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# DOMESTIC SUPPORT UNDER WTO REGIME AND ITS IMPACT ON AGRICULTURAL PRODUCTION OF THE PUNJAB, PAKISTAN

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The paper attempts to analyse the position of Pakistan, the province of Punjab, with respect to domestic support reduction commitments and to study its impact on the agricultural production of the Punjab. According to the findings of the study, Pakistan at present is in full conformity with the WTO regime on agriculture with a negative Aggregate Measurement of Support (AMS) value. The estimates of AMS for the Punjab depict the same trend. The estimated Cobb-Douglas type of agricultural production model for the Punjab established that the cropped area, agricultural labour, distribution of seed, budgetary expenditure on agricultural research and extension, land reclamation, and wheat price support contributed positively towards agricultural production, whereas the contribution of fertilser and expenditure on food trading services was found to be negative. The study suggests that Pakistan should explore and extend permissible Green Box support for agricultural and rural development of the country besides utilising the available cushion for support due to negative AMS value and *de minimus* criteria.

## I. Introduction

The Uruguay Round (1986-94) of trade negotiations that finally led to the creation of the World Trade Organisation (WTO) is described as a contest between two "paradigms" of agricultural policy: one resting on the principle that the sector is chronically uncompetitive (both for resources domestically and markets abroad) and in need of government support to survives; the other based on the premise that agriculture can be competitive both at home and abroad if only governments would discontinue distorting incentives [Josling (2002)]. The rules in the Uruguay Round Agreement on Agriculture (URAA) clearly favour the "competitive paradigm" and were a setback to the dependent agriculture paradigm that required a hands off

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approach to trade disciplines on agricultural policies [Josling (2003)]. Domestic agricultural support is a sensitive issue for all countries particularly developing countries producing agricultural commodities. Some countries such as the USA, Canada, Japan and other OECD countries grant large subsidies to their farmers (almost 300 billion US dollars annual), whereas others cannot afford such expensive policies [Vina et al. (2006), Chigunta et al. (2004), OECD (2004)]. The Uruguay Round Agreement on Agriculture (AoA) was a first step towards improving competition in the field of international agricultural trade [UNCTAD (2003)].

Like many other developing countries, agriculture has a pivotal role in Pakistan's economy. It accounts for about 21 per cent of GDP and employs almost 44 per cent of the country's workforce [Government of Pakistan (2008)]. Agricultural output has increased at an average annual rate of over 4 per cent in the past two decades, contributing significantly to overall economic growth, food supplies and nutrition and exports. Nonetheless, despite the rising trend of agricultural output, the country faces a number of challenges with respect to this sector. One is to reduce food imports, which have been growing steadily, in recent years. High incidence of poverty is also a major challenge [Herani et al. (2008), Jamal (2008), Gohar (1999)]. Broad-based agricultural growth provides the best option for reducing poverty in general and rural poverty in particular in these countries.

Owing to its importance in the agrarian economy of Pakistan, agriculture needs to be prioritised in the allocation of resources and all types of permissible domestic support should be extended to this sector. Nonetheless, the agricultural sector has been largely a neglected area and did not receive requisite attention and financial support by the policy makers in comparison to industrial and other sectors of the economy. With limited scope for expansion in cropped land, higher crop output will have to essentially come from higher yields, which requires investments in agricultural research and irrigation. Pakistan has a strong comparative advantage in the production of a number of agricultural products such as cotton and rice. Climate and location of the country give it an advantage in accessing a number of niche markets and it is generally considered that, given an enabling environment, agricultural exports could grow substantially. Under the WTO regime, on domestic support, there is ample scope for raising support outlays without contravening the provisions of the Agreement on Agriculture (AoA) and the agreement sets no ceiling on green box and SDT expenditures. Rather, the main problem is low levels of support to agriculture that makes our agriculture sector uncompetitive, particularly in relation to the developed world.

The province of the Punjab has paramount importance as it is the major contributor towards total agricultural production of the country. If agriculture in the Punjab province performs well, the overall agricultural growth rate of the country improves as well. In the scenario of the AoA of the WTO, the domestic support component has special connotations for the economy of the Punjab. Therefore, in

this research paper, an attempt has been made to analyse domestic support extended to the agricultural sector and to gauge its impact on agricultural production of the province of Punjab. The paper is organised as follows. The research methodology has been developed in Section II. Provisions relating to domestic support under the WTO are discussed in Section III, whereas Section IV deals with the domestic support as notified by Pakistan to the WTO. In Section V, the position of the Punjab province in relation to domestic support and its impact on agricultural production is examined. Conclusion and recommendations are given in Section VI.

## II. Research Methodology

The study is based, both on primary and secondary sources of information. The secondary sources of data include official publications of various offices of the Government of Pakistan and Government of the Punjab. Some of these include the Federal Bureau of Statistics, Islamabad, Ministry of Finance, Islamabad, Ministry of Food, Agriculture and Livestock, Islamabad, Ministry of Commerce, Islamabad, Planning and Development Department, Government of the Punjab, Lahore Bureau of Statistics, Government of the Punjab. The data relating to Pakistan's domestic support to the agricultural sector including Aggregate Measure of Support (AMS) and Green Box outlays as notified by the Government of Pakistan to the World Trade Organization were acquired from the online data base available on the WTO website[1] and Ministry of Food, Agricultural and Livestock, and Ministry of Commerce, Government of Pakistan.

The AMS as provided by the Government of the Punjab was estimated by using the information at the Pakistan level. The Product Specific AMS for the Punjab province was calculated on the basis of production percentage share of each product in national production. This percentage share was then multiplied by the national AMS for each product in each year to get the estimated value. Non-product specific AMS was also calculated using a similar method. For each category of non-product specific AMS i.e., fertiliser, electricity, and credit; percentage shares of the Punjab province were calculated from the national consumption of each of these variables. These shares were then multiplied by the respective national figure of non-product specific AMS to get the provincial non-product specific AMS estimate for the given years. In the case of electricity, after 1994-95 no subsidy was given in Pakistan except to the province of Balochistan. Therefore, the electricity subsidy for the Punjab was set to zero.

The empirical approach used in this study is based on the Cobb-Douglas type of aggregate production function. In its general form, the relationship between output

[1] http://docsoline.wto.org.

and the two inputs is nonlinear. A log linear form of this model is used as follows:

$$\text{In } Y_i = \beta_0 + \beta_i \text{ In } X_i + \mu_i \quad (1)$$

where:

In = Natural logarithm,
$Y_i$ = Dependent variable,
$X_i$ = Independent variables,
$\beta_i$ = Elasticities of production,
$\mu$ = Stochastic disturbance term.

The empirical model for this study was estimated for the period 1981 to 2004. During the estimation process, various variables were tried and the following type of model was specified.

$$\begin{aligned} Ln\ (TLAGRPRD) = {} & Ln\ \beta_1 + \beta_{2\,Ln}\ (CRPAREA) + \beta_3\, Ln\ (AGLABOUR) + \\ & \beta_4\, Ln\ (FERTCONS) + \beta_5\, Ln\ (SEEDDIST) + \\ & \beta_6\, Ln\ (ARSEXTEX) + \beta_7\, Ln\ (LNDRCLEX) + \\ & \beta_8\, Ln\ (FODTRDEX) + \beta_9\, Ln\ (WTSUPRICE). \end{aligned} \quad (2)$$

### *a) Dependent Variable (TLAGRPRD)*

The dependant variable used in the production model was total agricultural production (thousand tonnes) in the province of Punjab. Total agricultural production was obtained by summing the yearly production of cereals (wheat, rice, maize, bajra, jowar, and barley); pulses (gram, mung, mash, and masoor); cash crops (sugarcane, cotton, jute, tobacco, and guarseed); edible oils (rapeseed and mustard, sesamum, groundnut, and sunflower) and all fruits and vegetables.

### *b) Independent Variables*

The independent variables include:

*(CRPAREA)* = Cropped area of Punjab in thousand hectares,
*(AGRLABOUR)* = Agricultural labour of Punjab measured by the economically active population in agriculture in thousands,
*(FERTCONS)* = Fertiliser consumption i.e., the sum of Nitrogen (N), phosphorus (P) and potash (K) of fertiliser in metric tonnes of plant nutrients,

*(SEEDDIST)* = Distribution of improved seed in Punjab in thousand tonnes,

*(ARSEXTEX)* = Provincial expenditure on agricultural research and extension in million Rupees,

*(LNDRCLEX)* = Provincial expenditure on land reclamation in million Rupees,

*(FODTRDEX)* = Expenditure on food trading services in Punjab in million Rupees,

*(WTSUPRICE)* = Wheat support price (Rs/40 kg) as proxy variable for product specific AMS in Punjab.

## III. Domestic Support Provisions under the WTO

The principal aim (three pillars) of the AoA pertains to market access (developed countries have to reduce the tariff by 36 per cent and developing countries 24 per cent on average), reduction of domestic support (reduce domestic support by 20 per cent by developed countries and 13.3 per cent by developing countries), and elimination of export subsidies (reduced export subsidies by 36 per cent by developed countries and 24 per cent by developing countries).

The domestic support commitments in favour of agricultural producers under the provision of the WTO include the government measures of assistance, whether direct or indirect, to encourage agriculture and rural development. Domestic support commitments are also aimed at reducing expenditures, such as input subsidies on fertilisers, seed, pesticides and electricity to domestic producers (farmers). Under the WTO, the domestic support has been annexed with three boxes i.e., green, amber and blue on the analogy of traffic lights. Since domestic support is not absolutely prohibited and there is no Red Box, instead there is a Blue Box. The terminology was originally used in the discussion of agricultural support, but the metaphor curiously morphed into the multi-coloured boxes enshrined in the URAA. The three boxes, amber, blue and green became the focus of the rule system to discipline domestic subsidies for agriculture.

The domestic support measures included in the Amber Box (i.e., payments and subsidies paid to producers) are to be reduced, but not eliminated. The Amber Box measures are actionable i.e., are permitted temporarily but are to be drastically reduced. This domestic agricultural support is considered to distort trade and is subjected to reduction commitments. Amber box measures are based on Aggregate Measurement of Support (AMS), which is a measure of the annual level of support provided to producers of agricultural products expressed in monetary terms. The AMS limit is based on the member state's agriculture support over a base period (i.e., 1986-88). The countries that signed the URAA agreed to limit the Amber Box spending to a level at or below their AMS from their base period. Implementation of

the reforms began in 1995 and developed countries were given six years to meet the commitment whereas developing countries had 10 years to do the same. Developed countries were to reduce their AMS by 20 per cent during the implementation period and developing countries faced 13.3 per cent reductions, [WTO (2000)].

Within the Amber Box, support is divided into commodity specific and non-commodity specific groups. Amber Box support can be exempted from the AMS calculations under a criterion termed *de minimus*. The *de minimus* rule states that, for developed (developing) countries, AMS values below 5(10) per cent of the commodity's value of production for product specific support and AMS values below 5(10) per cent of the country's overall value of agricultural production for non-commodity specific support are exempted from the URAA's domestic support limits [Hart and Beghin (2004)]. These payments are exempted from reduction commitments even if the effects of such support are potentially production or trade distorting.

The Blue Box embodies certain direct payments to farmers aimed at limiting production and are specifically exempted from reduction commitments. This type of support is given in the European Union (EU) and United States and is used in production limiting programmes in the crop sector and on per head basis in the animal sector. This is again not relevant to Pakistan. The Green Box measures are non-actionable (i.e., are permitted) and comprise forms of support that are considered to have no or minimally distorting effects on production or trade. As annex 2 of the AoA indicates, such support must satisfy two following basic criteria:

1. The support in question shall be provided through a publicly-funded government programme (including government revenue foregone) not involving transfers from consumers.
2. The support in question shall not have the effect of providing price support to producers [Blandford (2001)]. These include such policies as general government services (in areas such as research, pest and disease, and so on); public stockholding for food security purposes; domestic food aid; direct payments to producers; decoupled income support (that is, support not related to or based on production); structural adjustment assistance; payments under an environmental programme; and payments under regional assistance programmes.

Certain types of government assistance in developing countries and LDCs named Special and Differential Treatment (SDT) are also exempt from support reduction commitments. These include both direct and indirect domestic investment in agriculture and rural development, as well as agricultural input subsidies generally available to low-income or resource-poor producers in developing countries [Schnepf (2005)].

## IV. Domestic Support as Notified by Pakistan to the WTO

Pakistan at present is in full conformity with the WTO regime on agriculture and has already fulfilled all obligations of the Agreement on Agriculture (AoA) vis-à-vis market access, domestic support and export competition. Regarding domestic support, agricultural producers in Pakistan are provided a notional type of minimum support price for a few commodities. The implementation of the support price policy has been restricted to wheat and occasionally to rice, cotton and sugarcane. Crops such as gram, onion, potato, and non-traditional oilseeds, i.e., sunflower, canola, soybean and safflower have been excluded from the programme and are now traded in the private sector.

### *a) Total Aggregate Measurement of Support (AMS)*

The current total Aggregate Measurement of Support (AMS) remained negative since the emergence of the WTO in the case of Pakistan. Therefore, Pakistan has no reduction commitments on this score. In the base period i.e., 1986-88, total AMS extended by Pakistan to its agricultural sector was negative 553.2 million dollars. In the implementation period (i.e., from 1995-96 to 2004-05), the AMS remained negative with a fluctuating trend. A negative AMS implies that the agricultural sector in Pakistan did not actually receive any support, rather it was taxed. However, in the year, 2005-06 and 2006-07 the AMS figure for Pakistan has assumed a positive value. This is largely due to increased wheat production thereby making the agricultural sector eligible for receiving price support and fertiliser subsidy. In spite of this, Pakistan still has a cushion for the continuation of wheat price support programme due to the *de minimus* criteria support (see, Table 1).

### *b) Product Specific Aggregate Measurement of Support (AMS)*

The product-specific aggregate measures of support (AMS) mainly focuses on individual commodities in the agricultural sector. In the base year, Pakistan submitted AMS for 11 crops that received market price support. The total product specific AMS in that period was a negative 640.3 million dollars, with positive AMS only for sugarcane (24.2 million dollars). During the initial part of the implementation period, the measure attained the lowest negative value of 72.4 million dollars in the year 1996-97. In the following years, the total value of product specific AMS grew more negative and attained negative 966 million dollars in year 2001-02. After 2003-04, the value of product specific AMS became less negative and it approached to zero value in 2006-07 (see, Table 2).

The reason behind this change in the total AMS value was the zero eligible production of most of the crops that Pakistan notified for the calculation of AMS.

For example, out of 11 original crops for which AMS was computed for 1986-88, eligible production was assumed zero for eight in 1995-96, ten crops for the ensuing years except 1999-2000 when the AMS value was negative for four crops. Part of the sharp change in total AMS was also accounted for wheat, where support became less negative.

There has been variation in AMS provisions for individual crops as well. In the base period, AMS calculations were negative for most of the crops. In the case of wheat, total AMS value first changed from -251.8 million dollars in the base period

**TABLE 1**

Total AMS to Agriculture
as Notified by Pakistan to WTO

*(Million US $)*

| Year | Product Specific AMS | Non Product Specific AMS | Current Total AMS |
|---|---|---|---|
| 1986-88 | -640.3 | 87.1 | -553.2 |
| 1995-96 | -202.5 | 11.8 | -190.7 |
| 1996-97 | -72.4 | 15.5 | -56.9 |
| 1997-98 | -143.42 | 22.5 | -120.92 |
| 1998-99 | -191.29 | 26.7 | -164.9 |
| 1999-00 | -257.54 | 12.6 | -244.94 |
| 2000-01 | -894.1 | 0 | -894.1 |
| 2001-02 | -966.0 | 0 | -966.0 |
| 2002-03 | -901.6 | 1.89 | -899.71 |
| 2003-04 | -448.5 | 14.9 | -433.6 |
| 2004-05 | -140.5 | 101.3 | -39.2 |
| 2005-06 | -42.5 | 198.6 | 156.1 |
| 2006-07 | 0 | 79.8 | 79.8 |

*Source:* Pakistan's Notifications to WTO: (http://docsoline.wto.org).

**TABLE 2**

Product Specific AMS of Pakistan

*(Million US $)*

| Product | 1986-88 | 1995-96 | 1996-97 | 1997-98 | 1998-99 | 1999-00 | 2000-01 | 2001-02 | 2002-03 | 2003-04 | 2004-05 | 2005-06 | 2006-07 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wheat | -251.8 | -172.0 | -72.4 | -143.42 | -191.29 | -257.37 | -894.1 | -966 | -901.6 | -448.5 | -140.5 | -42.5 | 0 |
| Seed Cotton | -187.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rice (Basmati) | -117.4 | -20.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rice (Coarse) | -48.6 | -10.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sugarcane | +24.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Onions | -0.2 | 0 | 0 | 0 | 0 | -0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Potatoes | -57.8 | 0 | 0 | 0 | 0 | -0.05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gram | -1.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Soybean | -0.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sunflower | -0.1 | 0 | 0.03 | 0 | 0 | -0.02 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Safflower | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | -640.3 | -202.5 | -72.4 | -143.42 | -191.29 | -257.54 | -894.1 | -966 | -901.6 | -448.5 | -140.5 | -42.5 | 0 |
| Status | *de* | *de* | *de* | *de* | *de* | *de* | *de* | *de* | *de* | *de* | *de* | *de* | *de* |

*Source:* Pakistan's Notifications to WTO (http://docsoline.wto.org)

to -172 million dollars in 1995-96, -72.4 million dollars in 1996-97, -996.0 million dollars in 2001-02 and zero value in 2006-07. Sugarcane is the only crop that received a positive support of 24 million dollars in the base period. Other crops such as seed cotton, rice, onions, gram, soybean, sunflower and safflower had negative contributions in the AMS calculations in the base period and zero or insignificant negative contribution to AMS in the later years.

### *c) Non Product Specific AMS*

Pakistan notified a total subsidy of 203 million dollars on farm inputs to the WTO for the base period, 43 per cent of which fell within non-product-specific AMS and 57 per cent under Special and Deferential Treatment (SDT). Non product specific AMS expenditures amounted to 87.1 million dollars as fertiliser, electricity and credit subsidies in the base years. Electricity subsidies constituted two

**TABLE 3**

Non-product-specific AMS of Pakistan

(Million US $)

| | Fertilizer subsidy | Electricity subsidy | Credit subsidy | Total | Status |
|---|---|---|---|---|---|
| 1986-88 | 27.4 | 58.1 | 1.6 | 87.1 | de |
| 1995-96 | 0.4 | 10.4 | 1 | 11.8 | de |
| 1996-97 | 0 | 15.5 | 0 | 15.5 | de |
| 1997-98 | 0 | 22.5 | 0 | 22.5 | de |
| 1998-99 | 0 | 26.7 | 0 | 26.7 | de |
| 1999-00 | 0 | 12.6 | 0 | 12.6 | de |
| 2000-01 | 0 | 0 | 0 | 0 | de |
| 2001-02 | 0 | 0 | 0 | 0 | de |
| 2002-03 | 0 | 1.89 | 0 | 1.89 | de |
| 2003-04 | 0 | 14.9 | 0 | 14.9 | de |
| 2004-05 | 86.1 | 15.2 | 0 | 101.3 | de |
| 2005-06 | 181.5 | 17.1 | 0 | 198.6 | de |
| 2006-07 | 68.1 | 11.7 | 0 | 79.8 | de |

*Source:* Pakistan's Notifications to WTO (http://docsoline.wto.org).

thirds of total support followed by subsidies on fertilisers (31.45 per cent) and very little on credit. During the year 1999-2000, non-product specific support was provided only to electricity, which was 14 per cent of the base period value. The total non-product specific AMS, which amounted to less than one per cent of the value of agricultural production in 1986-88, has since fallen even further to around or below 0.1 per cent in the year 1999-2000. The Government of Pakistan has started giving a fertiliser subsidy from the year 2004-05. However, this level of support is within 10 per cent *de minimis* level specified in the AoA.

As regards the Special and Differential Treatments (SDT) subsidies, where the total outlay was 116 million dollars in 1986-88, 67 per cent was on fertiliser, 32 per cent on credit and one per cent on tube wells. In Pakistan's notification, tubewell subsidies were justified under the SDT category as being part of a national strategy for agricultural and rural development. 74 per cent of the total subsidy on fertilisers that was reported under the SDT category benefited resource poor farmers with less than five hectares land.

Credit subsidies were estimated separately for interest-free loans and subsidised credits. The former was shown under the SDT category and the latter under the AMS, again using the five-hectare criterion. In the 1995-96 notification, the total SDT outlay was reported as only one million rupees, a drastic cut from the base period, and exclusively on fertilisers. No SDT outlays were reported in the subsequent years essentially indicating that all forms of SDT subsidies had been eliminated [FAO (2000)].

### *d) Green Box Outlays*

Pakistan has been regularly sending notifications to the WTO regarding its expenditures on domestic support. Pakistan has been giving domestic support under the Green Box in the following categories: general services on research, storage facilities, marketing services, extension services, general services, infrastructural services, flood protection services, water supply facilities. The total green box outlay of Pakistan in the base period was 228.5 million dollars. At the start of the implementation period i.e., in 1995-96, the support falling under the Green Box amounted to 439.9 million dollars. Afterwards, the government gradually reduced expenditure on the Green Box and it came down from 392.44 million dollars in 1996-97 to 156.6 million dollars in 2001-02, with the exception of 2000-01 when it was 493.98 million dollars. However, the notifications of the government to the WTO reveal that Pakistan has again started increasing Green Box expenditure and 645.1 and 522.74 were spent on Green Box related items in 2005-06 and 2006-07 respectively (see, Table 4).

## TABLE 4

Green box outlays of Pakistan

*(Million US $)*

| | General services on research | Storage facilit-ies | Mar-keting services | Exten-sion services | Gene-ral services | Infrast ructural services | Flood pro-tection services | Water supply services | Year Total |
|---|---|---|---|---|---|---|---|---|---|
| 1986-88 | 14.5 | 4.8 | 0.1 | 22.1 | 0.3 | 147.5 | 7.9 | 31.3 | 228.5 |
| 1995-96 | 12.8 | 0.8 | 0.1 | 2.4 | 0.5 | 335.0 | 34.6 | 53.7 | 439.9 |
| 1996-97 | 7.36 | 0.31 | 0.09 | 2.21 | 0.03 | 312.63 | 15.94 | 53.87 | 392.44 |
| 1997-98 | 7.55 | 0.2 | 0.01 | 1.62 | 0.02 | 266.12 | 22.84 | 14.09 | 312.45 |
| 1998-99 | 2.44 | 0 | 0.11 | 2.44 | 0.7 | 235.76 | 7.94 | 14.43 | 263.82 |
| 1999-00 | 3.18 | 0.08 | 0 | 1.86 | 0.01 | 213.07 | 7.18 | 13.04 | 238.42 |
| 2000-01 | 0.52 | 0 | 0.5 | 0.09 | 0.7 | 489.95 | 1.85 | 0.37 | 493.98 |
| 2001-02 | 2.14 | 0.04 | 2.32 | 8.87 | 0.3 | 140.94 | 1.17 | 0.82 | 156.6 |
| 2002-03 | 5 | 0 | 0 | 1.2 | 0.2 | 86.4 | 42.5 | 0.9 | 136.2 |
| 2003-04 | 7.8 | 0 | 2.9 | 0.6 | 2.3 | 74.0 | 22.9 | 14.1 | 124.6 |
| 2004-05 | 13.9 | 0 | 0.3 | 1.2 | 1.5 | 108.7 | 62.1 | 69.8 | 257.5 |
| 2005-06 | 0.5 | 0 | 8.4 | 1.1 | 4.4 | 408.5 | 65.4 | 156.8 | 645.1 |
| 2006-07 | 8.6 | 0 | 3.1 | 2.9 | 1.8 | 389.5 | 7.94 | 108.9 | 522.74 |

*Source:*Pakistan's Notifications to WTO (http://docsoline.wto.org).

## V. Punjab's Share in Domestic Support and its impact on Agricultural Productions

The land of five rivers, once known as the granary of the East, is the lifeline of Pakistan. Population wise, Punjab is the largest province. It is the second largest in terms of geographical area. The economy of the Punjab is mainly agricultural, although industry makes a substantial contribution. Despite its dry climate, extensive irrigation makes it a rich agricultural region. The province is playing a leading role in agricultural production. Its contribution in 2005-06 was 65.56 per cent (i.e., about 62,483.62 thousand tonnes) in the total agricultural production of the country. Commodity wise Punjab contributed 74.32 per cent cereals, 80.87 per cent pulses, 65.31 per cent cash crops, 66.66 per cent fruits and 74.06 per cent vegetables to the total production of these commodities at the national level (see, Table 5).

### *a) Aggregate Measurement of Support (AMS)*

The estimates of Aggregate Measurement of Support (AMS) for Punjab depict the same trend like AMS trend for Pakistan. The AMS in the base period and during the implementation years up to 2004-05 remained negative. In the base period, i.e., 1986-88 it had a value of -409.17 million dollars and in the later years it showed a fluctuating trend, some times a higher negative value and some times less

**TABLE 5**

Agricultural Production of Punjab and Pakistan in 2005-06

*(Thousand Tones)*

| Commodity | Punjab | Pakistan | % Share |
|---|---|---|---|
| Cereals | 22,588.00 | 30394.50 | 74.32 |
| Pulses | 524.70 | 648.80 | 80.87 |
| Cash Crops | 30,818.48 | 47,185.00 | 65.31 |
| Edible Oils | 312.94 | 5,063.00 | 6.18 |
| Fruits | 4,764.00 | 7,147.00 | 66.66 |
| Vegetables | 3,475.50 | 4,692.70 | 74.06 |
| Total Agricultural Production | 62,483.62 | 95,131.00 | 65.56 |

*Source:* Agricultural Statistics of Pakistan, 2005-06.

negative value. However, in the 2005-06, the AMS figure for Punjab province has assumed positive value due to lesser negative value of product specific AMS and greater positive value of non product specific AMS (see, Table 6).

### *b) Product Specific AMS of Punjab*

In the Punjab, the estimated AMS was negative for all notified crops except sugarcane that received an estimated support of 14.56 million dollars in the base period. The product specific AMS for Punjab remained negative throughout the implementation period which indicates that the agricultural sector was heavily taxed and did not receive support. However, in the year 2006-07, product specific AMS for the Punjab has approached zero value due to rising wheat production, yet support can be provided to the wheat sector under the *de minimus* criteria.

**TABLE 6**

Estimated AMS to Agriculture in Punjab

(Million US Dollars)

| Year | Product Specific AMS | Non-Product Specific AMS | Total AMS |
|---|---|---|---|
| 1986-88 | -479.45 | 70.284 | -409.17 |
| 1995-96 | -147.31 | 0.29 | -147.02 |
| 1996-97 | -53.77 | 0 | -53.77 |
| 1997-98 | -105.91 | 0 | -105.91 |
| 1998-99 | -141.53 | 0 | -141.53 |
| 1999-00 | -201.29 | 0 | -201.29 |
| 2000-01 | -724.68 | 0 | -724.68 |
| 2001-02 | -773.5 | 0 | -773.5 |
| 2002-03 | -721.67 | 0 | -721.67 |
| 2003-04 | -359.7 | 0 | -359.7 |
| 2004-05 | -112.95 | 59.3 | -53.65 |
| 2005-06 | -33.51 | 127.5 | 93.99 |
| 2006-07 | 0 | 46.36 | 46.36 |

Estimations based on Pakistan's Notifications to WTO.

**TABLE 7**

Product Specific AMS for Punjab

*(Million US$)*

| Product | 1986-88 | 1995-96 | 1996-97 | 1997-98 | 1998-99 | 1999-00 | 2000-01 | 2001-02 | 2002-03 | 2003-04 | 2004-05 | 2005-06 | 2006-07 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wheat | -178.85 | -126.45 | -53.79 | -105.91 | -141.53 | -201.22 | -724.68 | -773.5 | -721.67 | -359.7 | -112.95 | -33.51 | 0 |
| Seed cotton | -156.44 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rice (Basmati) | -106.99 | -19.12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rice (Coarse) | -12.33 | -1.74 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sugarcane | 14.56 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Onions | -0.05 | 0 | 0 | 0 | 0 | -0.02 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Potatoes | -38.48 | 0 | 0 | 0 | 0 | -0.04 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gram | -0.78 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sunflower | -0.09 | 0 | 0.02 | 0 | 0 | -0.01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | -479.45 | -147.31 | -53.77 | -105.91 | -141.53 | -201.29 | -724.68 | -773.5 | -721.67 | -359.7 | -112.95 | -33.51 | 0 |

Estimations based on Pakistan's Notifications to WTO.

### *c) Non-Product Specific AMS of Punjab*

In the case of non-product specific AMS, the estimated share of the Punjab in the base period was 70.284 million dollars. This is the only period for which Pakistan notified fertiliser and agricultural credit subsidy besides electricity subsidy to the WTO. Later, up to the year 2004-05, fertiliser, credit and electricity subsidies were not given in the Punjab. In recent years, the government has once again initiated a fertiliser subsidy programme. The estimated non-product specific AMS for the years 2004-05, 2005-06 and 2006-07 were 59.3, 127.50 and 46.36 million dollars respectively (see, Table 8).

### *d) Impact of Domestic Support on Agricultural Production of Punjab*

To study the impact of domestic support on agricultural production of Punjab, a Cobb-Douglas type production model was estimated. Table 9 shows the results of fitting a multiple linear regression model to describe the relationship between TLAGRPRD and 8 independent variables. The equation of the fitted model is:

$$\begin{aligned} Ln(TLAGRPRD) = {} & -0.0983 + 0.6441\ Ln\ (CRPAREA) + 0.6016\ Ln \\ & (AGLABOUR^{*}) - 0.5927\ Ln(FERTCONS^{**}) + 0.1403 \\ & Ln(SEEDDIST^{*}) + 0.0089\ Ln(ARSEXTEX) + 0.1926 \\ & Ln(LNDRCLEX) - 0.0343\ Ln(FODTRDEX) + 0.2387 \\ & Ln(WTSUPRICE^{*}). \end{aligned} \quad (3)$$

The output of regression analysis indicates that the cropped area in the province of Punjab has a positive impact on total agricultural production. However, the elasticity coefficient for this variable is not significant.

The elasticity coefficient for agricultural labour is positive at 0.6016 and is significant at the 9 per cent level. This reveals that increase in agricultural labour over the years has positively contributed to enhancing agricultural production, despite the fact that agricultural labour in the Punjab is not equipped with modern methods of agricultural production and are illiterate. This necessitates that domestic support should be extended in the Punjab for capacity building of the farmers.

The value of elasticity coefficient of fertiliser (nutrients) consumption is 0.5927 and has a negative sign. The coefficient is highly significant at the 2.5 per cent level. The elasticity coefficient implies that increase in fertiliser consumption results in a decline of agricultural production. Although this negative sign apparently seems misleading and unexpected, according to the existing literature a negative coefficient of fertiliser cannot be referred to a higher use of fertiliser as usually argued. Rather it implies improper and unbalanced combinations of plant nutrients (NPK) that affects

## TABLE 8

Non-Product Specific AMS in Punjab

*(Millions US$)*

| Year | Fertilizer | Agri. Credit | Electricity | Total |
|---|---|---|---|---|
| 1986-88 | 18.7 | 0.729 | 50.855 | 70.284 |
| 1995-96 | 0.29 | 0 | 0 | 0.29 |
| 1996-97 | 0 | 0 | 0 | 0 |
| 1997-98 | 0 | 0 | 0 | 0 |
| 1998-99 | 0 | 0 | 0 | 0 |
| 1999-00 | 0 | 0 | 0 | 0 |
| 2000-01 | 0 | 0 | 0 | 0 |
| 2001-02 | 0 | 0 | 0 | 0 |
| 2002-03 | 0 | 0 | 0 | 0 |
| 2003-04 | 0 | 0 | 0 | 0 |
| 2004-05 | 59.3 | 0 | 0 | 59.3 |
| 2005-06 | 127.5 | 0 | 0 | 127.5 |
| 2006-07 | 46.36 | 0 | 0 | 46.36 |

Estimations based on Pakistan's Notifications to WTO.

## TABLE 9

Multiple Regression Analysis

| Parameter | Coeffi-cients | Std. Error | T-Sta-tistic | P-Value |
|---|---|---|---|---|
| CONSTANT | - 0.0983 | 8.0860 | - 0.0121 | 0.9905 |
| Ln (CRPAREA) | 0.6441 | 0.9507 | 0.6775 | 0.5084 |
| Ln (AGLABOUR) | 0.6016 | 0.3372 | 1.7841 | 0.0946 |
| Ln (FERTCONS) | - 0.5927 | 0.2395 | - 2.4751 | 0.0257 |
| Ln (SEEDDIST) | 0.1403 | 0.0776 | 1.8071 | 0.0908 |
| Ln (ARSEXTEX) | 0.0089 | 0.01972 | 0.4497 | 0.6593 |
| Ln (LNDRCLEX) | 0.1926 | 0.1756 | 1.0973 | 0.2898 |
| Ln (FODTRDEX) | - 0.0343 | 0.0281 | - 1.2231 | 0.2402 |
| Ln (WTSUPRICE) | 0.2387 | 0.1290 | 1.8501 | 0.0841 |

R-squared = 98.93 per cent. Adjusted R-squared = 90.79 per cent.
Standard Error of Estimates = 0.0619. Durbin-Watson Statistics = 1.91.
No. of observations = 24.

the productivity of soil resulting in lower production [Nyuyen (1999), Nguyen et al. (2000), NFDC (1998), Sarah and Brad (1993)]. Kamat et al. (2007), also found negative contribution of fertiliser for Indian agriculture for almost the same period. This result highlights the importance of an advisory service for the efficient and effective use of fertiliser particularly for the farmers who are illiterate and are not properly trained in the application of fertilisers in terms of balanced nutrients usage.

The distribution of improved seed in the Punjab has played a significant role in boosting agricultural production in the province. The elasticity coefficient has a positive value of 0.1403 and is significant at the 9 per cent significance level. The results imply that one percent increase in the distribution of improved seed brings about a surge of 0.1403 per cent in agricultural production. This indirectly highlights the importance of agricultural research and shows that improved seed contributes significantly towards agricultural production.

In order to study the impact of Green Box domestic support on agricultural production, two variables were incorporated i.e., expenditure incurred by the Punjab government on agricultural research and extension and land reclamation which was used as a proxy variable for infrastructural expenditure. The value of the coefficient of agricultural research and extension is almost zero and is 0.0089 and non-significant. This meager contribution of agricultural research and extension is due to the low priority given to this sector in budgetary allocations. Expenditure incurred on agricultural research and extension is insufficient to meet the requirements of modern agriculture and makes Punjab's agriculture internationally uncompetitive. Most of the budget is utilised in the payment of salaries and other expenditures and as a percentage of total allocation meager operational agricultural research and extension expenditure is left [Nagy and Quddus (1998)].

Another component of the Green Box measures i.e., infrastructural services was given representation in the form of land reclamation expenditure. The coefficient for land reclamation expenditure is 0.1926 and is not significant. Similarly, expenditure incurred on food trading services provided by the Punjab government has an insignificant elasticity coefficient with a negative value of 0.0343.

Wheat support price was used as a proxy variable for market price support falling under the AMS calculations. The elasticity coefficient for wheat support price is 0.2387 and is significant at the 8 per cent significance level. The estimate shows a positive contribution of this variable and implies that one per cent increase in wheat support price pushes up agricultural production by 0.23 per cent. The results justify the continuation of a price support programme in the Punjab, particularly to the wheat sector without contravening the provisions of the Agreement on Agriculture of the WTO.

## VI. Conclusion and Recommendations

Pakistan is economically an agrarian country largely drawing its economic strength from the agriculture sector. In spite of its major role in the economic development of the country, the agriculture sector has only in the recent past initiated its journey towards commercialisation and is not yet fully self supportive. The farming community lacks proper knowledge and is not adequately equipped to meet the challenges of modern agriculture. The majority of the farmers are illiterate and are unable to make rational decisions on their own and need institutional support. Further, the market mechanism is not well established and not capable enough to provide proper economic signals to all the stakeholders. All these factors justify that domestic support to our agriculture should be continued, rather enhanced. The Agreement on Agriculture of the WTO sets various rules and regulations regarding the provision and prohibition of domestic support to agriculture. In the following, various suggestions have been extended for the provision of domestic support in the Punjab province within the framework of various WTO rules.

1. On the domestic support front, Pakistan has no reduction commitments as its Total Aggregate Measure of Support (AMS) remained negative throughout the implementation period. This implies that Pakistan can utilise this cushion by increasing its support, falling even with in the preview of AMS commitments and *de minimus* provision for the agriculture sector and rural development. In this regard, the results of the study indicate that wheat price support has contributed significantly to increasing agricultural output of the Punjab province. The wheat crop is very important from the food security point of view; therefore, the price support programme for wheat should be continued.
2. Although the Amber Box type of domestic support bars the provision of certain types of support, the Green Box type domestic support has no limit. Therefore, the government of Punjab should explore the possibilities in order to provide domestic support under the Green Box. This will enable the needy sector to get its due share.
3. In the WTO regime, agricultural producers of the Punjab are confronted with many challenges that call for an increased investment in the rural public domain such as agricultural research to further improve agricultural technology and to provide producers with better production conditions that are comparable with their foreign competitors. The results of the study report a negligible contribution of investment in research in the Punjab which is because of the meager budgetary allocation for operational research. In this direction, the government of the Punjab should:

a) accord high priority to agricultural research and investment spending on agricultural research should be increased manifold immediately,
b) ensure that major proportion of budget of the various research organizations is incurred on the operational research,
c) bring drastic institutional changes in the provincial research organisations in order to stem the current outflow of competent agricultural researchers,
d) fill all the vacant positions in the research organisations of the province. Fresh recruitment, promotions and appointment against various administrative posts should be on merit and should be linked with performance, and
e) ensure agricultural research be problem solving and target oriented.

4. Agricultural extension plays a key role in improving agricultural productivity. Presently the budgetary allocation for agricultural extension is also far less than the current needs of the province. The government should lay special emphasis on improving extension services in the province and funding in this area should be increased. According to Davidson *et al.,* (2001), urgent attention is required for rethinking extension strategies for the Punjab so as to narrow the growing information gap between the rich and the poor farmers.

5. The results of the study establish a significant relationship between the distribution of improved seed and agricultural output in the province of the Punjab. Therefore, efforts should be made to further enhance the distribution of seed in the province. In this regard, the cost of transporting seeds can be subsidised in the province with the objective of ensuring universal and timely access to this vital input. Seeds should also be made available in case of natural calamities and seed storage infrastructure should be developed. Grants should be provided to both public and private seed corporations for the maintenance of certified and foundation seeds. The core poor should be given improved seed at cheaper rates and in small packs.

6. Fertiliser constitutes a major component of the cost of production of crops. The government should ensure timely and proper availability of all types of nitrogenous, phosphate and potash fertilisers at affordable rates to the farming community. The government is already giving a gas subsidy to the fertiliser sector which should be continued and additionally, the government should give an import subsidy on the import of fertilisers. Besides this, technical and advisory services to the farming community should be arranged so that farmers can effectively incorporate balanced plant nutrients.

7. Infrastructural development should be accorded high priority in the budgetary allocations of the Punjab government. Public expenditure on irrigation, and land reclamation should be further enhanced and spendings on canal lining and laying down of water courses for overcoming water losses during the conveyance of

water to the tail end farms should be increased. In water deficient areas, water conservation techniques should be introduced and promoted among the farmers. Where installation of tube wells is feasible, farmers should be provided incentives and technical expertise for tube well installation. In this connection, electricity should be provided at subsidised rates to the agriculture sector.

8. Expenditure on public stockholding of food for food security under Green Box expenditures of the Punjab has been quite low in the past. The provincial food department receives no allocation from the provincial budget; rather it finances its expenditure by taking loans from the banks. The government has the cushion to increase spending on the stockholding of food to ensure timely availability of food to the rural poor at concessional rates and should vigorously explore this area of domestic support. Further, the agricultural marketing system in the Punjab needs considerable improvements. The farmers of Punjab in general and small farmers in particular lack modern marketing techniques that result in high post-harvest losses. Although separate Ministry of Agricultural Marketing has been established, there is a need to make it vibrant and functionally working for the provision of various marketing related services to the farmers who need facilitation in the product preparation, handling, storage, bargaining, grading, standardisation, packing and disposal of their produce. The market information system should be strengthened in order to provide information to all the stakeholders and ensure coordination in agricultural markets.

9. Pest and disease control including general and product specific and disease control measures such as early warning systems, quarantine and eradication has assumed paramount importance because of the Sanitary and Phyto-Sanitary Agreement of the WTO. Since the province of the Punjab is the major producer and exporter of fruits and vegetables, the government should ensure a proper pest and disease control mechanism in the province in line with the international standards, if the objective is to increase exports from Punjab. A strict system of inspection including general inspection service and the inspection of particular products of health, safety, grading and standardisation purposes should be enforced and inquiry points at various places should be set up.

10. The findings of the study indicate that the contribution of agriculture labour in increasing agricultural production of the province of the Punjab has been quite significant in spite of the fact that labour in our country is not equipped with modern techniques used in the agriculture sector. It is, therefore, an urgent need of the time to arrange training programmes for not only the farmers but other stakeholders as well. The government in this regard should chalk-out comprehensive trainings programmes. Various programmes and projects should be initiated in collaboration with various research and training institutes and agricultural universities.

All the above suggested sectors, sections, and categories need domestic support of the provincial government. The suggested provisions can directly or indirectly help agricultural and rural development in the province. The government can extend domestic support to the above suggested areas without contravening the provisions of the AoA of the WTO.

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