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An Analysis of Pakistan's Agricultural Commodities based on Effective Protection Rate and Its Decomposition

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This study analyses the impact of the government's interventionist policies in the product and input markets for the two leading crops of Pakistan, wheat, and cotton. The study employs standard measures of the nominal rate of protection (NRP) and effective rate of protection (ERP). In addition, it also proposes a method to additively decompose the ERP into two components representing the effect of distortions in the product and input markets.

The study finds that government policies in the wheat market are mostly designed to protect flour mill owners and thereby ordinary consumers at the cost of farmers. Since the consumers of wheat by far outnumber the wheat growers, this policy design seems to represent a political decision to appease the common public.

Regarding cotton, the study finds that the government does not intervene much in the market to the extent that farmers are left at the mercy of monopolistic procurement agencies and better-informed rent-seeking intermediaries in the marketing chain. Export procedure is so cumbersome that only the well-informed and well-connected traders can benefit from price hikes in the world market.

The study recommends serious reconsideration of government policies in the light of normative considerations. In this context, open debate on agricultural policy in Parliament and the Senate would be highly desirable.

1. INTRODUCTION

Despite its continuously declining share in GDP, the agricultural sector of Pakistan has always played a key role in the socio-economic development of the country. For a population of 210 million people, the agricultural sector provides a reasonably healthy average food basket and generates a net exportable food surplus. Agriculture contributes about 21 percent to GDP and 43 percent to employment in the country. Wheat is the staple food of Pakistan and contributes to GDP and employment through many food products besides simple bread. Textile, which is by far the largest manufacturing industry of Pakistan in terms of output, employer, and exports earnings, is highly dependent on domestically produced raw cotton.

During the early years after independence, Pakistan faced an acute shortage of primary food products like wheat flour, rice, sugar, and edible oil. Households were protected from the potential food price inflation through rationing. The shortage of wheat

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was partially offset by wheat imports from the USA under the concessional PL-480 programme, especially during the 1960s. However, the process of 'Green Revolution' initiated in the 1960s helped Pakistan overcome food shortage during the 1980s and 1990s. Agricultural productivity was increased substantially with technological advancement in agriculture by developing more productive seed varieties, mechanisation, adopting chemical fertilisers, and better water availability with the help of water reservoirs at Tarbela and Mangla. This process was facilitated by providing cash-starved farmers subsidies on the purchase of inputs and sale of outputs.

Since farmers could not afford to store bulk quantities of output due to lack of storage facilities and urgent need of cash to pay off debts, government agencies ensured that commodity prices did not crash immediately after harvesting. This has been done by procurement of commodities at prices above the market price. In addition, subsidies on fertilisers and other crucial inputs have been provided to ensure that farmers get benefit from better seed varieties.

However, some of these subsidies have been slashed over the years for various reasons. First, it appears that with enough food availability in the country, policymakers no more considered it essential to subsidise farmers when the government was running large budget deficits. To deal with huge losses in public-sector enterprises, especially in transport, communication, and steel industries, along with circular debt in the energy sector, various governments resorted to cut subsidies in all such sectors, especially the agricultural sector, wherein a large number of small beneficiaries could not organise to form a strong coalition to block the change of policy effectively. In other words, subsidies to farmers were gradually taken away to support highly inefficient industries and write-off liabilities of the defaulting elite energy consumers.

This policy shift also got support under the IMF loan agreements. Another reason has been that the provision of cheap food to net consumers of food (also including very small farmers whose consumption exceeds own production), whose number by far exceeds the number of net suppliers of food (the farmers with production greater than own consumption), has been used as a tool to gain popular political support. The subsidies on such food or non-food products that provide raw material to manufacturing firms, specifically cotton and sugarcane, have also been reduced to support the politically well-placed elite owners of mills.

However, the 2007-08 food price crisis triggered many changes in the agricultural trade policy stance adopted by countries worldwide. Export restrictions on agricultural output and regressive measures to curb agricultural imports were observed in the short term to protect consumers from the hike in international food prices. Headey (2010) finds that defensive trade policies during this time exaggerated international price movements. Since the 2007-08 food crisis, many countries have continued with defensive trade policies towards agriculture and have begun to pursue food self-sufficiency policies with hopes to improve food security. For example, the OECD has explored how governments can develop policies and a system that delivers advantages from an open and trade-exposed agricultural sector while at the same time addressing domestic policy objectives such as protecting vulnerable groups. OECD analysis emphasises the important role of decoupling support, targeted and tailored support programmes, and addressing the subsequently disadvantaged groups through compensation or policy measures (Greenville, 2015).

It is suspected that Pakistan's currently prevailing agricultural pricing policy is anti-protective primarily, whether it is in the form of procurement prices, subsidies, or other such incentives. Several studies have employed an effective rate of protective (ERP) as a measure of how government policies serve as protective or anti-protective measures.

The present study has two objectives. First, it provides updated estimates of ERP for wheat and cotton, the two leading crops, for the past 15 years. Second, it proposes and applies a method to additively decompose the ERP into two components representing the effects of distortions in product and input markets.

Estimating ERPs and other related statistics is a time-incentive task as it requires a lot of manual data entry. In addition, there is more than one approach to estimate ERPs depending on how free-market notional prices and distortion-loaded realised prices are computed. Therefore, the study focuses on two major crops, namely wheat and cotton. Wheat is the staple food of Pakistan and contributes about 10 percent to value-added in agriculture and is cultivated on 39 percent of the cropped area in Pakistan. In recent years Pakistan has overcome the demand-supply gap and has become a net exporter of wheat. Pakistan ranks at number seven in terms of area and production of wheat but number 59 in terms of yield (Ejaz and Ahmad, 2019). Cotton is the second major crop of Pakistan in terms of cultivated area (15 percent of the total cropped area) and production (6.7 percent of value-added in agriculture). During the past 25 years, the growth of the textile sector has resulted in faster growth in the use of raw cotton than its production, thereby converting Pakistan's position from a net exporter to a net importer of raw cotton. In addition, Pakistan also imports specific grades of cotton from the USA and Egypt (Ejaz and Ahmad, 2019).

Production of both crops is highly concentrated in the province of Punjab. The province contributes 76 percent to Pakistan's total wheat production and is the only province with surplus wheat with a 95 percent share in procurement. The contribution of Punjab to cotton production is also about 76 percent. Therefore, the study is confined to Punjab to manage the data-related issues in a better way.

The study expects to find that to appease consumers of agricultural products, whether households or manufacturing firms, the agricultural pricing policies of Pakistan have mostly created disincentives for farmers in recent years.

The rest of the paper is organised as follows. Section 2 explains the methodology for estimating nominal and effective rates of protection and decomposing the latter into revenue and cost components. Section 3 describes data sources and details on the measurement of various statistics that go into estimating the nominal and effective rates of protection and the latter's decomposition. Section 4 presents results and discussion, while Section 5 concludes the study.

2. MEASURING NOMINAL AND EFFECTIVE RATES OF PROTECTION

Although traces of the basic idea of ERP could be found in earlier literature on trade and industry, the formal concept was introduced and refined in a number of articles and books by Gorden (1962, 1966, 1969, 1971). He proposed that while evaluating how an industry is being protected from foreign competition with import taxes or export

subsidies, it is essential to net out the impact of taxes and subsidies on inputs used in the production of the goods under consideration. In this context, the literature considers all inputs going into the production process other than factors of production, thereby focusing on how value-added, or equivalently the reward to factor services, in an industry is affected by import taxes and subsidies.

The measure of protection that considers the changes in output value caused by taxes and subsidies on output only, and does not consider the changes in inputs costs due to intervention, is the basic measure and is called nominal rate of protection (NRP). Denoting the output price (value per unit of output) in the presence and absence of taxes and subsidies on output by P_1 and P_0 respectively, NRP is written as:

$$NRP = \frac{P_1 - P_0}{P_0} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

If, however, taxes and subsidies on inputs are also taken into account, then the focus is shifted from output price to value-added per unit. The corresponding measure of protection is ERP and in its simplest form is given by:

$$ERP = \frac{VA_1 - VA_0}{VA_0} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

Here, VA_1 stands for value-added per unit of output in the presence of taxes and subsidies on output and inputs, while VA_0 denotes value added in the absence of all such distortions.

It is shown in Appendix that ERP is related positively to NRPs for output and negatively to NRP of each input as follows (see Equation C in the Appendix).

$$ERP = \underbrace{\{S_0^Q \, NRP^Q\}}_{Revenue\ component} + \underbrace{\{-\sum_{i=1}^{n} S_0^i \, NRP^i\}}_{Cost\ component} \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

In this equation NRP^Q and NRP^i denote NRPs for output and input *i*, respectively, while S_0^Q and S_0^i denote the shares of output and input *i* in value-added in the absence of distortions.

It is obvious that S_0^Q is always greater than one whereas S_0^i could be greater than, equal to, or less than one, depending on how large the input cost is relative to value-added. In any case, the above equation shows that the impact of all the distortionary measures can be additively decomposed between the impact on revenue per unit and the impact on the cost per unit. The first component is useful to understand to what extent distortionary policies in the product market tend to protect or harm farmers. The second component indicates whether and to what extent the distortionary policies in input markets supplement or offset the effects of product market policies on farmers.

The algebraic manipulations in the Appendix show that Equation (3) can also be written in a more consolidated form (Equation F in the Appendix) as given below.

$$ERP = \underbrace{\{S_0^Q \, NRP^Q\}}_{Revenue\ component} + \underbrace{\{-S_0^I \, NRP^I\}}_{Cost\ component} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (4)$$

where S_0^I is the combined share of the cost of all inputs in value-added in the absence of distortions and NRP^I is the NRP of the price index of inputs measuring distortionary input prices relative to distortion-free input prices. In this index, the realised input

quantities per unit of output (in the presence of distortions) are used as weights. The price index here has the interpretation of the Paasche price index. The two components of ERP are hereby referred to as the revenue and cost components.

Later on, the formulas for NRP and ERP had to be revised to account for measures of protection other than taxes and subsidies. To take into account all forms of protective measures in the estimation of ERP, the value-added measures VA_1 and VA_0 are respectively interpreted as value-added in the presence and absence of distortions (domestic as well as at the border) caused by all types of policy interventions in the product and input markets. This interpretation, however, necessitated the need to convert, for example, import quota to an equivalent import tariff. But it turned out that equivalence between tariffs and quotas and other direct or indirect trade restrictions is not straightforward (Bhagwati 1968, Chiou, *et al*. 2005 and Lake and Linask, 2013). To overcome this difficulty, the hypothetical output price in the absence of all policy distortions is set equal to the pre-tariff border price further adjusted for inland transportation and other such charges.

For the estimation of ERP for crops in Pakistan, the first point that needs some deliberations is the identification of the intended beneficiaries of protection. Since the decision-makers whose behaviour matters are farmers themselves, all other agents involved in the delivery of output from farm to market and inputs from market to farm are not considered. This basically means that all calculations are to be made with prices prevalent or effective at farm-gate. Thus, the output value is estimated as the farm-gate equivalent of the price received by farmers, which is adjusted for transportation and other such costs. Likewise, the cost of purchased inputs is also estimated in farm-gate equivalent costs, adjusting for transportation costs, etc.

Since the focus of protection is farmer, value-added includes income that accrues to the farmer in terms of imputed cost of labour, land rent, and rental cost of farm machinery owned by farmers. All other purchased inputs, specifically seeds, fertilisers, pesticides, weedicides, and rent of hired machinery, are counted in input costs. In other words, value-added is calculated as:

$$VA = \textit{value of output} - (\textit{cost of seeds} + \textit{cost of fertilisers} + \textit{cost of pesticides} + \textit{cost of weedicides} + \textit{cost of hired machinery}$$

A number of inputs are used within each category with varying rates of taxes and subsidies. In particular, the following inputs are considered in the estimation of ERP.

Seeds
Fertiliser
  DAP (Di-ammonium phosphate)
  Urea
  NP (Nitrogen phosphorus)
  CAN (Calcium ammonium nitrate)
  Gypsum
  SOP (Sulphate of potash)
  SSP (Single superphosphate)
Pesticides
Weedicides

Hired Machinery
Ploughing
Planking
Levelling
Tractor Drilling Cost
Ploughing in Case of Broadcast
Planking in Case of Broadcast
Threshing

For the actual application, we start with NRP for output, which is the relative difference between the realised price received by farmers and the hypothetical benchmark price that would prevail in the absence of intervention. The latter is estimated as the farm-gate equivalent of border price. It is estimated by adjusting the border price for inland transport, marketing margins, and quality differences. Conversion of border price to farm-gate price depends on whether the product under consideration is exportable or importable. For exportable products, the farm-gate equivalent price is obtained by subtracting from the *fob* export price all the per-unit costs involved in the transfer of the product from farm to port, including transportation, handling, and marketing costs, wholesale margins, storage charges, and other charges like toll charges/fees. The reason is that if the farmer chooses to export the product, all such costs will amount to a drain on receivables for farmer. In case the product needs any processing for exports, the processing cost per unit of output is subtracted from the border price and if a non-exportable byproduct is to be separated, its value (at farm-gate) is added to the border price. For example, in the case of cotton, the cost of separating cotton seeds from the raw crop (seed cotton) per unit of the crop is subtracted from the border price, while the value of seeds per unit of the crop is added.

Likewise, for importable products, the farm-gate equivalent price is obtained by adding to the *cif* import price all the per-unit costs involved in transferring the product from port to the reference market where farmers are supposed to sell their product. These costs include transport costs, toll/fees, handling charges, etc. Further, wholesale margin and incidental expenses are subtracted, and adjustment is made for quality differences to arrive at the benchmark import price at farm-gate.

NRP is also estimated for inputs, which indicates how the cost of production for farmers is affected by government interventions. However, as opposed to product-market interventions, any policies that tend to raise (reduce) input prices like tariffs (subsidies) on imports tend to harm (protect) farmers by raising (reducing) the cost of production per unit.

Once the NRPs on output and inputs are estimated, it is straightforward to estimate NRP and its two components as indicated by Equation (3). The advantage of ERP over NRP is that the former considers the combined effects of all trade barriers and price interventions both in product and input markets (Valdes, 2013).

3. DATA

Data needed for the study are not available in consolidated form from any single source, and several sources are used to collect all the required data. The main data

sources are the crop-wise annual booklets published by Agriculture Policy Institute, specifically *Cotton Policy Analysis* and *Wheat Policy Analysis*. Data on realised input prices (including the effects of distortions, if any), input quantities per unit of output and, hence, input costs (all in the presence of distortions) are either directly given or derived from the information given in these booklets. The realised product prices of cotton and wheat are obtained from *Agricultural Statistics of Pakistan*, Pakistan Bureau of Statistics and *Pakistan Economic Survey*, Ministry of Finance.

The distortion-free wheat and cotton prices are estimated as the farm-gate equivalent of border prices adjusted for transportation and other such costs. The data on the border price of wheat are obtained from *External Trade Statistics Pakistan* published by the Pakistan Bureau of Statistics, while the data on the border price of cotton are taken from the website www.cotlook.com. Data on the exchange rate, to convert dollar prices in rupees' denomination, are taken from *Annual Reports* of the State Bank of Pakistan.

For distortion-free prices of inputs, we need data on taxes and subsidies. The required information is available from the document *Customs Tariffs* published by the Federal Board of Revenue. The five types of taxes on trade that are considered for NRP on inputs and ERP of the two products are custom duties (applied to *cif* value of imports), regulatory duty (a tax on luxury items to manage-supply imbalance and BOP in general), federal excise duty (including special federal excise duty applied on the *cif* value of imports), sales tax (applied on value of imports including all types of duty and withholding tax (advance tax applied on value of imports including duties and sales tax that can be reclaimed on the filing of return with the revenue department).

4. RESULTS AND DISCUSSION

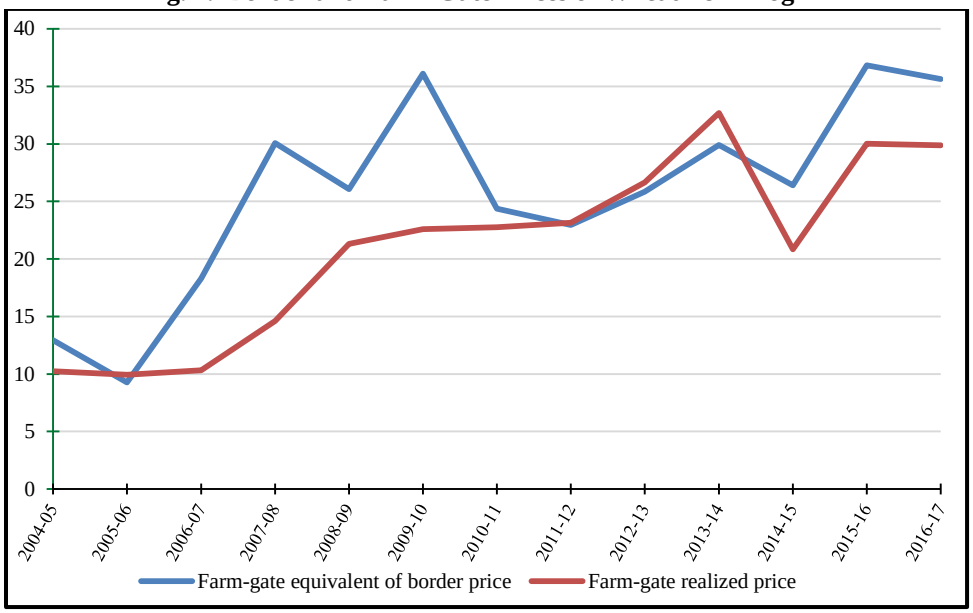
NRP and ERP along with its two components, are estimated for wheat and cotton over the years 2004-05 to 2016-17 using the methodology and data explained above. The crop-wise discussion follows below.

4.1. Wheat

With a sudden surge in excess supply during the harvest season (May and June), the market price of wheat tends to decline. Farmers, especially those with small and medium farm holdings, face the risk of losses as they do not have adequate storage facilities and cannot hold on to their produce in the hope of better prices in the future. The wheat procurement policies of the Federal g and Punjab government are implemented by Pakistan Agricultural Storage and Services Corporation. Ltd (PASSCO) and Provincial Food Departments (PFD) of Punjab. These policies are supposed to protect farmers by providing a price floor (often referred to as 'support price') during the harvest season, subject to annual review with possible revision. Supplemented by trade restrictions, wheat procurement policies are meant to absorb the effects of market forces on the wholesale price of wheat, especially major international price shocks. As explained in Dorosh and Salam (2007), the main objective of wheat procurement at support price is to protect farmers' incomes and subsidise wheat sales to flour mills and households at stable and affordable prices. When needed, the federal government imports wheat to ensure sufficient food stock to keep the price of wheat stable in short to medium terms.

Here it will be useful to make a simple comparison between the realised farm-gate price of wheat and the farm-gate equivalent of border price to have some idea about how wheat price in Pakistan has been moving in comparison to world market prices. Figure 1 presents the trends. The figure shows that the farm-gate equivalent of border (world) price of wheat increased sharply during 2006-07, 2007-08 and 2009-10, resulting in a 290 percent increase in just four years (from the year 2009-10 compared with 2005-06). In contrast, the realised farm-gate price increased by 127 percent only as the so-called 'support price' was kept low to protect domestic consumers. Later on, when the farm-gate equivalent of border price fell during the next two years (2010-11 and 2011-12) by 36 percent, the realised farm-gate price increased by 2.5 percent. In the next two years (2012-13 and 2013-14), the farm-gate equivalent of border price and the farm-gate price increased by 30 percent and 41 percent, respectively, making farm-gate price exceed border price for the first time after the year 2005-06. In 2014-15, border prices decreased by about 12 percent, whereas farm-gate prices declined sharply by 36 percent. After that, the farm-gate price remained substantially below the border price.

Fig. 1. Border and Farm-Gate Prices of Wheat Per Kilogrm



The above analysis shows that the realised farm-gate price of wheat has remained below in most of the years or slightly above the farm-gate equivalent of border price. Another observation is that the year-to-year variations in realised farm-gate price have been mostly smaller than the variations in the farm-gate equivalent of border price, thereby indicating that the wheat procurement policy has been designed mainly to absorb fluctuations in world prices. The overall picture that emerges from the graph is that the wheat procurement policy for Punjab has focused mainly on subsidising and insulating consumers from world market fluctuations at the cost of farmers. This seems more of a political decision to gain popular support from consumers who outnumber the wheat growers.

We now move to the estimation of protection rates. Table 1 presents the results on NRP and ERP along with the two components of the latter. The table shows that with the exception of four years 2005-06, 2011-12, 2012-13, and 2013-14, the NRP on wheat has remained negative, as can also be inferred from Figure 1. This means that the direct product price policy for wheat has been anti-protective for farmers in most of the years.

The highest value of negative NRP was observed during the years 2006-07, 2007-08, and 2009-10. This coincided with the period of the world commodity price hike when the government banned the export of wheat. The export restriction was lifted in 2010-11 when world price decreased substantially, and the private sector exported one million tons of wheat without any subsidy. During the ban, in surplus years, the government procured wheat at a low price and sold abroad. The export of wheat is now freely allowed according to Export Policy Order 2013. This observation indicates that government did not allow the private sector to benefit from higher world prices and acted as a rent-seeking intermediary between farmers and the world market. Had the private sector been allowed to export wheat, some of the benefits of higher world prices would have passed on to farmers as the private sector would be bidding better prices in competition with government procurement agencies.

Dorosh and Salam (2007) have pointed out that since the price at which wheat has been sold to flour mills does not include the transactions cost of procurement, or handling and storage cost, mills owners also have been reaping economic rent, though the benefit of this subsidy has been partially passed on to consumers. One can infer from these observations that during the three years of abnormally high negative nominal protection rates, government and flour mills benefitted and consumers of wheat remained protected from world food inflation,[1] while farmers did not gain much. It should also be noted here that negative nominal protection rate in any year does not necessarily mean that wheat price has declined during the year or farmers are worse off compared to their previous position; it just means that government intervention has caused the price to remain less than the level that would prevail under free-market conditions.

Table 1

Estimates of Protection Rates for Wheat

Year	Status of Net Trade	NRP	ERP	Revenue Component	Cost Component
2004-05	Importer	–20.78	–32.23	–31.08	–1.16
2005-06	Importer	7.34	24.83	19.71	5.12
2006-07	Importer	–43.63	–61.65	–63.03	1.38
2007-08	Importer	–51.41	–66.42	–67.73	1.30
2008-09	Importer	–18.23	–28.08	–30.65	2.57
2009-10	Importer	–37.46	–52.31	–53.35	1.04
2010-11	Exporter	–6.63	–10.37	–12.02	1.65
2011-12	Exporter	0.83	7.44	2.59	4.85
2012-13	Exporter	3.08	10.03	7.20	2.83
2013-14	Importer	9.26	21.72	19.47	2.24
2014-15	Importer	–21.08	–55.18	–54.88	–0.30
2015-16	Exporter	–18.51	–33.35	–34.17	0.82
2016-17	Exporter	–16.11	–30.11	–30.66	0.54

[1] This does not mean that consumers were not affected in general. Increase in the world prices of pulses were generally passed on to consumers.

The table shows that after a period of low NRP for four consecutive years (2010-11 to 2013-14), farmers again faced a high degree of negative NRP, which seemed odd for the year 2014-15 when border price decreased by 12 percent.

Moving to ERP, we observe almost the same pattern and trend as depicted by NRP, the only difference being that the value of ERP is higher as compared to NRP mainly because the former has a substantially smaller denominator than the latter.

It is further observed that variations in ERP are mainly driven by the variations in its revenue component, representing the effects of distortions in the product market. The cost component that shows the effect of distortions in the input markets is throughout very small. Furthermore, the sign of the revenue component of ERP (the same as the sign of NRP on the product) is negative for most of the years and positive for some years. On the other hand, the cost component of ERP is positive in all but two years, 2004-05 and 2014-15, when it was negligibly small. The year 2004-05 is the only one when fertiliser was taxed, while in both 2004-05 and 2014-15, weedicides/pesticides and machinery were taxed. Although these taxes continued in the subsequent years as well (though with reduced rates), yet the cost component of ERP remained positive as their impact was offset by subsidy on fertilisers. This means that while government interventions in the wheat market have been mostly unfavourable to wheat growers, the interventions in input markets have been mostly favourable, though their impact has been rather small.

The main factor contributing to negative average NRP on inputs and, hence, positive cost component of ERP on wheat is the subsidy on inputs, especially DAP and exemption of taxes and duties (regulatory duties, custom duties, federal excise duties, sales tax, etc.) on seeds, fertilisers, pesticides, weedicides, and farm machinery.

4.2. Cotton

The vulnerability of cotton growers to market fluctuations is not different from that of wheat growers, especially when prices fall sharply during harvest season (December and January). Trading Corporation of Pakistan (TCP) is the sole government agency responsible for buying cotton lint directly from farmers. In 1995 the practice of fixing support price was replaced by announcing indicative benchmark prices (WTO, 2015). As noted in Ejaz and Ahmad (2019), "According to Import Policy Order 2012–15, published by the Ministry Of Commerce, there is no restriction on import of cotton", while "cotton can be exported only after an export contract registration (against a security deposit of 1 percent of the contract value) with the Trade Development Authority of Pakistan (TDAP) and a classification certificate issued by the Pakistan Cotton Standards Institute".

However, it is observed that government does not intervene directly in the product market as rigorously as in the wheat market. It is perhaps because the maintenance of low price to protect the chain of textile industry and ultimately consumers (households) is not considered as crucial as the protection of wheat flour mills and, hence, consumers of wheat. Thus, the rates of export and import duties on cotton have remained low since the mid-1990s. The Trading Corporation of Pakistan (TCP) made an exception in 2008 when it bought 42,000 tons of cotton in an effort to boost domestic prices.

Figure 2 presents the relative position and trend in the realised farm-gate price and the farm-gate equivalent of border prices of cotton. The figure shows that both the prices

continued to increase steadily till the year 2009-10, after which a sharp hike in the price is observed in 2010-11, followed by an equally sharp decline in 2011-12 and finally settled to somewhat stable path till the last year of analysis. Incidentally, in 2010-11 not only the farm-gate equivalent of border price of cotton increased sharply, but Pakistan also lost about 2–3 million bales of cotton as a result of widespread floods.

Notably, the realised farm-gate price remained below the farm-gate equivalent of border price throughout the period of analysis irrespective of the time trend. The minimum gap between the two prices was observed in 2013-14. The gap increased sharply in recent years, reaching the maximum level in 2016-17. In 2010-11, when border price increased sharply, the realised farm-gate price also went up partially due to the loss of crop in floods, thereby maintaining almost a similar gap between the world and domestic prices as prevailing in other years.

Fig. 2. Border and Farm-Gate Prices of Cotton per Kilogrm

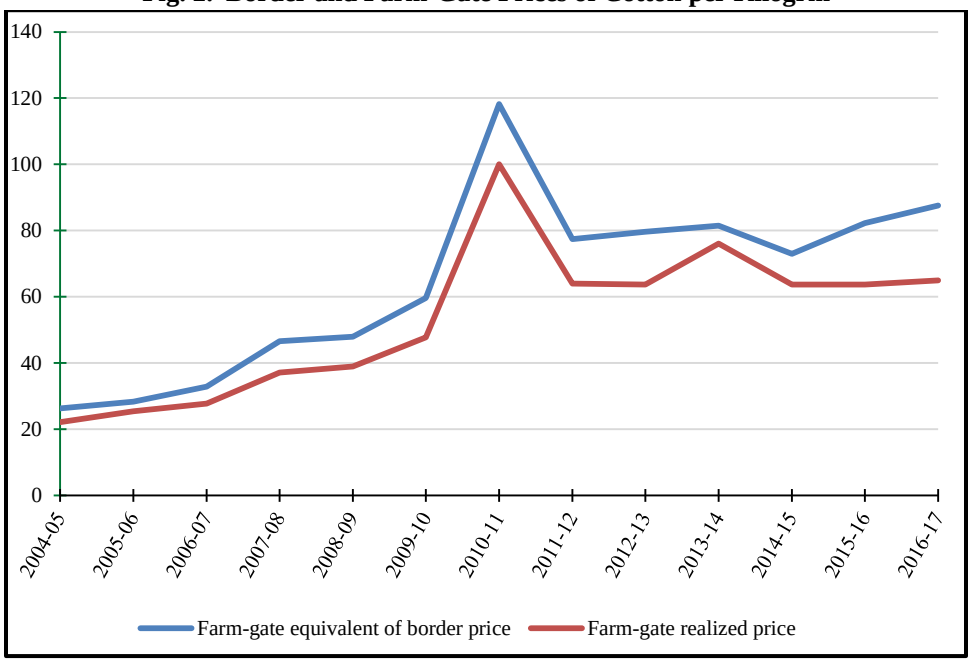


Table 2 presents the results on the rate of protection and other related statistics. First, note that as indicated by Figure 2, the NRP for cotton has remained negative throughout the period of analysis with the minimum values observed in the years 2013-14 (6.6 percent). In the very next year, NRP increased to the second highest level (22.5 percent) and then to the highest level (25.8 percent) in 2016-17. This perhaps suggests a change of policy as the increase in world price was not matched by a similar increase in farm-gate price.

The table also shows that NRP for cotton has been more stable with the same average value compared to NRP on wheat. Customs duties on the import of cotton are exempt, while exports are subject to a small percentage of export surcharge. In addition, there are no restrictions on imports either.

This low level of government intervention in the cotton market seems inconsistent with the observed values of NRP, which is by no means negligible. Ejaz and Ahmad (2019) attribute this inconsistency to the structure of the cotton market within the country. The study quotes official sources in the Ministry of Textile Industry suggesting that "cotton ginners buy seed cotton from farmers at the domestic farm-gate rates…and they sell to APTMA (All Pakistan Textile Mills Association, the sole buyer of lint). The monopsonistic power enjoyed by APTMA allows it to depress the local price of lint by restricting purchases from the local market." The disparity between border and farm-gate prices cannot be bridged through exports because of procedural difficulties and complications in the export of cotton. To export cotton, one must first get registered, and exports must be carried out within a short period after registration. World cotton prices are pretty unstable, and there is no guarantee that an exporter would benefit from a price hike because, by the time export permission is guaranteed, the price may have declined. Most exporters tend to shy away from this risky situation.

Table 2

Estimates of Protection Rates for Cotton

Year	NRP	ERP	Revenue Component	Cost Component
2004-05	–15.81	–41.82	–37.22	–3.95
2005-06	–10.25	–23.86	–29.51	6.01
2006-07	–15.56	–38.12	–43.44	5.59
2007-08	–20.23	–39.00	–42.11	3.36
2008-09	–18.86	–59.61	–68.58	9.31
2009-10	–19.95	–53.65	–58.81	5.41
2010-11	–15.34	–24.59	–25.70	1.19
2011-12	–17.38	–46.15	–48.96	2.87
2012-13	–19.97	–107.54	–117.00	9.43
2013-14	–6.56	–28.34	–36.41	8.34
2014-15	–12.69	–134.42	–127.73	–7.30
2015-16	–22.52	–113.79	–116.28	2.41
2016-17	–25.75	–111.30	–114.82	3.47

Another possible reason mentioned in Ejaz and Ahmad (2019) is that farmers do not have sufficient knowledge to take benefit from rising world prices, while the chain of intermediaries in the marketing business tends to reap the rent.

Moving ahead, we observe that ERP on cotton has remained negative throughout the analysis period. Unlike the case of wheat, NRP and ERP on cotton always showed a consistent pattern of government policies being unfavourable for farmers. The ERP went up to more than 100 percent in recent years, indicating that the cotton policy has become highly anti farmer-friendly. This pattern is quite astonishing given that the cost component of ERP has remained favourable to farmers except for two years, 2004-05 and 2014-15 for a reason explained in the sub-section of wheat.

It is evident from this analysis that it is the revenue component and, hence, product-market interventions that have harmed the farmers. Notably, there is no

particular policy in place that could protect farmers from world market price fluctuations. The procurement agencies and the marketing chain of intermediaries are given a free hand to exploit farmers based on their monopolistic powers, superior knowledge of marketing procedures, and storage capacity that small to medium farmers are unable to match.

5. CONCLUDING REMARKS

The study finds that the realised farm-gate price of wheat has mostly remained relatively more stable and lower than (or slightly above) the farm-gate equivalent of border price. During the period of world commodity price hike (2007-08 and 2009-10), while government acted as a rent-seeking intermediary as it bought surplus wheat at a low price to be sold at a much higher world price, the private sector was not allowed to benefit from higher world price. This eliminated any chances of transmitting the dividend of world food inflation to farmers through competition between government procurement agencies and private exporters. While government and flour mills benefitted and consumers of wheat remained protected from world food inflation, farmers did not gain. It appears that the wheat procurement policy is framed to favour wheat consumers and mill owners rather than wheat growers.

The current procedure of filing applications to wheat procurement agencies, deposit of 110 rupees per bag to a commercial bank for the purchase of each standardised (gunny) bag and waiting for a week for obtaining the sale receipts is too difficult for most farmers, which creates room for the entry of agents ('Arties'). This procedure needs simplification. For example, gunny bags should be made available in the open market. Commercial banks may be instructed to make instant payments to farmers, and the cost of this bridge financing may be borne by the government.

Regarding cotton crop, the study observes that the government does not intervene directly in the product market as rigorously as in the wheat market. It is perhaps because the maintenance of low price to protect the chain of textile industry and ultimately consumers (households) is not considered as crucial as the protection of wheat flour mills and, hence, consumers of wheat. Nevertheless, the realised farm-gate price has consistently remained below the farm-gate equivalent of border price.

The study concludes that in the case of cotton, it is the revenue component of ERP and, hence, product market interventions that have harmed the farmers. There is no specific policy to protect farmers from world market price fluctuations. The marketing chain of intermediaries led by government procurement agencies tends to exploit farmers based on their monopolistic powers, superior marketing knowledge, and storage capacity.

The collusion amongst textile mills in buying cotton has resulted in depressed prices received by farmers; the gap between the farm-gate price and farm-gate equivalent border price has widened over the past 3 years which shows that the anti-farmer bias has been getting stronger in recent years. To remove the anti-farmer bias in the cotton market, it is recommended that the Competition Commission of Pakistan should intervene and break the monopsony power exerted by APTMA. Although government procurement policy can also break the monopsony power of APTMA, yet such an intervention is not recommended as it ultimately leads to inefficiency, distortion, and corruption.

APPENDIX
Proofs of Equations (3) and (4)

Substituting for the value-added in the presence and absence of distortions in ERP formula given by Equation (2), denoting the prices of input i in the presence and absence of distortions by W_1^i and W_0^i respectively, the realised quantity of input i in the presence of distortion by X_1^i and re-arranging the resulting expression, yields:

$$ERP = \frac{\left(P_1 - \sum W_1^i\ x_1^i\right) - \left(P_0 - \sum W_0^i\ x_1^i\right)}{P_0 - \sum W_0^i\ x_1^i} = \frac{P_1 - P_0}{P_0 - \sum W_0^i\ x_1^i} - \frac{\sum W_1^i\ x_1^i - \sum W_0^i\ x_1^i}{P_0 - \sum W_0^i\ x_1^i} \quad \ldots \quad \text{(A)}$$

Further manipulations result in Equation (3) as follows.

$$ERP = \frac{P_0}{P_0 - \sum W_0^i\ x_1^i}\ \frac{P_1 - P_0}{P_0} \ - \ \sum_{i=1}^{n} \frac{W_0^i\ x_1^i}{P_0 - \sum W_0^i\ x_1^i}\ \frac{W_1^i - W_0^i}{W_0^i} \quad \ldots \quad \ldots \quad \ldots \quad \text{(B)}$$

Or

$$ERP = S_0^Q\ NRP^Q - \sum_{i=1}^{n} S_0^i\ NRP^i \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \text{(C)}$$

The second expression in Equation (A) can also be manipulated as follows.

$$\frac{\sum W_1^i\ x_1^i - \sum W_0^i\ x_1^i}{P_0 - \sum W_0^i\ x_1^i} = \frac{\sum W_0^i\ x_1^i}{P_0 - \sum W_0^i\ x_1^i}\ \frac{\sum W_1^i\ x_1^i - \sum W_0^i\ x_1^i}{\sum W_0^i\ x_1^i} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \text{(D)}$$

Or

$$\frac{\sum W_1^i\ x_1^i - \sum W_0^i\ x_1^i}{P_0 - \sum W_0^i\ x_1^i} = \frac{\sum W_0^i\ x_1^i}{P_0 - \sum W_0^i\ x_1^i}\ \frac{\sum W_1^i\ x_1^i / \sum W_0^i\ x_1^i - 1}{1} = S_0^I\ NRP^I \quad \ldots \quad \ldots \quad \text{(E)}$$

Substituting this result into Equation (A) and carrying the result to equations (B) and (C) yields the following result.

$$ERP = S_0^Q\ NRP^Q - S_0^I\ NRP^I \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \text{(F)}$$

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