EXPORT EARNINGS, ECONOMIC GROWTH AND CROP YIELD:
EMPIRICAL EVIDENCE FROM PAKISTAN

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ABSTRACT

Agriculture sector plays a very important role for the growth of developing countries like Pakistan. In fact it is usually referred as a back bone of these countries because these are the agro-based countries with lower manufacturing base. Agriculture sector contributes to growth through a variety of channels among which self-sufficiency in food, provision of raw materials to industrial sector; earning foreign exchange through cash crops; and providing employment to a large part of population are worth mentioning. In this research paper OLS technique is used to determine the relationship between the aggregate yield of crops and per capita gross domestic product and trade balance of major crops on overall trade balance. Aggregate yield of crops (rice, wheat, cotton and maize) and trade balance have significant impact on the per capita GDP and overall trade balance of Pakistan.

Key Word: Crop yield, economic growth, export earning, ordinary least square

INTRODUCTION

Pakistan has been traditionally an agricultural country. Over the last few years, despite the industrial and services sectors have increased their share in GDP, agriculture still remains a major contributor to the national economy of Pakistan with almost 21% share of GDP. The sector is even more vital from perspective of creating employment opportunities, particularly in the rural communities, where an estimated 62% of the total employed population is attached directly or indirectly to agriculture (GoP, 2010). Overall the economy of Pakistan is mainly based on the following major crops i.e. wheat, rice, cotton, maize and sugarcane. Major crops accounts for 82 % of the value added in overall agriculture. Thus, the four major crops (wheat, rice, cotton and sugarcane), on average, contribute 33.1 % to the value added in overall agriculture and 6.3 % to GDP. The minor crops account for 11.1 %s of the value added in overall agriculture. Cotton, sugarcane rice and wheat accounts for 8.6, 6.4 3.6 and 14.4 % of the value added in agriculture and about 1.8, 0.8 1.4 and 3.1% to GDP, respectively. These crops were sown on the area of 2820, 1029, 2883 and 9045 thousand hectares, respectively (GoP, 2010).

In the world most of the developing couturiers are primarily based on agriculture. Therefore, the incidence of poverty and food security, depend on a high degree of the production. In those developing countries one or a few agricultural commodities are left for export, e.g. major crops, fruits items, sugar, oilseeds. In the world, production equals consumption, for the individual countries. But the growth rates of a country depend upon the movements in their net agricultural trade positions. In general, the growth rates of food production in the developing regions have been below than the demand, and as a result their imports have been growing faster than their agricultural exports. These trends led to a gradual erosion of their traditional surplus in agricultural trade. In fact, the developing countries have turned in recent years from net agricultural exporters to net importers (FAO, 2003).

The question is often raised whether the traditional exporting countries have sufficient production potential to continue generating an ever-growing export surplus. Concern with adverse environmental impacts of intensive agriculture is among the reasons why this question is raised. The overall lesson of the historical experience seems to be that the production system has so far had the capability of responding flexibly to meet increases in demand within reasonable limits. This is probably also valid for the future (FAO, 2003). This research is based to answer the above questioned weather same situation is happening with the case of Pakistan. What is the yield situation of crops in Pakistan? Weather yield has an impact on countries per capita GDP? What is the impact of crops trade balance on the over all trade balance of the country?
This study has examined Pakistan’s growth experience by using two complementary approaches. It
provided an historical account of Pakistan’s growth performance with particular macroeconomic variables that
have shaped the country’s growth profile. Then, crops trade balance has also been analyzed on overall trade
balance. Our hypothesis represent that four crops production and export has positive impact on economic growth
and trade balance. The main objectives of the study are:

i. To empirically analyze the impact of growth of crops on per capita GDP in Pakistan along with other
determinants.

ii. To determine the impact of crops trade balance on overall trade balance along with other determinants of
trade balance.

MATERIALS AND METHODS

Being an agro-based economy role of agriculture sector in the Pakistan’s economy is of immense
significance. In order to assess this role, four crops (rice, wheat, cotton and maize) of Pakistan have been
selected to see their impact on economic growth through OLS model (Carmignani and Chowdhury, 2007). Ordinary Least Square (OLS) introduced by Gauss (1821) has been used to compute the effect of different
independent variables on growth and trade. The technique is very useful for both basic and advanced research.

The data set used in this study relates to Pakistan and consists of annual observations. The annual time
series data of GDP, Total Population, Per Capita Gross Domestic Product (pcgdp), Gross Fixed Capital
Formation (gfcf), Government Final Consumption Expenditure (gfce), GDP Deflater and Trade Openness
(to) are obtained from International Financial Statistics (IFS) 2011 issued by International Monetary Fund.
Data on World GDP (wgdp) is taken from World Development Indicator 2011 issued by World Bank. Data on
term of Term of Trade (tot) and Secondary School Enrolment (sse) are taken from Various Issues of
Economic Survey published by Federal Bureau of Statistics. Yield per hectare four major crops; Wheat, Rice,
Maize and Cotton have been taken of Fifty Years of Pakistan’s Statistics Book (Volume III) issued by Federal
Bureau of Statistics. These variables are used in different forms and the range of the data is from year 1960-
2010. In model the data of Per capita GDP is formulate by dividing GDP with Total Population and Per Capita
GDP are changed in real form after dividing it by GDP Deflator (2001=100). All variables are expressed in
natural logarithms form except tof and to. All variables are transformed into annual series by taking two years
moving average.

The general form of model is given below:

\[ y_\text{it} = \alpha_1 + \alpha_2 x_\text{it} + \mu_\text{it} \quad \text{where } i = 1, 2, 3, \ldots, 9 \]

Here, \( y_\text{it} \) is the dependent variable, \( \alpha_1 \) is the intercept term that shows the average effect of all
variables not included in regression model, \( \alpha_2 \) is the coefficient of independent variable, that is, \( x_\text{it} \), \( t \) is the
time period, \( i \) is the number of variables. \( \mu \) is the error term which contains the effect of all other variables not
included in the model but have an effect on dependent variable.

By incorporating variables used in this research regression the model takes the following form.

\[ \text{pcgdp} = \alpha_1 + \alpha_2 \text{gfcf} + \alpha_3 \text{gfce} + \alpha_4 \text{tot} + \alpha_5 \text{m2} + \alpha_6 \text{tot} + \alpha_7 \text{sse} + \alpha_8 \text{crop} + \mu_\text{it} \quad (1) \]

\[ \text{tb} = \alpha_1 + \alpha_2 \text{gfcf} + \alpha_3 \text{gfce} + \alpha_4 \text{tot} + \alpha_5 \text{m2} + \alpha_6 \text{tot} + \alpha_7 \text{wgdp} + \alpha_8 \text{tcrop} + \mu_\text{it} \quad (2) \]

Where,

\( m2 \) = Money supply

\( to \) = Trade Openness

\( tot \) = Term of Trade

\( wgdp \) = World GDP

\( pcgdp \) = Per capita GDP
RESULTS AND DISCUSSION

In this section equations are estimated through Ordinary Least Square Technique (OLS) and the results are interpreted. As a first step to estimation unit root properties of time series data have been examined. For this purpose Augmented Dickey Fuller (ADF) (1976) test has been employed. All variables are used in accordance with their unit root properties.

The results for first equation are provided in Table I. All the standard errors are adjusted for heteroscedasticity and autocorrelation using Newey-West test. It is the extension form of White’s heteroscedasticity-consistent standard error test. It is used for large sample. The first Variable \( gfcf \) is significant at 1.0 %. It shows the positive impact on \( pcgdp \). Coefficient shows that 1.0 % increase in \( gfcf \) brings 0.2 % increase in \( pcgdp \). Results are in correspondence with theory as large capital formation in itself depicting that economy is growing through investment and increased factor productivity. \( gfce \) shows negative and insignificance relationship with per capita GDP. \( m2 \) is showing the positive and significant relationship with \( pcgdp \). As money supply can be translated into increasing money stock through decreased interest rates would lead to higher gross national product. \( see \) is showing the negative relationship with \( pcgdp \). Coefficient shows that 1.0 % increase in \( see \) brings about 0.1 % decrease in \( pcgdp \). Results are significant at 1.0 % level of significant. Aggregate of yield of four crops are showing positive relationship with \( pcgdp \). 5 % increase in \( crop \) brings 0.1 % increase in \( pcgdp \). Results are significant at 5% level. According to Arifullah (2007) Pakistan crops sector has showed a stable trends over the period from 1980 to 2005. But the researcher couldn’t suggest that stable trend shows the productivity, economic efficiency and optimization.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Variable Description</th>
<th>Coefficient</th>
<th>t-Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td></td>
<td>1.259***</td>
<td>2.952</td>
</tr>
<tr>
<td>( gfcf )</td>
<td>Gross fixed capital formation</td>
<td>0.248***</td>
<td>6.052</td>
</tr>
<tr>
<td>( gfce )</td>
<td>Gross final consumption expenditure</td>
<td>-0.023</td>
<td>-1.069</td>
</tr>
<tr>
<td>( m2 )</td>
<td>Money supply</td>
<td>0.227***</td>
<td>4.593</td>
</tr>
<tr>
<td>( tot )</td>
<td>Term of trade</td>
<td>0.021</td>
<td>0.636</td>
</tr>
<tr>
<td>( sse )</td>
<td>Secondary school enrolment</td>
<td>-0.112***</td>
<td>-2.310</td>
</tr>
<tr>
<td>( to )</td>
<td>Trade openness</td>
<td>-0.291</td>
<td>-1.568</td>
</tr>
<tr>
<td>( crop )</td>
<td>Aggregate yield of four crops</td>
<td>0.117**</td>
<td>1.83**</td>
</tr>
</tbody>
</table>
The first variable of Table II gfcf is showing the insignificant relationship with the trade balance. Money supply m2 show positive and significant relationship with the tb. Money supply can be translated into high inflation means that the purchasing power of the people is lower. People would demand less of both local and imported goods thus having positive impact on trade balance Coefficient of tot shows that 1.0% increase in term of trade brings 9.4% decrease in tb. tot shows negative relationship with the tb. Results are correspondent to the theory. According to the theory relationship between tot and tb is affected through the elasticity’s of the substitution of the domestic and foreign goods. wgdp is showing negative relationship with the tb. The level of coefficient shows that the 1% increases in wgdp brings 1.9% decrease in tb. wgdp can increase and decrease the trade balance. However the negative sign is showing that with the increase in world GDP, contribution of Pakistan’s trade in total trade is decreasing. to shows positive relationship with tb. The scale of to shows that 1% increase in to brings 12.5% increase in tb. tcrop is significant at 10% level. tcrop shows positive impact on tb. The value of coefficient shows that 10% increase in tcrop brings 0.03% increase in tb. Salam (1992) also agreed with the results. The researcher analyzed the term of trade of all agriculture and its sub-sector during the period. Comparative Analysis Technique was used. Analysis showed that the barter term of trade (BTT) was better in the period of early 80’s. The BTT of major crops was improved in the year 1982 further if continuously declined. With the increase in the production of...
crops, income term of trade improved. While in other sector like livestock there was a significant improvement in the parity ratio between the prices received and paid.

CONCLUSION AND RECOMMENDATIONS

Results shows that average trend of the yield per hectare have increased but average growth of yield production showed a lot of variation of the four crops. In the research OLS technique is used to determine the relationship between the aggregate yield of crops on \( \text{pcgdp} \) and trade balance of four crops on over all trade balance. After estimating the model, the aggregate yield of crops shows the 5\% significant effect on the per capita GDP. Aggregate trade balance of the crops also has a positive impact on the over all trade balance with 10\% level of significant. It means that agriculture sector can play a very important role in the economic growth. On the basis of trade estimation, we can recommend that agriculture sector, specially the production of main four crops can play a very important role in the era of food security and also improve the external sector of Pakistan economy through foreign exchange earning. Therefore, Government should propose those best possible options in term of inputs like seed, fertilizers quality and prices, electricity and fuel prices etc which will help to improve the productivity of the crops.

REFERENCES


IFS, Int’l Financial Statistics (various issues), IMF.


