AGRICULTURAL POLICY AND WHEAT PRODUCTION:
A CASE STUDY OF PAKISTAN

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ABSTRACT

The study aims to determine the effect of Agriculture Policy on wheat production in Pakistan. The effect of change in tax/subsidy on agricultural productivity depends upon their respective sensitivities, which is reflected through the value of Nominal Protection Coefficient (NPC). NPC is a ratio between border prices and prices received by the local producer. Using the data for the period 1971-2006, the study concludes that the government policy has insignificant effect on wheat production though the sign of its coefficient is positive. JEL Classification: H23, H24, Q18.

Key Words: Wheat production, taxes, subsidies, agricultural policy.


INTRODUCTION

Wheat is one of the major components of food used in many consumer items such as porridge, bread and biscuits. Wheat production in Pakistan has been stagnant for the last seven years whereas population has increased significantly at a rate of 2.5% per annum, from 137 million to 160 million during the period 1999-2005, widening the between demand and supply. Wheat production should have increased proportionally to meet the contemporaneous as well as the future demand, whereas it could attain the level of only 16.8 million tons rather than 22 million tons causing a shortfall of 5.2 million tons per annum. This is a worrisome situation which calls for attention from the policy makers to increase the wheat production in order to ensure food security. In the presence of cap on land and water resources, the only option is to increase yield per acre. The World Food Programme (WFP) has cautioned about the coming food security problem that could adversely affect the half of population in Pakistan.

Agricultural policy and productivity cover different aspects that have significant impact on wheat production. Input and output prices, subsidies and taxes and other input are frequently discussed in the literature regarding agriculture policy. For example, Chaudhry and Kayani (1991) observe the impact of taxes on Pakistan’s agriculture and suggest different approaches such as Nominal Protection Coefficient (NPC), Effective Protection Coefficient (EPC) and Producer Subsidy equivalent (PSE). The study point out that income inequality between industrialists, agrarians, rural and urban people is also a factor which discourages agricultural productivity and economic growth. To determine optimal tax theory and its basic principles, Chaudhry (2001) analyzes an appropriate tax policy for Pakistan’s agriculture, consistent with the norms of optimal taxation. It highlights the pitfalls of the current tax policy in terms of equity, efficiency, economic stability and their revenue earning capacity. It is argued that the existing system of agricultural taxation should by revised by a combination of proportional land tax and tax on marketed output.

Similarly, Parry (1999) explains the effect of pre-existing taxes on the agricultural production. It identifies the relation between the tax distortions and the production and finds that pre-existing taxes raise the cost of all policy instruments up to 200 percent. This ultimately discourage the agricultural productivity. In another study, Fulginiti and Perrin (1994) assert that changes in the output prices affect the resource allocation in the economy. These prices also affect the choice of the producer about the investment in technological innovation over time (Fulginiti and Perrin, 1999).

The effects of common agricultural policy (CAP) were summarized by Koning (2006) which were implemented in European Union (EU). Since supply mismanagement induces lower price which indirectly affect the agricultural productivity, the protection the farmers against cheap imports is suggested so that the agriculture could move forward. Similarly, the role of public infrastructure in increased productivity is identified by Teruel and Kuroda (2005). The study provided empirical evidence for the decline in Philippine agricultural productivity due to reduced supply of rural infrastructure. Wiebe et al. (2000) evaluates the significance of land quality on agricultural
productivity. The study justified the significant impact that different land qualities have on agricultural productivity. In an effort to analyze the effect of policy on agricultural productivity, Fulginiti et al. (1992) viewed that policymakers distort agricultural sector sometime through exports taxes and over-valued exchange rates. To observe the effect of fertilizers and fertilizer industry on agricultural productivity, Shrotriya (2006) found the incentive for fertilizer industrialists and promotion of the farmers’ education could make balanced and efficient use of fertilizers. Fertilizer industrialist’s could promote the knowledge of the farmers and highlight the importance of fertilizer usage. This can be done by farmer training, farmer schooling, farmer service, and films-crops or themes etc. Alene (2007) evaluates the effect of education on agricultural production under improved technology. It surfaces the importance of the farmer’s education on the agriculture production.

In this backdrop, the underlying study attempts to investigate the effects of government policy on wheat production in Pakistan for the period 1972-2006. Agriculture policy is reflected through the Nominal Protection Coefficient (NPC), where as NPC and wheat production is partially interlinked. Hence, the effect of NPC along with other variables on wheat production is investigated.

**MATERIALS AND METHODS**

This section gives a brief description of the data sources as well as the brief the construction of variables used in the current study. The first and most important variable is the Nominal Protection Coefficient (NPC), which is constructed by dividing domestic output prices by social prices, i.e., import/export parity prices. It measures the impact of output pricing policies without any consideration about intervention/distortion in input markets.

\[
\text{NPC} = \frac{\text{Domestic prices}}{\text{Social prices}}
\]

The data on this variable is taken from ‘Agricultural Prices Commission, Government of Pakistan (APCOM).

The second variable is agriculture output, for which wheat production in tons is taken as proxy. The third important variable is agricultural labor which is calculated as the number of persons employed in a particular land area against their salary, tips or reward. The agricultural labor is also measured at aggregate level, which shows the total number of employed persons in agriculture. Agricultural land is the fourth variable which refers to the share of land area that is arable, under permanent crops, and under permanent pastures. On average an agricultural land is cultivated twice or thrice a year in Pakistan. The fifth variable “agricultural land per capita” is the land, which an individual can utilize within a specific period and make earning from it. It is calculated by dividing the agriculture land to the agriculture labor. Similarly, agricultural machinery refers to the number of wheel and crawler tractors (excluding garden tractors) in use in agriculture at the end of the calendar year specified or during the first quarter of the following year. Another variable is fertilizer consumption which measures the quantity of plant nutrients used per unit of arable land. Fertilizer products cover nitrogenous, potash, and phosphate fertilizers (including ground rock phosphate). The time reference for fertilizer consumption is the crop year (July to June). Lastly, Gross Domestic Product (GDP) is the market value of final goods and services produced in the economy. Furthermore, data are taken in constant local currency units. The main sources of data for these variables include The Pakistan Economic Survey (various issues), World Development Indicators and Statistical Year Book (Federal Bureau of Statistics).

**Theoretical Framework**

This section presents the analytical framework used in the study. It highlights theoretical background and the model specification. For this purpose, the work of Hu and Antle (1993) has been extended.

**Background of the Model**

The model analyzes the effect of agricultural policy on wheat productivity. It incorporates fiscal variables (taxes and subsidies) in the wheat production function for this analysis. Theoretical speaking, the agricultural policy could affect the aggregate wheat production only with the moderate level of taxes or subsidies. This inference changes drastically if the taxes or subsidies increase without limits, diminishing the marginal effect and may even result in negative impact on wheat productivity.

Hu and Antle (1993) found a negative relationship between agricultural growth rate and tax rate in the agricultural sector particularly in developing countries. The effect of change in tax (subsidy) rate on agricultural productivity depends upon its magnitude reflected through the value of Nominal Protection Coefficient (NPC). NPC is the ratio between border prices and prices received by local producer. There is linear relationship between NPC
and productivity only for moderate range of tax or subsidy (for example, for the value of NPC between 0.7 and 1.15). Due to lack of resources and technology that are given exogenously in short-run, extensive subsidy has also negative impact on wheat productivity. Thus moderate level subsidy and aggregate wheat productivity are expected to be positively linked. It is important to note that subsidies are subject to the diminishing return. As noted above, subsidy provides an incentive to increase production by increasing input use on both intensive and extensive margins. A subsidy that gives expansion onto marginal land may lower average productivity, thereby offsetting the positive productivity effects of subsidy.

In addition at each point in time the available set of technology and resource constrain can change the productivity with the degree of subsidy or tax rate. Furthermore, it is considered that the marginal effects of increasing taxation on productivity should also decline. These reasons articulate the negative effects of the use of excess subsidies resulting in the slowdown of the economic activity. In this study the Nominal Protection Coefficient (NPC) is used as a proxy variable. NPC is ratio of local prices to world prices (border prices). Border prices show the opportunity cost of tradable goods for the countries that are relatively small and price taker in the world market. The value of NPC represents the protection level of the agriculture sector. If NPC is equal to unity, there is no government intervention in price setting. If NPC is greater than unity then government is protecting the agriculture sector. If value of NPC is less than unity, it means government is imposing taxes on agricultural products. Although there are several limitations of using NPC (like quantitative restrictions, input subsidies or supply control) yet it is used unless some other effective measure is available.

Hu and Antle (1993) depicted that producer incentive plays a dominant role in increasing productivity. This incentive might be distorted by government intervention that is ultimate obstacle in optimizing productivity. Price distortion caused by government intervention may have three types of effects on wheat productivity. The short-term effects depicting that, with given technology and resources, changes in output price affects the factor usage on the intensive margin and thus quantity supplied. This channel brings no change in productivity. Medium-term effects demonstrate that output price change may affect the choice of crop and land utilization. These changes may alter productivity with the help of change in technology or land use. The long-term effects surface that the change in output price alters incentives for physical and human capital investment and affects research and development through the new innovation process.

The Model

The policy variable Nominal Protection Coefficient (NPC) and wheat production are endogenously determined in the process of economic growth. Wheat production is considered to be a function of the policy variable. Thus, wheat output and the state of agricultural policy may be jointly endogenous variables, and to obtain consistent estimates of the production function, it is necessary to incorporate this endogeneity of NPC in the estimation of the production function. The model specifies, wheat output (Q) to be a function of NPC, labor (L), land (A), machinery (M) and fertilizer (F) inputs; while the policy variable NPC is function of agricultural share in GDP (Qs), income per capita (I) and agricultural land per capita (AC).

\[
Q = b_0 \text{NPC}_t \text{L}_t^{b_1} \text{A}_t^{b_2} \text{M}_t^{b_3} \text{F}_t^{b_4} \text{e}_t^{b_5} \quad (1)
\]

\[
\text{NPC} = a_0 \text{Qs}_t^{a_1} \text{I}_t^{a_2} \text{AC}_t^{a_3} \text{e}_t^{a_4} \quad (2)
\]

Where u and v are random errors. Equation (1) specifies the Cobb-Douglas type production function typically used in the literature on estimation of inter-country production functions. In this model, policy variable (NPC) shifts the production function in a factor-neutral way. Hence, this variable can be described as contributing to the explanation of differences in Total Factor Productivity over time in a country. Where Total Factor Productivity is defined as

\[
\text{TFP} = b_0 = \frac{Q}{L^{b_1} A^{b_2} M^{b_3} F^{b_4} e^{b_5}} \quad (3)
\]

According to this definition, NPC is covering the impact of policy on residual productivity not explored by differences in inputs. Thus, the NPC is measuring the impacts of research, technology adoption, and other efficiency differences not explored in conventional inputs, infrastructure, and human capital. The specification of equation (3)
is designed to capture time-wise variation in productivity. The equation (2) specifies NPC to be a function of agricultural share in GDP (Qs), per capita income (I), and resource endowment (AC).

Although there are objections to this rule, a simple plot of the NPC data against an indicator of the stage of agricultural development, such as share of agriculture in GDP, clearly portrays this general pattern. That is why the aggregate policy equation is specified as a function of share in GDP (Qs) and per capita income (I). As agricultural output per farm increases for a given per capita income, agricultural share of production in GDP increases as per capita income increases for a given agricultural output agriculture’s share falls. Hence, it is clear that $a_1 < 0$ and $a_2 > 0$. A second factor, represented in the literature influencing the policies toward agriculture, is the country’s agricultural resource endowment. Countries with more agricultural resource endowments are more likely to utilize agriculture as a tax base to finance general development and other policy objectives. Thus, it is also considered that $a_3 < 0$.

Model Specification

The present study extends the work of the Hu and Antle (1993) and develops linkages between theoretical model and the empirical variables. There are several variables that may affect the productivity differently according to their capacity. Aggregation also entails many aspects that are attractable for consideration. Given the space limitations, it is not possible to consider all the aspects.

Firstly, the Nominal Protection Coefficient (NPC) is used as a proxy variable, a ratio of local prices to world prices (border prices). As stated above, the value of NPC represents the protection level of the agriculture sector. Secondly, labor is one of the major factors of production. A small increase in the labor employment at initial levels might increases the wheat production. Nevertheless, the excessive employment might decline the productivity as every addition in labor would be less fruitful causing the marginal productivity of labor to fall. Land is another significant factor of production. Increase in arable land increases the wheat production. The economically feasible piece of land is complementary for the resource efficiency. The use of these efficient resources makes land more productive and hence produces higher output. The poor farmers would not be able to utilize the best available technology and resources, resulting in lower level of wheat productivity. It makes the positive relationship between agricultural land and wheat production. In general, machinery has positive impact on wheat productivity. It makes the efficient use of the resources. The availability of the tractors to a particular land area brings more efficiency to the work of farmers. Similarly, fertilizer is another basic input in wheat production and its timely availability is very crucial for production.

Next, we link the second equation’s variables with their dependent policy variable (NPC). Share in GDP (Qs) affects the NPC negatively as agricultural output increases for a given per capita income (I), agriculture’s share of production in GDP increases. This boost in share discourages the authorities to protect agriculture. Income per capita (I) is positively related with the policy variable NPC. An increase in income per capita (I), for a given agricultural output, will lower the agriculture’s share. This cut in share stresses the government to protect the agriculture. The addition in arable land per capita (AC) induces the government to tax more to finance general development and other policy objectives. Thus, it has also negative effect on the policy variable Nominal Protection Coefficient (NPC). In terms of mathematical equation, these can be written as follow:

\[
\text{Wheat Output} = \hat{a}_0 + \hat{a}_1 \text{NPC} + \hat{a}_2 \text{L} + \hat{a}_3 \text{A} + \hat{a}_4 \text{M} + \hat{a}_5 \text{F} \tag{4}
\]

\[
\text{NPC} = \hat{a}_0 + \hat{a}_1 \text{Qs} + \hat{a}_2 \text{AC} + \hat{a}_3 \text{I} \tag{5}
\]

Estimation Technique

OLS and Full Information Maximum Likelihood (FIML) methods have been employed for the estimation purpose. The main equation uses the OLS while the presence of partially simultaneity in the equations requires the estimation to be in OLS system of equations. The main equation contains the variables that are related to the wheat productivity and these variables are labor (L), agricultural land (A), machinery (M), fertilizer (F) and the variable NPC of which lag value is linked with wheat productivity. The sub equation consists of variables which affect the value of NPC. This equation is estimated by using system of equation’s OLS and FIML respectively.
RESULTS AND DISCUSSION

This section is divided into two sub-sections. The first sub-section discusses the results of the main equation, estimated by Ordinary Least Square (OLS). Second sub-section discusses the results of partially simultaneous model, estimated by OLS system of equations and Full Information Maximum likelihood (FIML).

Interpretations of Main Equation

The results of the baseline model (last row) along with its variants are presented in (Table I). This model incorporates all those variables drawn from our theoretical model. Initially, it focuses the results of this model and then the variants are explained. The results show that three variables Fertilizer (F), machinery (M) and agricultural labor (L) out of five are statistically significant at standard level. In addition, the nominal protection coefficient (NPC) and agricultural land (A) are insignificant in most of the estimations, but having the expected signs. To check the robustness, significance, consistency of signs, and reliability of results, the main equation is estimated by the alternative specifications. Different combinations of variables are estimated. This process reveals that all the variables are consistent in term of signs, but some are not in significance.

The regression coefficient of agricultural labor (L) is highly significant and consistent with the literature. Its coefficient varies within narrow range of 0.0006 to 0.0009. It shows that the positive correlation between the agricultural labor and wheat production. This result is consistent with the theoretical model under discussion. The smaller values of coefficients reveal the smaller correlation between agriculture labor and its quantity. This result is also consistent with the reality as marginal product of labor in agriculture is very low.

Table 1 Results of Regression Analysis of Main Equation (Dependant Variable: Agriculture Output)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intercept</th>
<th>NPC(-1)</th>
<th>A</th>
<th>L</th>
<th>F</th>
<th>M</th>
<th>AR(1)</th>
<th>R²</th>
<th>F-Stat</th>
<th>D.W.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.05</td>
<td>-37497.1</td>
<td>4255.79</td>
<td>0.0012</td>
<td>(23.79)*</td>
<td>0.95</td>
<td>344.56</td>
<td>2.23</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.05</td>
<td>-1605.66</td>
<td>753.98</td>
<td>0.0009</td>
<td>(6.27)*</td>
<td>0.904</td>
<td>0.97</td>
<td>34.67</td>
<td>2.31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.05</td>
<td>4928.36</td>
<td>1900.51</td>
<td>(25.38)*</td>
<td>0.96</td>
<td>391.89</td>
<td>1.56</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.05</td>
<td>16767.70</td>
<td>2419.58</td>
<td>0.272</td>
<td>(5.01)*</td>
<td>0.96</td>
<td>270.78</td>
<td>2.75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.05</td>
<td>-26362.2</td>
<td>2349.67</td>
<td>0.0007</td>
<td>(5.19)*</td>
<td>0.97</td>
<td>424.99</td>
<td>1.63</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.05</td>
<td>-14116.2</td>
<td>2701.12</td>
<td>0.0005</td>
<td>(3.78)*</td>
<td>0.96</td>
<td>330.34</td>
<td>2.12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.05</td>
<td>-13061.70</td>
<td>2450.36</td>
<td>0.272</td>
<td>(4.91)*</td>
<td>0.96</td>
<td>196.49</td>
<td>2.75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.05</td>
<td>-1937.29</td>
<td>583.83</td>
<td>0.0007</td>
<td>(4.91)*</td>
<td>0.97</td>
<td>342.51</td>
<td>1.75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.05</td>
<td>1145.33</td>
<td>592.47</td>
<td>0.0006</td>
<td>(3.41)*</td>
<td>0.97</td>
<td>350.55</td>
<td>2.39</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.05</td>
<td>4097.72</td>
<td>1523.06</td>
<td>0.003</td>
<td>(12.98)*</td>
<td>0.97</td>
<td>368.66</td>
<td>1.61</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.05</td>
<td>-13303.3</td>
<td>1713.77</td>
<td>0.0003</td>
<td>(3.68)*</td>
<td>0.98</td>
<td>396.47</td>
<td>1.58</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.05</td>
<td>-10217.0</td>
<td>704.47</td>
<td>0.0003</td>
<td>(2.89)*</td>
<td>0.98</td>
<td>278.05</td>
<td>2.17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.05</td>
<td>-6504.20</td>
<td>2067.83</td>
<td>0.0003</td>
<td>(3.64)*</td>
<td>0.97</td>
<td>291.37</td>
<td>1.86</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.05</td>
<td>-1797.11</td>
<td>392.47</td>
<td>0.0006</td>
<td>(4.58)*</td>
<td>0.98</td>
<td>323.25</td>
<td>2.02</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.05</td>
<td>-5575.02</td>
<td>637.38</td>
<td>0.0001</td>
<td>(2.59)*</td>
<td>0.98</td>
<td>264.71</td>
<td>2.03</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.05</td>
<td>-1.01</td>
<td>0.52</td>
<td>(0.72)</td>
<td>(4.38)*</td>
<td>(1.64)*</td>
<td>(2.49)*</td>
<td>(3.39)*</td>
<td>(0.00)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: The parentheses encompass the t-values for coefficients and p-values for F-tests. *, ** and *** indicate that the coefficient are significant at 1%, 5% and 10% level of significance respectively.

Fertilizer (F) is significant at 1% level, it’s the coefficient estimate varies from 0.001 to 0.002. It shows a positive relationship between use of fertilizer and production of wheat. It means that increase in the fertilizer usage would increase the production of wheat. This result is consistent with Shrotriya (2006). Pakistan has had...
experienced it in the epoch of Green Revolution. In comparison to agriculture labor, its impact on production of wheat is slightly stronger.

The third significant variable is machinery (M) which also shows positive correlation with the productivity of wheat. Its coefficient value alters from 0.272 to 0.88, consistent with the theory. The positive correlation between machinery and output reveal in the cause of the wheat production, machinery. Increase in machinery increases the efficiency of other inputs. If more tractors are available on a particular land area, the farmer would be able to complete the job on-time and efficiently. These results are consistent with the Chaudhry and Kayani (1991).

Nominal protection coefficient (NPC) is insignificant but has an expected sign. This insignificance is not in accordance with our theoretical expectation. The insignificance of NPC reveals that Pakistani government is neither protecting (not subsidizing) nor opening (not taxing) the agriculture sector for foreign competition, which is not the case in Pakistan. Nonetheless, it can be justified on some other grounds as the situation here is slightly different from other countries where empirical studies have been conducted. It might be the market imperfections, lack of knowledge, lack of perfect information, negligence of government and/or the incorrect official figures. The market imperfection is considered to be the most important factor reducing the influence of NPC on production. In the presence of market imperfections, people engaged in agricultural activities have no access to world market. They make the decision about their production while keeping in mind the local prices (Koning, 2006). The lack of information also plays a very crucial role to change the NPC’s effect on wheat production. If the people are not aware about the real situation in world market, their decision is likely to be based on the wrong assessment. In this entire set-up, the government is responsible for the provision of the correct information about market along with the effective strategy to approach the world market. The lack of these factors in Pakistan might be the reasons for insignificance of NPC.

**Interpretations of Simultaneous Equation**

Earlier pages discussed the determinants of wheat production, where NPC was explanatory variables, whereas working for the determinants of NPC makes it the simultaneous model as production of wheat depends on NPC and NPC depends upon quantity of wheat produced along with income and agriculture land per capita. In the presence of simultaneity in the equations, it can be estimated in system by using OLS and FIML, respectively. These results are given in Table II and III, respectively.

The NPC and agricultural land remained insignificant here as well. The variables like fertilizer, machinery and agricultural labor are significant at standard level of significance. The results of our sub equation which is estimated in both of the cases, highlight the insignificance impact of the explanatory variables like agricultural share in GDP (Qs), agricultural land per capita (AC) and income per capita (I) on NPC. The reason of this insignificance impact is that the agricultural share in GDP has never surpassed a certain limit. The NPC may be affected by the value of agricultural share in GDP after it changes the structural formation of the economy. But in case of Pakistan it’s never happened. Agricultural land per capita (AC) is also insignificant but has expected signs in both OLS and FIML estimations, respectively. The agricultural land per capita is not significant in case of Pakistan because the agricultural land per capita is decreasing over time.

**Table II** Results of regression analysis by using System (OLS)

<table>
<thead>
<tr>
<th>Main Equation</th>
<th>Intercept</th>
<th>NPC(-1)</th>
<th>A</th>
<th>L</th>
<th>F</th>
<th>M</th>
<th>R²</th>
<th>D.W.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.973687</td>
<td>1534.20</td>
<td>0.0002</td>
<td>0.0005</td>
<td>0.001</td>
<td>0.042</td>
<td>0.98</td>
<td>1.76</td>
</tr>
<tr>
<td></td>
<td>(-1.69)</td>
<td>(1.17)</td>
<td>(1.64)**</td>
<td>(3.53)*</td>
<td>(3.16)*</td>
<td>(2.30)*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: t-stats are given in parenthesis. *, ** and *** indicate that the coefficients are significant at 1%, 5% and 10% levels of significance, respectively.*

<table>
<thead>
<tr>
<th>Sub Equation</th>
<th>Qs</th>
<th>AC</th>
<th>I</th>
<th>R²</th>
<th>D.W.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.928</td>
<td>-0.010</td>
<td>-0.001</td>
<td>1.932</td>
<td>0.19</td>
</tr>
<tr>
<td></td>
<td>(1.24)</td>
<td>(-0.79)</td>
<td>(-0.01)</td>
<td>(0.17)</td>
<td></td>
</tr>
</tbody>
</table>

*Note: t-stats are given in parenthesis.*
CONCLUSION AND RECOMMENDATIONS

The goal of the study was to determine the effect of NPC along with other variables on the wheat productivity. The main equation shows the effect of NPC on wheat production whereas the sub-equation shows the fallout of other variables like agricultural share in GDP, agricultural land per capita and income per capita on NPC. In sub-equations, all of the variables are insignificant which affect the NPC. In a net shell, NPC is not significant in case of Pakistan. The wheat output depends upon some other factors such as agricultural labor, machinery and utilization of fertilizers, which remained robust and stable throughout our analysis.

It is suggested that some policies while keeping in view of the results. First, the government should subsidize fertilizer and should take effective steps to ensure the availability of fertilizers in time. Second the government should introduce new and cost effective technology, available at reasonable prices. The results demonstrate that although the coefficient of the Nominal Protection Coefficient (NPC) variable is insignificant, however it does have a positive effect on wheat productivity. Thus, it appears that steps in the direction of educating the local entrepreneurs on the modus operandi of how to participate in a global market might be helpful. This will help economic agents better understand the dynamics of the international market. The government should work with trading partners to insure ease of access for the local farmers to their market. It can help local farms acquire information on the world market and learn how to respond to changes in international scenarios.

REFERENCES


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