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Impact of Cotton Production on Economic Growth in Pakistan

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ABSTRACT

This research is based on the impact of cotton production on the economic growth of Pakistan. In this context secondary data has been collected from the year 19732017. For this purpose, simple OLS regression method is applied to identify the relationship of cotton production with GDP. Results suggested that the link between area of cotton production, domestic investment and labor force with economic growth is significant and positive whereas the impact of cotton production and yield of cotton has insignificant on GDP in Pakistan.

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1 Introduction

No one exactly knows about the origin of cotton. Firstly, pieces of cotton cloth and bits of cotton bolls found about seven thousand years ago in Mexico. After that in the subcontinent, cotton was found about 3,000 B.C. (GOP-2007) (Cotton Counts www.cottoncounts.net). Furthermore, it was produced throughout the tropical regions in Asia and America. Cotton production and consumption by countrywide during 2017-18 show that India is the largest cotton producer which produces 6.20 million tons followed by China which produces 5.34 million tons. Pakistan is the fourth largest cotton producer which is 1.80 million tons and third largest consumer with consumption of 2.35 million tons ICAC (Cotton this month- April 2018). Agriculture is the most important pillar of Pakistan economy. Cotton is a white gold, cash crop and the second important crop after wheat in Pakistan. It is an important crop of most of the developing countries. Pakistan has five provinces but only two provinces, Punjab and Sindh are included in study, because these two provinces are the major cotton production regions while other three provinces are the minor ones. Cotton has been sown in almost 3-million-hectare area for the last few years and is cultivated by more than 1.6 million farmers. Punjab is the main cotton producing province which presents 80% of total cotton area and 75% total cotton production. But in Sindh, cotton cultivated area is almost 20% and received production is about 26%. Pakistan is the 4th largest cotton producer, 3rd largest consumer and 2nd largest exporter (World Textile Demand 2015).

The use of chemicals has positive impact on the cotton production otherwise it puts serious intimation resulting in low crop yield. Meanwhile, the use of chemicals in the agriculture sector creates serious threats on public as well as water value and atmosphere (Carvalho, 2006, Rehman et al., 2016). On the other hand, *BT* cotton is a new technology which has increased production and ultimately contributed to upgrade agriculture and GDP in Pakistan (Ali & Abdulai 2009). Therefore, the yield of cotton has increased due to the high rate of education, land preparation, purity of seed, better irrigation system and use of fertilizer (Bakhsh, Hassan & Maqbool 2005). Cotton is the major cash crop and contributes a pivotal role in the GDP of any country. Consequently, the cultivation area has significantly increased in the last 30 years; it is up to increase around 7.86 million acres in 2015-16. There is the 10 percent share of cotton and its relevant production in growth of economy and 55 percent to the exchange rate incomes in Pakistan from 2015-16 (Economic Survey of Pakistan). In the perspective of globalization an investigation of safety of cotton production in Pakistan could throw light on possible impact of domestic price, trade and exchange rate policies on effective incentives and efficient resources allocation. There are two main cropping seasons; i.e. kharif (April to September) and Rabi (October to March) in Pakistan. Rice, sugarcane, cotton and maize are kharif crops whereas wheat, gram, tobacco, rapeseed, barley and mustard are Rabi crops. Cotton is a significant non-food kharif crop and an important source of international trade earning (Bakhsh et al., 2005). In addition, surplus lint cotton is exported for raw material to provide textile industry. It is also available as raw material for textile mills, ginning factories, feed, fiber and cooking oil. Therefore, it is an engine of growth about 1200 ginning factories and more than 370 textile mills that solely depends upon this silver fiber in Pakistan (Hina, Huma, Faridi & Hira 2013). This huge expansion of cotton industry provides livelihood to the millions of people including skilled as well as unskilled and contributed significantly in fetching foreign exchange (Ali & Mehboob 2007). The present cotton scenario is exciting and holds even better prospects for future, both in terms of employment and exports. A large number of factors either climatic or inputs affect cotton productivity. Ali (1983) identified biological factors responsible for yield gap at farmer's fields through farm experiments and socio-economic constraints. These factors indicate the yield gap by the low adoption of new technology from the farmers. Khan *et al.* (1986) and Hassan (1991) examined some objects that are responsible for low crop yield such as lack of trained manpower, finance and marketing facilities, and high cost of Agricultural inputs. Furthermore, freshwater bodies are being impure through overflow and leakage of nitrates from agricultural land in Pakistan (Azizullah, Khattak, Richter, & Hader, 2011). Similarly, more use and misuse of pesticides have also harmful impacts both on crops and animals as well (Tariq, Afzal, Hussain & Sultana 2007). On the other hand, there are many factors which are involved for improving the cotton production like use of fertilizers, chemicals for pest control, high drained soil and water (Shafiq & Rehman, 2000). In the mid of 21st century, there are many problems of people for collaborating agriculture requirements (FAO, 2009). But in present the most serious challenges of agriculture are to produce more food from less water in arid and semi-arid areas (Shideed, 2011). Due to less resources of water almost 80 percent of world farming is based on rain-fed land that produces 80 percent food internationally (Falkenmark, Fox, Persson, Rockstorm 2001; & valipour 2013). In Pakistan about 6.35 million hectares of land is irrigated with canal water, 12.53 million hectares is cultivated through tube wells and there is no water for remaining 3.59 million hectares (GOP, 2012). In the same way a large number of developing countries with comparatively rich rural labor, Pakistan is considered as developing structural adjustment country. By the less involvement of government in cotton export subsidies and other trade control policies cotton production is reduced. In the perspectives of globalization; the protection of cotton production in Pakistan is possible with the policies and well-organized resources distribution that impact local prices, trade and exchange

ICAC (2002) In Pakistan, cotton is called a silver fiber that accounts about 60% of export earnings and over 64% of domestic edible oil production. Furthermore, the contribution of cotton production in economic growth depends upon market prices, weather forecasting and attack of diseases. Domestically and internationally gap of agricultural prices indicates farmer's gain or loss. Therefore, to recall the pervious study we suggest effective incentives of cotton seed production in Pakistan.

2 Literature Review

There are various studies which have explored the empirical evidence of the relationship between cotton production and economic growth. The review of few of such studies is presented here. Shafiq and Rehman (1999) explore the study using DEA modeling approach and achieved two types of consequences possibly. One is classifying the adjustments to use inputs on inefficient farms and second, to achieve optimum yield by reducing the cost of production and cutting down excessive use of inputs. Murgai & Byerlee (2001) observed the internationally increased in agricultural production mainly in the province of Punjab in both states, India and Pakistan. This study shows the increase in the sustainability of concentrated water irrigated in Agriculture Reform Systems due to resource degradation. Theory of this study provides the first quantitative facts of the impact of resources degradation for Pakistan. Bakhsh et al. (2005) investigated in their study; there are a large number of factors that affect cotton productivity like education, preparation of land, use of fertilizers, better irrigation system, recommended cotton varieties and rates of cotton seed. Almost all these factors affect positively on the production of cotton yield. Moreover Rehman et al. (2016) examined the positive relationship between fertilizer consumption and output of cotton crop whiles the negative relationship between area under cotton crop and agricultural gross domestic product of Pakistan. In this perspective, the study strongly forced that Government of Pakistan must inaugurate new financial support schemes for the improvement of agriculture sector. Akhtar, Sharif & Shah (2006) examined the main objects of this paper to look at the subsidies granted to the farmers for the protection of cotton production in Pakistan. These studies also intimate that average cotton was neither protected nor dis-protected considerably at current exchange rate which affected exportable situation by the omission of few years. So as a whole cotton producers' security has negative impacts under the exportable and importable scenarios with a shadow of exchange rate. Ali et al. (2009) investigated the significance of cotton production, BT cotton is used as an addition to the new technology that impacts positively on cotton production, income of the household and reduction in the level of rural poverty. Additionally, it also improves the human capital in the sense of education but in the same way the BT cotton has harmful effect on human life due to more use of pesticides. In this study Ali et al. (2013) showed the forecasting for better crop comparatively in the provinces of Punjab and Sindh. After 1980's cotton production has increased as compared to before 1980's due to the use of pesticides, increase in awareness of farmers and government subsidies. In this way cotton production has positive impact on composite growth rate in GDP.

3 Methodology

To explore the relationship between cotton production and GDP growth, the annual time series data from the year 1973 to 2017 has been used. Following econometric model is used to analyze the relationship between dependent and independent variables:

$$GDP = \beta_0 + \beta_1 AREAP + \beta_2 COTP + \beta_3 DI + \beta_4 YIELD + \beta_5 LF + \varepsilon$$

Here,

GDP= Gross Domestic Product

AREAP= Area of Production in 000 Acres

COTP= Cotton Production in 000 tons

DI= Domestic Investment

LF= Labor Force

Yield= Yield Average 40kg Per Acre

4 Result and Discussion

Simple OLS method is applied for the analysis and following correlation matrix is obtained.

Table 1. Correlation of the variables

	AREAP	COTP	YIELD	DI	LF
AREAP	1				
COTP	0.934601	1			
YIELD	0.835012	0.967204	1		
DI	0.820802	0.844577	0.847062	1	
LF	0.716543	0.79036	0.832359	0.933971	1

Table1 shows that correlation results of all variables are below 0.9 and there is no multicollinearity in these results.

Table 2. White Test for Heteroskedasticity

To check the presence of hetroskedasticity, the white test is used.

Heteroskedasticity Test: White	
F-statistic	1.338291
Prob. F(15,17)	0.2681

The criteria to decide the presence of heteroskedasticity is that the value of P is greater than 0.05 (p>0.05) means that null hypothesis will be rejected. Table 2 shows that value of P is 0.2681 that is greater than 0.05 and null hypothesis will be rejected.

Table 3. Breusch-Godfrey Serial Correlation Test

To check the presence of serial correlation, the Breusch-Godfrey LM teat is used.

F-statistic	2.934284
Prob. F(2,39)	0.065

Breusch-Godfrey Serial Correlation LM Test:

Present study uses Breusch-Godfrey LM test which is most appropriate for serial correlation. The LM test has P value less than 0.05 as the null hypothesis for autocorrelation do not be rejected.

Table3 shows that F-statistic 2.934284 and P-value 0.065 the null hypothesis of the Breusch-Godfrey Langrange Multiplier test is that there is no serial correlation in the residuals up to eh specified order.

Table 4. Parameter Estimates of the Model

The parameter estimates of the data are given below.

Variable	**CoefficientStd. Er**	**t-Stats**	**Prob.**

Variable	**Coefficient**	**Standard Error**	**t-Statistic**	**Probability**
AREAP	0.513380	0.107863	4.759554	0.0000
COTP	-0.221020	0.130819	-1.689470	0.0991
YIELD	0.005899	0.004968	1.187481	0.2422
DI	0.516590	0.052005	9.933422	0.0000
LF	0.006541	0.001235	5.296351	0.0000

Variable	Coefficient	Standard Error	t-Statistic	Probability
GDP(-1)	0.254021	0.076607	3.315888	0.0020

In this table GDP is the dependent variable and AREAP (Area of production), COTP (Cotton production), DI (domestic investment), Yield and LF (Labor Force) are independent variables which show the relationship to GDP. the relationship of GDP and AREAP is significance and positive. If AREAP increase per thousand acres GDP will increase 0.51 percent, so the relationship between GDP and AREAP is positive. The relationship of cotton production and GDP is insignificant and negative which shows that cotton production has no impact on GDP. In Pakistan last few years there are savior attack of Pink Boll Worm, White Fly, Virus and others disease on cotton crop. Due to these diseases cotton has low production due which shows the no impact on GDP. DI, Yield and LF show the positive relationship with GDP. If DI increase in one percent GDP will increase 0.51 percent and one percent increase in LF the GDP will increase 0.006 percent. R-Square is 0.99 that shows 99 percent change in GDP due to independent variables and 1% changes due to other variables which are not include in our model.

Table 5. Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
AREAP does not Granger Cause GDP	44	0.22022	0.8033
GDP does not Granger Cause AREAP		1.55662	0.2237
COTP does not Granger Cause GDP	44	0.08226	0.9212
GDP does not Granger Cause COTP		1.07701	0.3505
YIELD does not Granger Cause GDP	44	0.72734	0.4896
GDP does not Granger Cause YIELD		3.01198	0.0608
DI can Granger Cause GDP	44	3.86942	0.0293
GDP can Granger Cause DI		10.3519	0.0002
LF can Granger Cause GDP	44	11.062	0.0002
GDP does not Granger Cause LF		0.17601	0.8393

COTP does not Granger Cause YIELD		1.5154	0.2324
DI does not Granger Cause COTP	44	1.52384	0.2306
COTP does not Granger Cause DI		1.21329	0.3082
LF does not Granger Cause COTP	44	0.84024	0.4393
COTP does not Granger Cause LF		0.93388	0.4016
DI can Granger Cause YIELD	44	2.92959	0.0653
YIELD can Granger Cause DI		2.78211	0.0742
LF does not Granger Cause YIELD	44	2.07078	0.1397
YIELD does not Granger Cause LF		0.7644	0.4725
LF does not Granger Cause DI	44	11.9573	9.0005
DI does not Granger Cause LF		0.17877	0.837
COTP does not Granger Cause AREAP	44	3.14865	0.054
AREAP does not Granger Cause COTP		1.67971	0.1996
YIELD can Granger Cause AREAP	44	4.81399	0.0135
AREAP does not Granger Cause YIELD		2.16755	0.1281
DI does not Granger Cause AREAP	44	0.62697	0.5395
AREAP does not Granger Cause DI		0.23752	0.7897
LF does not Granger Cause AREAP	44	2.02394	0.1458
AREAP does not Granger Cause LF		0.78428	0.4635
YIELD does not Granger Cause COTP	44	1.30721	0.2822

This table shows the parawise ganger causality test. The Ganger causality shows that the lin between DI and GDP is Bi directional. It is also found the labor force Ganger cause on GDP. There is also a significant result yield and area production that shows yield may also increase area production. The Ganger causality shows that the link between DI and Yield is bi directional.

5 Conclusion and Policy Recommendations

In this research, the impact of cotton production on the economic growth of Pakistan is showed. For this Purpose, simple OLS regression method is applied to identify the relationship of cotton production with GDP. Results suggested that AREAP, DI and LF are the significance and positive relationship with the economic growth. The result shows that one 000 Acar increase in area production, GDP will increase 51 percent, similarly one percent increase in DI, GDP will also increase 51 percent and increase in labor force per person, GDP will increase 0.6 percent. R-Square is 0.99 that shows 99 percent change in GDP due to independent variables and one percent changes due to other variables which are not included in our model.

According to this study, some policy recommendations are stated as follows:

- Domestic investment should be properly used in different agricultural techniques to increase the area of production so that it may increase the level of GDP in Pakistan.
- Agricultural loans should be provided to the farmers so that they can easily manage their expenses. iii.

  Skilled labor should provide to the agriculture sector to increase the GDP in Pakistan.
- Government should provide new variety of seeds to the farmers so that they may increase the production of cotton.
- Government should provide the varieties of cotton seed that resistance against the diseases which improve the cotton production.
- Government should provide fertilizer to the farmers on subsidies rate which reduce the expenses and improve the yield.
- Policy makers should provide job opportunities for the agriculture-based people so that the growing population of the country could improve the growth of economy.

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