed description of each sector is provided below.

Wheat Production

Figure 1 depicts the structure of the model. As shown in the diagram, the production side of the model consists of three input demand equations pertaining to water availability, credit, and fertiliser offtake. In addition, the production side contains acreage and yield equations, and an identity relating wheat production with acreage and yield. The following equations summarise the production side of the model:

(1) $WATAV = f(RIRSUB, RPESV, RELSUB)$
(2) $CREDT = f(RIR, RCRSUB, RELSUB)$
(3) $FEROF = f(RPRCPW, RRPFER, RPESV, CREDT, SEED)$
(4) $YIWH = f(RPRCPW, FEROF, ARF)$
(5) $ARWH = f(RPESV, CREDT, TRANO, WATAV)$
(6) $WPROD = YIWH \times ARWH$

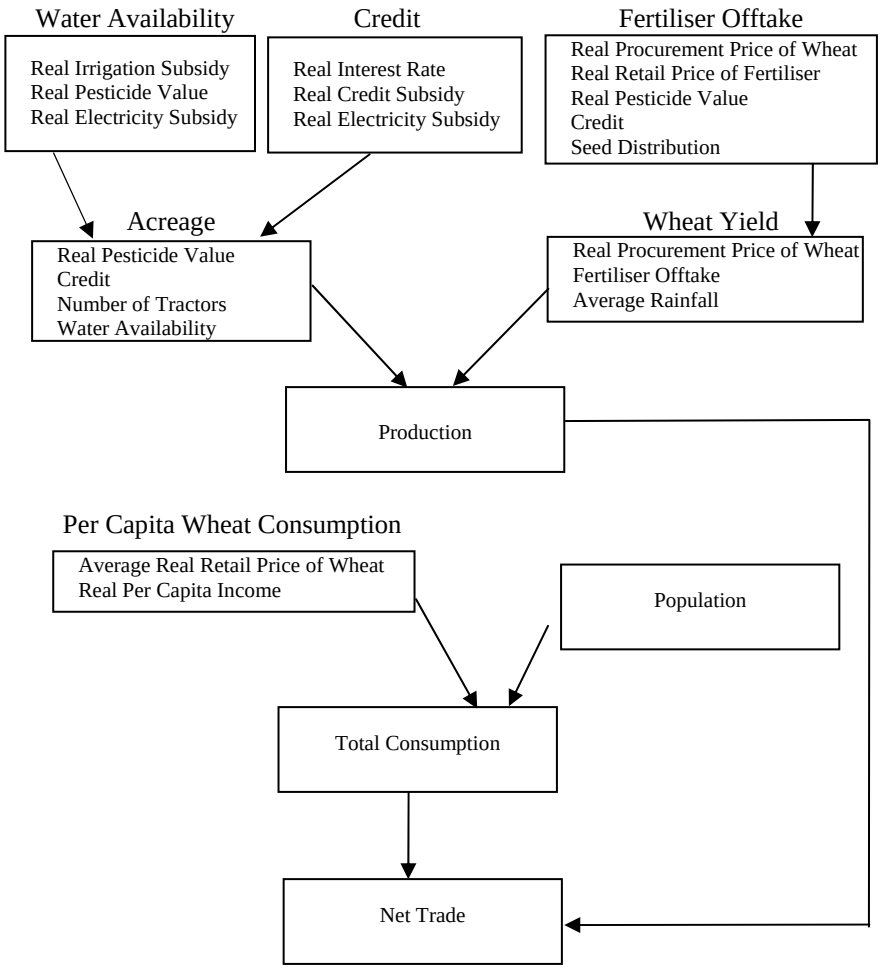

Fig. 1. Pakistan Wheat Model.

where:

WATAV = Water Availability (Million Acre Feet).
RIRSUB = Real Irrigation Subsidy (Million Rs).
RPESV = Real Pesticide Price (Rs Per Ton).
RELSUB = Real Electricity Subsidy (Million Rs).
CREDT = Credit Demand (Million Rs).
RIR = Real Interest Rate (Percent).
RCRSUB = Real Credit Subsidy (Million Rs).

FEROF = Fertiliser Offtake (Thousand Tons).
RPRCPW = Real Procurement Price of Wheat (Rs 40/Kg.).
RRPFER = Real Retail Price of Fertiliser (Rs 50/Kg.).
SEED = Seed Distribution (Thousand Tons).
WPROD = Wheat Production (Thousand Tons).
ARWH = Area Under Wheat Crop (Thousand Hectares).
YIWH = Yield for Wheat (Kg./Hectare).
ARF = Average Rainfall (Millimeters).
TRANO = Tractor Numbers (Numbers).

The explanatory variables in the water availability equation are real irrigation subsidy, real pesticide price, and real electricity subsidy. Input demand equation pertaining to credit is specified in terms of real interest rate, real credit subsidy, and real electricity subsidy. The explanatory variables in the fertiliser offtake equation are real procurement price of wheat, real retail price of fertiliser, real pesticide price, and credit and seed distribution. Fertiliser offtake influences the yield while the other two inputs, water availability and credit, are assumed to affect the acreage decision. Wheat production is determined by multiplying acreage with yield.

Wheat Consumption

The consumption side of the model consists of an equation for per capita wheat consumption.[2] The explanatory variables in this equation are real retail price of wheat and real per capita income.

(7) $PCWC = f(ARRPW, RPCI)$
(8) $WCONS = PCWC \times POP$

where

PCWC = Per Capita Wheat Consumption (Kg.)
ARRPW = Average Real Retail Price of Wheat (Rs/Kg.)
RPCI = Real Per Capita Income (Thousand Rs)
WCONS = Wheat Consumption
POP = Population.

Wheat Trade

International trade side of the model consists of the following identity.

(9) $WIMP = WCONS\text{-}WPROD$

[2]Variations in stocks are included in wheat consumption and it is assumed that the government manipulates trade and stocks to balance production and consumption.

where

WIMP = Wheat Imports.

4. EMPIRICAL RESULTS

The model specified above has been estimated by Ordinary Least Squares, utilising data on the relevant variables for the period 1972 to 1992. The data for the model were taken from *Economic Survey* (ES) (Various Issues), *Agricultural Statistics of Pakistan* (ASP) (Various Issues), International Food Policy Research Institute (IFPRI) (1992), Food and Agriculture Policy Research Institute (FAPRI) (1994), Food and Agriculture Organisation (FAO) (1995), and *Trade Yearbook*. The data on credit, irrigation, and electricity subsidies have been acquired from Mellor (1993). The data on GDP deflator and CPI were taken from International Monetary Fund (IMF) (Various Issues) *Statistical Yearbook*. The base year of the price indices was 1985 = 100. Consider the following estimated input demand equations:

$$WATAV = 81.629 + 2.006\ (RIRSUB) - 0.010\ (RPESV) + 1.445\ (RELSUB)$$
$$(37.80)\quad (7.04)\quad (-2.39)\quad (5.55)$$
$$R^2 = 0.86\quad D.W = 1.29 \qquad \ldots \quad \ldots \quad \ldots \quad \ldots \qquad (1)$$

$$CREDT = 4727.87\ -25998\ (RIR) + 819.25\ (RCRSUB) + 424.93\ (RELSUB)$$
$$(4.09)\ (-5.06)\quad (7.58)\quad (10.34)$$
$$R^2 = 0.98\quad D.W. = 1.88 \qquad \ldots \quad \ldots \quad \ldots \quad \ldots \qquad (2)$$

$$FEROF = -32.83 + 11.61\ RPRCPW - 2.76\ RRPFER - 0.496\ RPESV$$
$$(-0.10)\quad (3.15)\quad (-2.29)\quad (-6.70)$$
$$+ 0.115\ CREDT + 3.63\ SEED$$
$$(18.14)\quad (3.25)$$
$$R^2 = 0.98\quad D.W = 2.27 \qquad \ldots \quad \ldots \quad \ldots \quad \ldots \qquad (3)$$

All the explanatory variables in the above equations are statistically significant at the 5 percent level and have the expected signs. The water availability equation shows that there is a positive relationship between water demand and the irrigation subsidy. There is a negative relationship between water demand and pesticide price. As the price of pesticides increases, the demand for water declines. This means that water and pesticides are complementary inputs. The electricity subsidy has a positive relationship with water demand. The credit equation shows that as the rate of interest increases, the demand for credit declines. The credit subsidy and electricity subsidy have a positive relation with the credit demanded. The fertiliser offtake equation shows that there is a positive relationship between the

procurement (producer) price of wheat and the quantity demanded. The sign of the coefficients for the fertiliser price is negative. Similarly, as the price of pesticides rises, the quantity demanded of fertiliser declines, so these inputs are complements. The signs on the credit and seed variables suggest that these are complementary inputs as well.

The estimated yield and acreage equations are as follows:

$$YIWH = 430.646 + 6.219\ (RPRCPW) + 0.433\ (FEROF) + 0.397\ (ARF)$$
$$(1.23)\quad (1.68)\qquad (10.70)\qquad (2.19)$$
$$R^2 = 0.87\quad D.W. = 2.20\qquad \rho = -0.37$$
$$(-1.43)\quad \ldots\quad (4)$$

$$ARWH = 4286.60 - 0.544(RPESV) + 0.069(CREDT) + 0.028(TRANO)$$
$$(5.62)\qquad (-2.97)\qquad (2.38)\qquad (3.93)$$
$$+ 21.59\ (WATAV)$$
$$(2.40)$$
$$R^2 = 0.96\quad D.W. = 2.28\qquad \ldots\quad \ldots\quad \ldots\quad \ldots\quad \ldots\quad (5)$$

The explanatory variables in the yield equation are significant at 5 percent level and the equation shows that there is a positive relationship between input use and yield. The equation has been corrected for the first order autocorrelation. The estimated coefficients for the explanatory variables are significant at the 5 percent level and have the expected signs. Our results show that with the increase in input price of pesticides, the area of wheat planted declines. The rest of the explanatory variables show a positive relationship with wheat acreage.

The estimated equation for per capita wheat consumption is described below:

$$PCWC = 121.51 - 742.13\ (ARRPW) + 0.664\ (RPCI)$$
$$(4.26)\quad (-1.77)\qquad (1.34)$$
$$R^2 = 0.82\quad D.W. = 1.71\qquad \ldots\quad \ldots\quad \ldots\quad \ldots\quad \ldots\quad (6)$$

In the above equation, retail price of wheat is statistically significant at the 10 percent level and has the anticipated sign, whereas per capita income is statistically insignificant. Cornelisse and Naqvi (1989) have mentioned that a consistent time-series of directly observed volumes of wheat consumption is not available in Pakistan. They use an approximation of actual consumption volumes to derive their income elasticity. Their estimates show an income elasticity of 0.4. Moreover, they argue that although there is a positive relationship between income and consumption of wheat, the income elasticity has declined from about 0.6 in the early 1960s to about 0.4 in 1985. However, for this study no relationship between per capita wheat consumption and real per capita income was found.

5. SIMULATIONS

In this section, the estimated model is used to project annual estimates of Pakistan's production, consumption, and net trade of wheat for the period 1993 to 2000. We have constructed three different scenarios that capture alternative wheat pricing policies. The baseline scenario is based on the continuation of past policies until the year 2000.[3] The first scenario is based on the assumption that subsidies are removed completely. In the second scenario, it is assumed that subsidies are phased out gradually.

Baseline Scenario

The baseline scenario is designed to predict the evolution of production, consumption, and trade if existing agricultural policies are maintained until the year 2000. To predict the endogenous variables of the model, it is necessary to incorporate projected changes in such exogenous variables as the fertiliser price, the irrigation subsidy, and the credit subsidy. These exogenous variables have been projected using the time trend derived from the historic data. In the acreage equation, the exogenous variables, pesticide price, and tractor numbers have been projected with a time trend. The other two explanatory variables, credit and water availability, are predetermined in the acreage equation. Similarly, in the yield equation, the procurement price of wheat and rainfall are exogenous variables, as the projections of these variables have been attained through the time trend. The fertiliser offtake in the yield equation is predetermined and the projected values of this variable are incorporated into the yield equation. On the consumption side of the model, the wheat projections over 1993 to the year 2000 have been made on the basis of the per capita wheat consumption equation. The exogenous variables in the per capita wheat consumption equation are average real retail price of wheat and real per capita income. The projections for these exogenous variables have been derived by the time trend based on historic data. Projected values for the exogenous variables are used in the per capita wheat consumption equation to predict per capita wheat consumption. The projected per capita wheat consumption is then multiplied by the projected population to get the total wheat consumption by the year 2000.

Scenario One

Scenario One is designed to represent the evolution of wheat production, consumption, and trade over the years 1993 through 2000, if the government completely eliminates both input and consumer subsidies. As we know from the

[3]For example, the retail price of wheat increased from Rs 3.84 per kg. in June 1993 to Rs 4.57 per kg. in March 1994, a rise of 19 percent. The price of wheat-flour also exhibited a similar trend as it increased from Rs 4.50 per kg. to Rs 5.14 per kg., an increase of 14 percent. Moreover, the Government also announced the increase in the issue price of wheat from Rs 3,550 to Rs 4,375 per ton (ES). The trend reflected in these price changes is assumed to continue until the year 2000.

literature, the government has reduced the fertiliser subsidy to 9 percent in the year 1991. Assuming that this 9 percent subsidy on fertiliser is removed altogether, the price of fertiliser will be 9 percent higher than in the baseline. Therefore, we have added the 9 percent increase in the baseline projections of the exogenous price variable of fertiliser. Similarly, we have assumed zero subsidy on irrigation and credit over the projected period. Projected values for the exogenous variables are used in the relevant input demand equations to predict input use.

As noted earlier, the Government of Pakistan has increased the retail price of wheat from Rs 3.84 per kilogram in June 1993 to Rs 4.57 per kilogram in 1994. In Scenario One, on the consumption side of the model, assuming zero subsidy on the wheat or wheat-flour, we have added 20 percent to the average real retail price of wheat in the baseline projections over the years 1993 to 2000. The other exogenous variable in the per capita wheat consumption equation is real per capita income. The projected values of these exogenous variables are used in the per capita wheat consumption equation to predict per capita wheat consumption over the period 1993 to 2000. The projected per capita wheat consumption is then multiplied by the projected population to get total consumption of wheat over the projected period.

Scenario Two

Scenario Two is designed to explore the implications of gradually phasing out subsidies as opposed to eliminating them completely. The fertiliser subsidy is reduced gradually from 9 percent to zero by the year 2000. Similarly, the subsidy on water is gradually reduced from its 1991 level of 11.3 percent to zero over the years 1993 to 2000. According to the International Financial Statistical Yearbook of the IMF, the private rate of interest was 15 percent in 1993. The Agricultural Development Bank of Pakistan (ADBP), under the administrative control of the federal government, lends at 7 percent, so there is an implicit subsidy of 8 percent. This estimated subsidy is gradually reduced over the years to reach zero by the year 2000. All the other exogenous variables in the input demand equations are the same as in the baseline scenario. In the acreage equation, the explanatory variables, credit and water availability, are predetermined, as the projected values of these variables are computed from the estimated input demand equations. In the yield equation, the fertiliser offtake is predetermined and the projected values for this variable are also computed through the estimated input demand equation. On the consumption side, we have gradually increased the price of wheat in the baseline projections over the years 1993–2000, reflecting a government policy that is orientated towards phasing out of consumer subsidy on wheat. The projections for the other exogenous variable, real per capita income, are derived by using the time trend.

Comparison of the Baseline with Other Scenarios

Table 3 provides a comparison of the projections derived under the Baseline Scenario and the other two scenarios, while Table 4 highlights the percentage differences between baseline projections and the projections based on Scenarios One and Two. According to Table 3, wheat production and consumption decline both in Scenarios One and Two. For example, wheat production declines from 16.2 million tons in the baseline scenario to 10.1 million tons and 12.3 million tons, respectively, in Scenarios One and Two. Similarly, wheat consumption decreases from 20.8 million tons in the Baseline Scenario to 20.4 million tons and 20.6 million tons, respectively, in Scenarios One and Two. However, the decline in wheat production is more pronounced than the corresponding decline in wheat consumption, resulting in an increase in net wheat trade in both scenarios. For instance, the total net trade average in the Baseline Scenario is 4.6 million tons while the average of the projections for Scenario One and Scenario Two are 10.4 and 8.2 million tons, respectively. It is interesting to note that wheat consumption over the projection period does not vary much among the Baseline and the other two scenarios. This is largely due to a low value of the price elasticity of demand.

Table 3

Comparison of the Baseline with the Other Scenarios

	Baseline	Scenario One	Scenario Two
Production (000 Ton)	16248.46	10053.14	12347.02
Consumption (000 Ton)	20808.56	20425.57	20563.41
Net Trade (000 Ton)	4560.11	10372.43	8216.39
Area under Wheat (000 Hect.)	8328.16	6775.4	7376.51
Wheat Yield (Kg. Per Hectare)	1949.5	1483.53	1669.12
Real Retail Price of Fertiliser (Rs per 50 Kg.)	111.31	121.33	116.09
Real Retail Price of Wheat (Rs/Kg.)	1.93	2.31	2.17
Per Capita Wheat Consumption (Kg./Year)	154.79	151.93	153.02

Note: Figures are average projections for the period 1993 to 2000.

In the Baseline Scenario, per capita consumption of wheat is about 155 kg., while the real price on average is Rs 1.93 per kg. Therefore, on average, the total per capita expenditure on wheat in the Baseline is about Rs 300 per year. Following the same procedure, average per capita expenditure on wheat is about Rs 351 in Scenario One and Rs 332 in Scenario Two. According to these results, by eliminating subsidies, there is an increase of per capita wheat expenditure of about Rs 30 to Rs 50 per year. Considering real per capita income in Pakistan of Rs 6,494 in 1994, this increase in per capita expenditure on wheat of Rs 30 to 50 is not much. The

additional expenditure on wheat would be just about 0.62 percent of the real per capita income on average. However, the real per capita income here does not reflect the income differentials among various income groups. The impact of the increase in the price of wheat could have more severe effects on lower-income households with higher numbers of family members.

According to Table 4, average wheat production in Scenario One is 38 percent less than that in the Baseline Scenario, while the average wheat production in Scenario Two is 24 percent less than that in the Baseline Scenario. The results indicate that Pakistan's wheat production will be lower with the policy changes, but the decrease in Scenario One is more significant than the decrease in Scenario Two. The production estimates can be further explained by considering the acreage and yield projections. Wheat acreage is lower in Scenario One as compared to the Baseline, while in Scenario Two the wheat area is declining. Average wheat acreage in Scenario One is 19 percent less than that of the Baseline, while in Scenario Two it is 11 percent less. Wheat yields in Scenario One are pretty much constant, fall in Scenario Two, but rise in the Baseline. Yield projections in the Baseline average 1949 kilograms per hectare, while the average yield in Scenario One is 1483 and 1669 kgs. per hectare in Scenario Two. The effects of decreases in acreage and yield ultimately lead to lower production of wheat. The relatively greater decline of wheat production in Scenario One is due to eliminating input subsidies altogether, while the effect of removing subsidies gradually is less severe. As for the net wheat trade, the percentage difference between Scenario One and the Baseline Scenario is a hefty 127 percent, while the percentage difference in the average projections between Scenario Two and the Baseline is 80 percent.

Table 4

Percentage Differences: Baseline vs. Other Scenarios

	Scenario One	Scenario Two
Production	–38	–24
Consumption	–1.84	–1.18
Net Trade	127.46	80.18
Area under Wheat	–18.64	–11.43
Wheat Yield	–23.9	–14.38
Real Retail Price of Fertiliser	9	4.29
Real Retail Price of Wheat	19.69	12.43
Per Capita Wheat Consumption	–1.84	–1.14

Note: Figures show the percentage differences between average baseline projections and projections associated with Scenarios One and Two for the period 1993 to 2000.

Impact of Price Increase on Different Income Groups

The demand for wheat is inelastic, therefore a price increase would leave a minor impact on the consumption of staple wheat. However, with the increase in the price of wheat, the consumers, specially the lower-income households, will be spending a larger share of their income on wheat and wheat-flour as compared with the higher-income households.

We took the data on average monthly per capita consumption expenditure by different income groups ranging from the income of Rs 1,000 to Rs 7,001 and above. The data were also taken on monthly per capita expenditure on wheat and wheat-flour by different income groups from the Household Income and Expenditure Survey (HIES, 1992-93). Our results show that the upper-income group (Rs 7001 and above) allocates only 3.93 percent of its total expenditure to wheat and wheat-flour, compared with 9.7 percent for the lowest-income group (Rs 1,000). Thus the lowest income group spends almost two-and-half times more of their total expenditure on wheat and wheat-flour as compared with the highest-income group.

We have also analysed the impact of increase in the price of wheat on consumer expenditure.[4] Assuming Mellor's estimate of an average household additional expenditure on wheat, i.e., Rs 76 per annum, we have estimated that the lowest-income household with the income of Rs 1008.47 would be spending an additional 7.6 percent of its income on the consumption of wheat. In the second quintile, given the average per capita income of Rs 1,818.35, the increase would represent 4.2 percent of income, while in the third and fourth quintiles, with average per capita income of Rs 2,537 and Rs 3,639, the additional expenditure on wheat would represent 3 and 2 percent of income, respectively. Finally, in the highest quintile, given the income of 7,354, the additional expense would be about 1 percent of their income. According to these results, the consumers in lower-income groups will be relatively more affected by the increase in the price of wheat, as compared with the higher-income households.

Impact of Input Subsidy on Wheat Production

To identify the most critical inputs in the production of wheat, the model is used to simulate the complete removal of fertiliser subsidy while maintaining the irrigation and credit subsidies. The result is shown in Figure 2. The figure shows that there will be a very slight impact on the predicted production if the fertiliser subsidy is removed while keeping the other input subsidies. Similarly, we tried to predict the projected production of wheat in the case of complete elimination of irrigation subsidy while maintaining subsidies on fertiliser and credit. In this case, as shown in Figure 3, the removal of the irrigation subsidy has a significant impact on the predicted production of wheat. The elimination of the credit subsidy, holding the

[4]Data on different income groups are taken from Adams and He (1995) while information on additional expenditure on wheat is acquired from Mellor (1993).

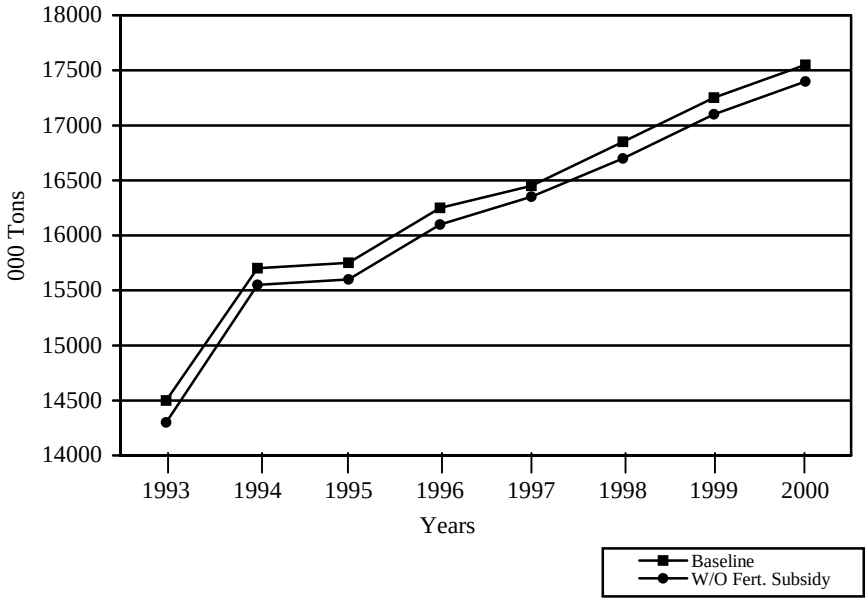

Fig. 2. Predicted Wheat Production (Eliminating Fertiliser Subsidy).

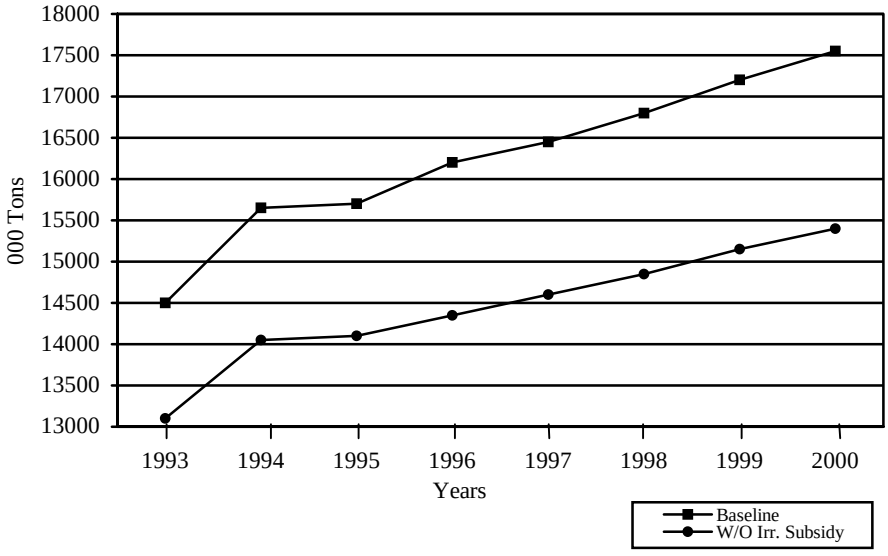

Fig. 3. Predicted Wheat Production (Eliminating Irrigation Subsidy).

other subsidies constant, is also simulated. This is shown in Figure 4. The result is interesting as there is a big divergence between the projected production in the baseline and the projected production of wheat without the credit subsidy. These results suggest that irrigation and credit are the most critical inputs in wheat production in Pakistan.

Impact of Raising the Procurement Price on Wheat Production

From the farmers' point of view, the procurement (support) price plays a decisive role in determining the wheat production. According to the wheat marketing study by Cornelisse and Naqvi (1984), the channels used by the farmers in disposing of their marketable surplus included the Government Procurement Centres (42.6 percent), *Beoparis* (30.9 percent), Commission Agents (19.4 percent), Other Farmers (4.7 percent), and Village Shopkeepers (2.2 percent). Thus, the major portion of the marketable surplus is absorbed by the Procurement Centres. It is also believed, as in the report of the National Commission on Agriculture, that the determination of support price is a balancing act in which conflicting interests of many parties have to be reconciled into a stable but progressive pricing policy. The growers regard the procurement prices as a cost-plus mechanism which guarantees the producers their costs and some profit. When international prices rise, the growers expect the support prices to transfer the benefit to producers; on the other hand, when the international prices fall, they want the government to stabilise the prices at the previous higher level. The effort of the government in determining the procurement price is to balance the various interests (NCA).

As we are aware of the fact that the Government of Pakistan is keen to increase the procurement price of wheat. Therefore, to assess the response to changes in the procurement price, an increase of 10 to 20 percent in the procurement price of wheat has been simulated in the model over the years 1993 to 2000. The 10 percent increase in the procurement price of wheat was made in the year 1993 and then it was increased gradually over the projected period to reach 20 percent by the year 2000. Figure 5 shows the simulated production in case of eliminating the input subsidies and raising the procurement price of wheat. The figure also shows the predicted production in the baseline. The result shows that the average projected production, in baseline, of 16.2 million tons is higher as compared to the average projected production of 11 million tons by raising the procurement price of wheat and eliminating the input subsidies. However, the impact of increase in the procurement price of wheat partially offsets the loss in the production due to eliminating the input subsidies. Thus the average production in Scenario One, with the elimination of subsidies, is about 10 million tons, while the average production by eliminating the subsidies and raising the procurement price of wheat during the projected period is about 11 million tons.

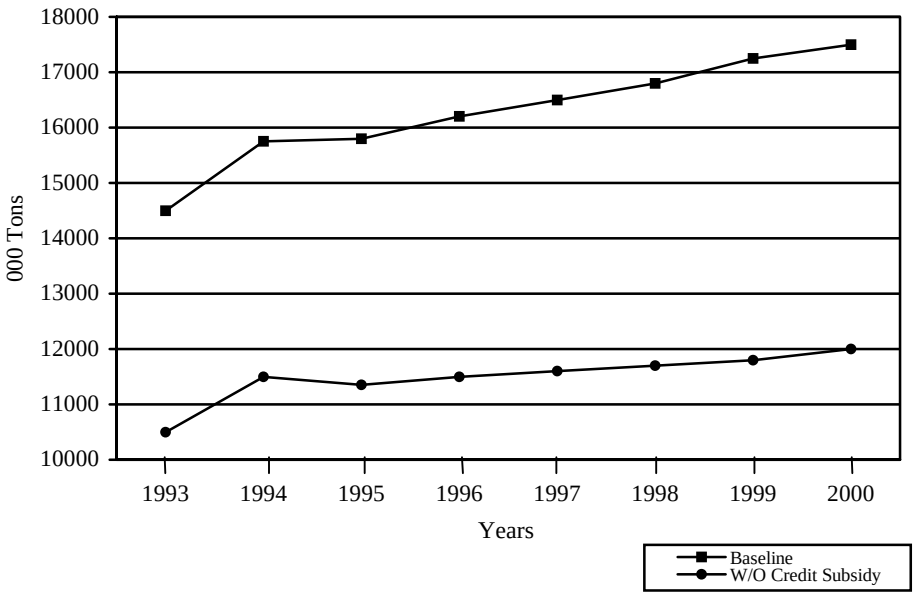

Fig. 4. Predicted Wheat Production (Eliminating Credit Subsidy).

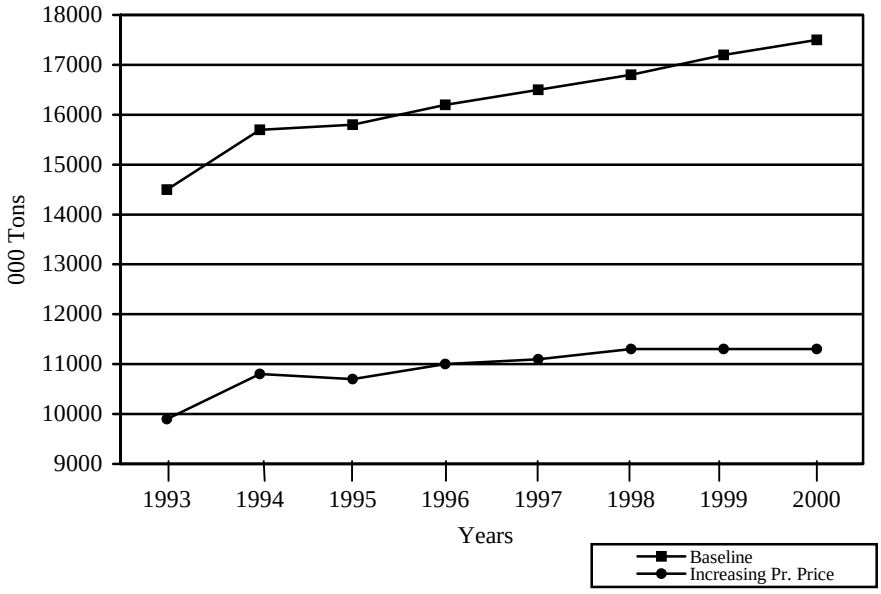

Fig. 5. Predicted Wheat Production (Increasing Procurement Price).

6. SUMMARY AND CONCLUSIONS

The primary objective of this study has been to analyse the implications of eliminating input subsidies and the consumer price subsidy on wheat in Pakistan. A simulation model has been used to project the evolution of production, consumption, and trade in response to inputs and consumer price changes. Our results show that there will be a decline in the production of wheat if the government eliminates input subsidies. However, average production over the projection period is relatively higher in Scenario Two, where the subsidies are reduced gradually, as compared to Scenario One, where the subsidies are completely removed at once. According to our results, there will be a slight decline in the consumption of wheat due to an increase in the consumer price of wheat over the projected period. The imports of wheat over the projected period increase as production falls and consumption expands. Average imports of wheat are greater if the subsidies are eliminated completely as compared to phasing them out gradually.

As for the impact of removal of input subsidies, our results show that there will be a decrease in the production of wheat. The elimination of fertiliser subsidy will have a marginal impact on the production of wheat, while elimination of irrigation and credit subsidy would have a significant impact on the production of wheat. We have also analysed the impact of raising the procurement price and eliminating the input subsidies on wheat production. As such, we found in Scenario One that by eliminating the input subsidies the wheat production declined to ten million tons; while, on the other hand, by eliminating the input subsidies and raising the procurement price, the projected production of wheat was about eleven million tons. Therefore, the impact of increase in the procurement price of wheat partially offsets the loss in the production due to eliminating the input subsidies. Furthermore, our results show that with the elimination of subsidies, on average, there would be an increase of about Rs 40 per year in the per capita expenditure of wheat. Given the real per capita income average, Rs 6,494, the increase of Rs 40 in the per capita expenditure is not high. By increasing the retail price of wheat, the increase in the per capita expenditure would be just about 0.62 percent of the real per capita income. Regarding the impact of price increase on different income groups, we have estimated that with the increase in the price of wheat, the lowest-income household with the income of Rs 1008.47 would be spending an additional 7.6 percent of its income on the consumption of wheat while in the highest quintile, given the income of Rs 7,354, the additional expense would be about 1 percent of the income. Our results show that the upper-income group allocates only 3.93 percent of its total expenditure to wheat and wheat-flour, compared with 9.7 percent for the lowest-income group. Therefore, the lowest-income group spends almost two-and-half times more of its total expenditure on wheat and wheat-flour as compared with the highest-income group. Thus, the lower-income household with the higher number of family members will be affected more with the increase in the price of staple wheat.

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