Impact of Institutional Agricultural Credit on Agriculture Sector Growth and Rural Unemployment in Pakistan

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This research article studies the impact of credit given by different financial institutions to farmers for agricultural development and its impact on rural unemployment rate covering the data sample from 1990 to 2021. Agriculture sector is the main sector of Pakistan’s economy. It provides employment to 43.7 % of total labor force and its contribution in GDP of Pakistan is 22%. This study analyze the impact of institutional agricultural credit provided by ZTBL, COP and CB, Infrastructure, GDP and total cropped area (TCA) on Rural Unemployment rate and agriculture sector and the impact of rural unemployment rate on agriculture sector growth. For this purpose, time series secondary data from 1990 to 2022 is used. ADF test estimate that RU, ZTBL, COP, CB, INFRA, GDP and TCA is stationary at First difference and AG is stationary at level. To estimate the impact of ZTBL, COP, CB, INFRA, GDP and TCA Toda and Yamamoto Technique is used and find out that all the variables individually as well as jointly has impact on RU. RU has unidirectional causality with CB, INFRA and TCA while the causality of RU with ZTBL, COP and GDP is bi-directional.
Introduction

The agricultural industry plays a significant role in Pakistan's economy, contributing 18.9% of the country's GDP and accounting for 42.3% of all employment. The agriculture sector's growth rate for the fiscal year is 2.07%, while the 3.5% growth rate that was intended to be achieved in this sector for the fiscal year 2017–18 was actually attained at a rate of 3.81%. Fruit production contributed 3.33% of the value added to the agriculture sector overall during the fiscal year, or 2.04% of GDP (GDP). The input against this The caring government doctrine, an endowment of skilled seeds, pesticides, and fertiliser accessibility, all of which are concurrent with the endowment of adequate credit/finance facility, are the inputs against this extraordinary growth. Pakistan has experienced the fastest growth in the agriculture industry over the past 13 years thanks to the rise of agricultural credit and finance. According to the 6th Population and Hosing-Census of Pakistan 2017, population growth in Pakistan is 2.4%, and as a result, demand for agricultural products and production is rising steadily. This rising demand can be met by providing farmers with timely and affordable loan facilities (Economic-Survey-of-Pakistan, 2017-18).

The sustainable growth in agriculture sector also cause boasts in other sectors as other sectors depend on agricultural sector for their desired raw material. The Government of Pakistan is trying to transform subsistence farming to modernize forming to boast the overall economy of Pakistan. Agriculture sector of Pakistan contributes in the growth of GDP of Pakistan, welfare and prosperity of People through its latent role to reduce rural poverty and rural unemployment. It provides employment opportunities to almost 43.7 percent out of total employed labor force which not only meet their own food necessities but also provide food to other people of the country. It contributes almost 22 percent in the GDP of Pakistan. About 66 percent of Pakistan's rural residents depend on agriculture either directly or indirectly for their livelihood (Bashir et al., 2007).

Pakistan’s growing population cause increase in the demand of food stuff and this demand is stimulating growth of agriculture sector. That’s why policy makers pay great attention on agriculture sector growth. The transition of farming depends upon modern and latest techniques and improved inputs, use of better seeds fertilizers, Pesticides, mechanization, availability of tractors and better irrigation facilities. This activity reduces the rural unemployment. The reduction is unemployment will be help full for economy to grow. To enhance the production capacity of agricultural sector and increase the productivity and growth of this sector, this sector can be financed through credit. Empirical studies show that agricultural credit is beneficial for enhancing production and growth of rural sector. Agriculture credit is an essential ingredient in the growth strategy of agricultural sector (Khan, et al. 2011).

A crucial component of agricultural growth and development is agricultural financing. This makes it possible for farmers to get the inputs they need to increase agricultural production and output. Therefore, the issue of increasing agricultural output depends on the availability of financing and credit options for farmers in their local regions. (Ahmad, 2007; Rao et al., 2021)
Shah et al., 2019). A greater amount of financial resources are needed to increase the productivity of the agricultural sector, and agricultural credit meets this demand. The easiest approach to increase agricultural production is through the introduction of simple, affordable financing (Abedullah et al., 2009).

Two dominant markets for agricultural credit exist in Pakistan. Informal market provides loan for short period to tide over bad impacts especially for consumption purpose. Such type of loan is mostly provided by moneylenders, traders and commission agents at a higher interest rate than organized institutions and banks. Second type in the form of Institutions which provide loan to farmers consisting of government departments, corporations and co-operatives, Domestic Private Banks, Commercial Banks and specialized financial Banks i.e. Zarai Taraqiye Bank Limited (ZTBL), formally the Agricultural Development Bank of Pakistan (ADBP) and Punjab Provincial Cooperative Bank Limited (PPCBL). Specialized banks i.e. (ZTBL) and (PPCBL) are the main and larger sources of institutional agricultural credit. These specialized banks are involved in the disbursement of medium and long term credit to farmers. Before 1972, Agricultural Development Bank (ADBP) was the most prominent agriculture lending institution in Pakistan (Sial et al., 2011).

Farmers are being aided by the country's 3,950 agriculturally designated branches of 31 commercial, microfinance, and Islamic banks, which also have 31 commercial branches. The 19 commercial banks, 2 specialised banks (ZTBL, PPCBL), 7 microfinance banks, and 3 Islamic banks that make up the agriculture lending banks are involved in lending money to farmers for development loans for agricultural activities like raising crops, livestock, poultry, fisheries, orchards, nurseries, forestry, apiculture, and sericulture. Commercial banks were hesitant to lend to small farmers prior to 1972 due to high administrative costs, high lending risks, and the lack of acceptable securities among farmers. Commercial banks began to participate in agricultural loans following the 1972 Banking Reforms and nationalisation, and their stake has grown over time. Commercial banks play a significant role in the provision of agricultural financing and have developed and implemented a number of programmes for this purpose. Commercial banks have a vast network of branches throughout the country, including rural areas (Bashir et al., 2007). Since 2001 Domestic Private Banks have also started to provide loan to agriculture sector but it provide only 2 percent of total loan in initial. Till 1992 Taccavi had also their share in agriculture credit but after 1992 they had back out from the provision of agricultural credit. Co-operative societies held in all the provinces of Pakistan which are financed by Federal Bank for Co-operatives also have their contribution in the disbursement of agricultural credit.

The SBP granted an upward revision 13.0% higher than 2012-13 in the preliminary agriculture disbursement target of Rs. 360.0 billion to Rs. 380.0 billion of 2013–14 at the Agricultural Credit Advisory Committee (ACAC) meeting held on February 17, 2014. As a result, Rs. 90.4 billion (23.8% of the total allotted loan) and Rs. 188.0 billion (49.5% of the total loan) have been given to fourteen domestic private banks and five big commercial banks, respectively. Commercial
banks disbursed loans totaling Rs. 133.5 billion, or 71.0% of the annual objective and 8.0% more than loans totaling Rs. 123.7 billion disbursed last year and DPB contributed 21.2% of the overall loan disbursement, or Rs. 54.2 billion, or 60.0%. ZTBL is given Rs. 69.5 billion (18.3% of the total loan), while Punjab Provincial Cooperative Bank is given Rs. 10.0 billion (2.6% of the total issued loan) (PPCB). 7 Microfinance Banks as a group disbursed loan of Rs. 16.2 billion, which is 75.0% of Rs. 21.6 billion (5.7% of total target) assigned to Microfinance Banks. ZTBL reached 66.0% of its objective by disbursing Rs. 45.9 billion, while PPCBL accomplished 54.5% of its target by disbursing Rs. 5.4 billion. By disbursing Rs. 503.3 million, the three newly entered Islamic banks reached 94.6% of their goal of Rs. 532.0 million (0.1% of the total planned loan).

By making loans available to farmers, poverty and rural unemployment are decreased as well as the expansion and development of agriculture. And when people will get employed the burden on the economy will reduced of dependents and that people who were burden for economy will play a role for economic growth and their such contribution will be help full the growth of economy. As Unemployment is a burning issue faced by the entire world and this issue has attained worst condition in Pakistan and is increasing day by day. Unemployment rate is 5.9 % at the world level in 2014. Zimbabwe is at the top of the list for unemployment where unemployment rate was 95 % in 2009. In the ranking of unemployment rate Pakistan ranks at 142 with unemployment rate

<table>
<thead>
<tr>
<th>Banks</th>
<th>Target 2013-2014 Flow</th>
<th>2013-14 (July-March) % Age Achieved</th>
<th>Target 2012-2013 Flow</th>
<th>2012-13 (July-March) % Age Achieved</th>
<th>% Share in Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>5Big commercial Banks</td>
<td>188.0</td>
<td>133.5 71.0</td>
<td>208.0</td>
<td>153.5 123.67</td>
<td>52.2 80.6</td>
</tr>
<tr>
<td>ZTBL</td>
<td>69.5</td>
<td>45.9 66.0</td>
<td>72.0</td>
<td>37.95 52.7</td>
<td>17.9 16.4</td>
</tr>
<tr>
<td>PPCBL</td>
<td>10.0</td>
<td>5.4 54.4</td>
<td>9.0</td>
<td>5.43 60.3</td>
<td>2.1 2.4</td>
</tr>
<tr>
<td>14 DPBs</td>
<td>90.4</td>
<td>54.2 59.9</td>
<td>66.7</td>
<td>51.02 76.5</td>
<td>21.2 22.1</td>
</tr>
<tr>
<td>7 MFBs</td>
<td>21.6</td>
<td>16.2 75.1</td>
<td>13.8</td>
<td>12.96 93.9</td>
<td>6.3 5.6</td>
</tr>
<tr>
<td>3 Islamic Banks</td>
<td>0.5</td>
<td>0.5 94.6</td>
<td>-</td>
<td>-</td>
<td>0.2 -</td>
</tr>
<tr>
<td>Total</td>
<td>380.0</td>
<td>255.7 67.3</td>
<td>315.0</td>
<td>231.0 73.3</td>
<td>100.0</td>
</tr>
</tbody>
</table>

6% in 2013. The problem of unemployment is chronically affecting the large labor force in the main i.e. rural sector of Pakistan. Unemployment is emerged due to shortage of financial resources and lack of absorption capacity for labor force. Living standard in the rural sector of Pakistan remained low due to unemployment. Table 1.2 shows the unemployment rate faced by rural sector of Pakistan in last four decades.

**Table No2: Unemployed labor force**

<table>
<thead>
<tr>
<th>Years</th>
<th>Unemployed labor force (%)</th>
<th>in Selected Years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Urban</td>
</tr>
<tr>
<td>1995</td>
<td>5.37</td>
<td>6.90</td>
</tr>
<tr>
<td>2000</td>
<td>7.82</td>
<td>9.92</td>
</tr>
<tr>
<td>2010</td>
<td>7.69</td>
<td>9.70</td>
</tr>
<tr>
<td>2015</td>
<td>5.55</td>
<td>7.21</td>
</tr>
<tr>
<td>2021</td>
<td>6.00</td>
<td>8.01</td>
</tr>
</tbody>
</table>

Sources: Pakistan Economic Survey various issues, Handbook of Statistics of Pakistan & Pakistan labor force survey various issues.

Facts from above table show that unemployment rate is fluctuating. From 1995 to 2005 total unemployment rate increased from 5.37 % to 7.69 % in 2005 it decreased to 5.55% and in 2014 again rise to 6.00% and rural unemployment rate increased from 4.80% to 6.74% in years 1995 to 2005, in 2010 it decrease to 4.80 and after that it start to increase again and it become 5.02 in 2014. This situation is very dangerous in the economy of Pakistan especially in the rural part of economy. Due to unemployment resources of the economy are not used to their full capacity. Unemployed person has to face financial loss in the form of income. Poverty increased in and GDP remained low in the economy as output remains low due to insufficient and underutilization of labor force Unemployment prevails in both rural and urban sector of the economy of Pakistan. Because of this curse production of goods remains low and rural sector unemployment causes shortage of food stuff and Inflation rate increases. Outflow of countries resources start to fill the gap of shortage of production by increases imports. To absorb this unemployed labor force financial resources are required which can be provided by loan advancing institutions.
Agriculture sector is the main sector of Pakistan and its growth is necessary for the growth of Pakistan’s overall economy. But this sector has more severe problem of unemployment as compare to urban sector. According to economic survey of Pakistan (2014-15) in 2014 urban unemployed labor force was 1.52 million whereas 2.10 million of rural labor force is unemployed. And this is one of the reasons of slow growth of agriculture sector. To absorb rural unemployed labor force along with Institutional agricultural credit, GDP growth, Infrastructure and Total Cropped area can also be helpful.

Gross Domestic Product (GDP) is the monetary value of all the products in the economy within its own boundaries. The Growth of GDP can be helpful the reduction of rural unemployment and expansion of agriculture sector growth. Growth in GDP is the result of well fare of the society. When other sectors of the economy will grow their incomes will increase they will increase the demand for food stuff and other agriculture goods. The demand for agriculture raw material will also increase with the growth of GDP as when the GDP will increase that will encourage people to expand their business and for that they will increase demand for raw martial. So to full fill the required demand production of agriculture will increase which will cause agriculture sector growth. GDP growth is also beneficial for unemployment rate. Yela el al, (2015) explored inverse impact of unemployment on Growth in Nigeria in their study. The relationship between GDP growth and Unemployment can be seen.

1. Research Questions
   • Is institutional agricultural credit, GDP, Infrastructure and Total Cropped Area individually affecting rural unemployment rate?
   • Is institutional agricultural credit, GDP, Infrastructure and Total Cropped Area jointly affecting rural unemployment rate?
   • Is institutional agricultural credit, GDP, Infrastructure and Total Cropped Area has any individual impact on agriculture sector growth?
   • Is institutional agricultural credit, GDP, Infrastructure and Total Cropped Area has any accumulation impact on agriculture sector growth?
   • Is there any relationship between rural unemployment rate and agriculture sector growth?

Literature Review

According to Wilkes et al. (2018), the dairy industry in Pakistan's economy is the largest single sub-sector and has historically developed economically from the top down (Livestock Census Punjab, 2018). Using the Stochastic Frontier Analysis technique, Saima Ayaz and Zakir Hussain (2011) examined the effects of institutional credit on the farming sector's production efficiency in Pakistan's district of Faisalabad. In 2009, 150 farmers from each of the two tehsils of District Faisalabad—Tehsil Faisalabad and Tehsil Jaranwala—were chosen at random to make up a sample of 300 farmers. These farmers are split into two groups: those who utilise credit and those who do not, and they are questioned using a well-crafted questionnaire. The findings of their study demonstrated that factors such as farmer education, farming experience, herd size, cultural
practises, and the dummy variable of agricultural finance all have a significant and favourable impact on production efficiency. The effect of agricultural loan on production efficiency is, by comparison, the strongest of all of them. Nawaz Ahmad (2011) made his analysis to find the indirect role of institutional agricultural credit in agricultural production of Pakistan. Time series data is used consisting on the period of 1974 to 2008. He used ARDL and Augmented Dickey-Fuller approach to test the stationary of variables. According to them when credit is used as indirect input to purchase other inputs i.e. seeds, fertilizers, tractors and other modern techniques of production, then credit is helpful to increase production trough these inputs in agricultural sector of Pakistan. Therefore finally they drawn conclusion that credit as an indirect input significantly and positively effect the agricultural production of Pakistan.

Iqbal et al. (2003) taking data from 1971 to 2002 attempted to find the relationship between institutional credit and production of Pakistan. They analysed the role of credit disbursed for the purchase of seeds, fertilizers and tractors and to install tubewells causing cropping intensity increase which increase the Gross Domestic Product per cultivated hectare. Therefore they concluded that institutional agricultural credit has positive and significant impact on production of agriculture sector of Pakistan.

Sidhu et al. (2008) make their analysis on the contribution of institutional credit to agricultural growth and test the gap between demand and supply in different decades under different circumstances in the state of Punjab. Primary and Secondary both the sources are used to collect data for the period 1882 to 2003. They used simultaneous four equation model and arrived at final results that by the provision of credit formers used modern productive inputs and increase the use of machinery which caused increase in agriculture growth but the gap between demand and supply could not remove over the entire period.

By implementing innovative, expensive technology, Muhammad Amjad Saleem and Jan (2016) examined the effect of agricultural credit on Dera Ismail Khan's GDP. The data are from secondary sources and cover the years 1990 through 2008. They employed a Cobb-Douglass type linear regression model and came to the conclusion that increased usage of tractors, pesticides, irrigation, and fertilisers had a positive impact on agricultural production. According to research by Sail et al. (2011), the availability of water, crop intensity, and agricultural labour force per farmed hectare all have a considerable positive indirect impact on agricultural production. They used secondary time series data from 1772 to 2008 to estimate the Cobb-Douglass production function.

Obilor (2013) did his study to find the effect of commercial bank’s agricultural credit for agriculture sector in Nigeria. His study concluded that Commercial bank’s credit and prices of agricultural products effect agricultural productivity negatively whereas the effect of agricultural credit guarantee scheme fund and government fund allocation to agriculture for agricultural productivity is positively significant. He use both sources i.e. primary and secondary to collect
data and Unit Root test Dickey Fuller test and Eviews are used to estimate data in the form of linear regression model.

Mellor (2002) explored the impact of agriculture growth on employment in Egypt. And he concluded that in non-tradable sector agriculture growth increase employment and increased labor input will increase GDP. Increase in labor input or labor productivity has same impact on growth in non-traded and industrial sector; increase growth in both sectors. Technological change in agriculture has inverse impact on laboring class income in non-tradable sector. And capital investment has positive relationship with urban trade able sector growth.

Abedullah et al. (2009) analysed that agricultural credit expanded the growth of live stock sector of Faisalabad which provide employment opportunities to unemployed rural labor force. 10 villages and three tehsils are taken as sample to collect the data and 5 farmers are interviewed from each village. Income of the farmers by a systematic approach is compare before and after credit to check to profit and growth of live stock sector. Bashir et al. (2010) had done their work to analysed the impact of agricultural credit on productivity of wheat crop in District Lahore Punjab Pakistan. They made conclusion that credit has positive effect on the productivity of wheat crop. Akram et al. (2012) identified the reasons of unemployment and its effect on the youth of Pakistan. And they fingd out that unemployment has growing trend.

**Methodology, Data Description, Sources**

**Sources and description of data**

This study used the annual time series data covering the period from 1990 to 2021. Data on all variables is time series and of secondary type. Following sources provided data required data.

1) Federal bureau of statistics (Various Issues)
2) Pakistan labor force survey (Various Issues)
3) Pakistan economic surveys (Various Issues)

**Variables of the study:**

Ag = Agriculture sector growth  
Ru = Rural unemployment rate  
Ztbl = Zarai Taraqiyati Bank Disbursing credit to agriculture sector  
Cop = Cooperatives provided credit to Agriculture sector  
CB = Commercial Banks provided credit to Agriculture sector  
Gdp = Gross domestic Product  
Infra = Infrastructure
Tca = Total cropped area

Description of Variables:

Agriculture Sector Growth (Ag):

Agriculture sector growth shows the advancement in this sector due to increase in production. In our study this variables is used as reggresand to evaluate the impact of rural unemployment rate, institutional credit provided by ZTBL, COP and CB, Infrastructure, GDP and TCA on agriculture sector growth of Pakistan.

Rural Unemployment Rate (Ru)

Unemployment shows that part of labor force which failed to get job. Unemployment can be voluntary or in voluntary. Some persons are in voluntary unemployed because their skills are mismatched to vacancies. Some remain voluntary unemployed for better option. In rural sector of Pakistan there is a large no of disguised unemployed due to over populated rural sector. Underemployment also prevailed in Pakistan. In our study we will use rural unemployment as regressor to investigate the effect Rural unemployment rate on agriculture sector growth and as a reggresand to evaluate the impact of institutional credit provided by ZTBL,COP, CB, Gdp, Infrastructure and total cropped area on rural unemployment rate in Pakistan.

Zarai Taraqiyati Bank (ZTBL) Cooperatives (Cop) Commercial Banks (CB)

These banks provide institutional credit to agriculture sector of Pakistan. In our study these banks are used as regressor to influence rural unemployment rate and agriculture sector growth. We will analyse separately each bank’s effect in our study.

Gross Domestic Products (GDP)

Gross Domestic Products represents the monetary values of all those products services which are produced within a country’s geographical boarder. In this study it shows its impact on rural unemployment rate and agriculture sector growth.

Infrastructure (Infra)

Infrastructure refers to such facilities which are essential for modern life to sustained, and maintains its standard of living. For any economy it plays vital role for its functions and growth. It consists on roads, government buildings, telecommunications, water supply, sewage plants, food supply facilities, school and hospitals, bridges and railways etc. This study took infrastructure as a explanatory variable of rural unemployment rate and agriculture sector growth.

Total cropped area (TCA)

Total cropped area represents that part of area which is used for sowing once or more than once in a particular year. This is counted as many times as it used for sowings. This study included it as a regressor to regress its impact on rural unemployment rate and agriculture sector growth.
Specification of model

Our study required three models, as our main objective is to know the impact of rural unemployment rate on agriculture sector growth this will gives us one model with agriculture sector growth as dependent variable. But before we evaluate the impact of rural unemployment on agriculture sector growth we will discuss the impact on those elements which effect rural unemployment rate. For that purpose we make a separate model in which we take rural unemployment as a dependent variables and institutional credit provided by ZTBL, COP, CB, GDP, infrastructure and total cropped area as independent variables and we will check the impact of these variables on rural unemployment. And in the third model we will explore either the variables; ZTBL, COP, CB, INFRA, GDP and TCA have any impact on agriculture sector growth which effected by their explained variable; rural unemployment rate. We take data on all variables in log form to make it smooth and save it from variations. So our study required following three models.

\[
LRU = f (LZTBL, LCOP, LCB, LGDP, LINFRA, LTCA)
\]

\[
L(\text{ru}) = \alpha_0 - \alpha_1(Lztlb) - \alpha_2(Lcop) - \alpha_3(Lcb) - \alpha_4(Linfra) - \alpha_5(LGDP) - \alpha_6(Ltca) + \mu \\
\text{(I)}
\]

Where
\[
\alpha_0 = \text{is intercept or constant term}
\]
\[
\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5 \text{ and } \alpha_6 \text{ are slope coefficients of LZTBL, LCOP, LCB, LINFRA, LGDP and LTCA respectively.}
\]
\[
\mu = \text{is random error term which is assumed to have zero mean and constant variance.}
\]

\[
LAG = f (LRU)
\]

\[
L(\text{ag}) = \beta_0 - \beta_1(Lru) + \epsilon \\
\text{(II)}
\]

Where
\[
\beta_0 = \text{is intercept or constant term}
\]
\[
\beta_1 = \text{is slope coefficient of LRU}
\]
\[
\epsilon = \text{is random error term which is assumed to have zero mean and constant variance.}
\]

\[
LAG = f (LZTBL, LCOP, LCB, LINTFA, LGDP, LTCA)
\]
\[ L(\text{ag}) = \gamma_0 + \gamma_1 L(ztbl) + \gamma_2 L(cop) + \gamma_3 L(cb) + \gamma_4 L(\text{infra}) + \gamma_5 L(GDP) + \gamma_6 L(tca) + \mu_i \]  
\hspace{1cm} (III)

Where

\( \gamma_0 \) = is intercept or constant term

\( \gamma_1, \gamma_2, \gamma_3, \gamma_4, \gamma_5 \text{ and } \gamma_6 \) are slope coefficients of LZTBL, LCOP, LCB, LINFRA, LGDP and LTCA respectively.

\( \mu_i \) = is random error term which is assumed to have zero mean and constant variance.

The above three models will be used to estimate our require results.

**Empirical Results and Interpretations:**

The Augmented Dickey Fuller test is used to check the unit root of variables and obtained results are expressed in following table:

**Unit root test:**

As the estimated t values of all variables are more than 2 and p values is less than 5% so we reject null hypothesis and concluded that these variables are stationary have no unit root. All variables are stationary at first difference except ag (agriculture sector growth) which is stationary at level.  

<table>
<thead>
<tr>
<th>Variables</th>
<th>At level</th>
<th>T-values</th>
<th>Probabilities</th>
<th>At first difference</th>
<th>Variables</th>
<th>T-values</th>
<th>Probabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lru</td>
<td>-2.1363</td>
<td>0.2325</td>
<td></td>
<td>Lru</td>
<td>-6.0656</td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td>Lztbl</td>
<td>-2.4422</td>
<td>0.1385</td>
<td></td>
<td>Lztbl</td>
<td>-4.7766</td>
<td>0.0005</td>
<td></td>
</tr>
<tr>
<td>Lcop</td>
<td>-1.7165</td>
<td>0.4130</td>
<td></td>
<td>Lcop</td>
<td>-7.9455</td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td>Lcb</td>
<td>-0.0094</td>
<td>0.9506</td>
<td></td>
<td>Lcb</td>
<td>-4.0032</td>
<td>0.0042</td>
<td></td>
</tr>
<tr>
<td>Lag</td>
<td>-5.8694</td>
<td>0.0000</td>
<td></td>
<td>Lag</td>
<td>-10.8282</td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td>Lgdp</td>
<td>-0.4835</td>
<td>0.8822</td>
<td></td>
<td>Lgdp</td>
<td>-5.8213</td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td>Linfra</td>
<td>-2.9054</td>
<td>0.0555</td>
<td></td>
<td>Linfra</td>
<td>-4.1561</td>
<td>0.0028</td>
<td></td>
</tr>
<tr>
<td>Ltica</td>
<td>-2.1002</td>
<td>0.2459</td>
<td></td>
<td>Ltica</td>
<td>-8.1560</td>
<td>0.0000</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author’s calculations.

Now we use a appropriate technique for the estimation of our models, as we have three models. All variables of model (I) are not stationary at 1st difference and to estimate this model we will apply Toda and Yamamoto technique. Model (II) has one variable stationary at level and one variable at 1st difference. So we will use ARDL technique for estimation of model (II). Model (III) has dependent variable stationary at level and all independent variables stationary at first difference and we will apply Toda and Yamamoto approach for model (III).
Toda and Yamamoto Results

The results of Granger based Toda and Yamamoto are given in table below:

Table No 4: Granger Causality Results

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>LZRBL</th>
<th>LCOP</th>
<th>LCB</th>
<th>LINFRA</th>
<th>LGDP</th>
<th>LTCA</th>
<th>ALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probabilities</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Source: Author’s calculations

The results shown in the above table show that all the independent variables; LZTBL, LCOP, LCB, LINFRA, LGDP, LTCA are individually ganger cause dependent variables; LRU. The summation of all variables is also show the granger causality for dependent variable. And the effects of independent variables individually as well as the overall effect are strongly significant.

Table No 5: Granger Causality Results

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>LZRBL</th>
<th>LCOP</th>
<th>LCB</th>
<th>LINFRA</th>
<th>LGDP</th>
<th>LTCA</th>
<th>ALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probabilities</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Source: Author’s calculations

The results shown in the above table show that all the variables; LRU, LCOP, LCB, LINFRA, LGDP, LTCA are individually ganger cause LZTBL. The summation of all variables is also show the granger causality for LZTBL. And the effects of independent variables individually as well as the overall effect are strongly significant.

Table No 6: Granger Causality Results

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>LZRBL</th>
<th>LCOP</th>
<th>LCB</th>
<th>LINFRA</th>
<th>LGDP</th>
<th>LTCA</th>
<th>ALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probabilities</td>
<td>0.0183</td>
<td>0.4871</td>
<td>0.4434</td>
<td>0.0388</td>
<td>0.0001</td>
<td>0.0057</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Source: Author’s calculations

The results shown in the above table show that LRU, LINFRA, LGDP, LTCA are individually ganger cause LCOP. The effect of LGDP is strongly significant. But LZTBL and LCB does not granger cause LCOP. The summation of all variables is also show the granger causality for LCOP. And the joint effect on LCOP is strongly significant.

Table No 7: Granger Causality Results

Dependent Variable: LCB
The results shown in the above table show that only LTCA has impact on LCB. None of the LZTBL, LCOP, LINFRA, LGDP and LTCA has ganger cause LCB. The summation of all variables is also shows no granger causality for LCB.

### Table No 8: Granger Causality Results

<table>
<thead>
<tr>
<th>Dependent Variable: LINFRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent Variables</td>
</tr>
<tr>
<td>LRU</td>
</tr>
<tr>
<td>Probabilities</td>
</tr>
<tr>
<td>0.9629</td>
</tr>
</tbody>
</table>

Source: Author’s calculations.

The above show that no variable individually as well as jointly has variation impact for LINFRA.

### Table No 9: Granger Causality Results

<table>
<thead>
<tr>
<th>Dependent Variable: LGDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent Variables</td>
</tr>
<tr>
<td>LRU</td>
</tr>
<tr>
<td>Probabilities</td>
</tr>
<tr>
<td>0.0000</td>
</tr>
</tbody>
</table>

Source: Author’s calculations

The results shown in the above table show that LRU, LZTBL, LCOP, LCB, LINFRA and LTCA are individually ganger cause LGDP. The summation of all variables is also show the granger causality for LGDP. And the effects of independent variables individually as well as the overall effect are strongly significant.

### Table No 10: Granger Causality Results

<table>
<thead>
<tr>
<th>Dependent Variable: LTCA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent Variables</td>
</tr>
<tr>
<td>LRU</td>
</tr>
<tr>
<td>Probabilities</td>
</tr>
<tr>
<td>0.6984</td>
</tr>
</tbody>
</table>

Source: Author’s calculations.

The results shown in the above table show that all LRU, LZTBL, LCOP, LCB, LINFRA and LGDP individually ganger cause LTCA. The summation of all variables is also show the granger causality for LTCA. And the effects of independent variables individually as well as the overall effect are strongly significant.
ARDL Results

To estimate model (II) ARDL with co-integrating Bounds techniques is applied and estimated results of bounds test are mentioned in table below:

Table No 11: ARDL Bounds Test

<table>
<thead>
<tr>
<th>F-statistics</th>
<th>Critical value bounds</th>
<th>17.2715</th>
</tr>
</thead>
<tbody>
<tr>
<td>Significance</td>
<td>Io Bounds (Lower bounds)</td>
<td>II Bounds (Upper bounds)</td>
</tr>
<tr>
<td>10%</td>
<td>4.04</td>
<td>4.78</td>
</tr>
<tr>
<td>5%</td>
<td>4.94</td>
<td>5.73</td>
</tr>
<tr>
<td>2.5%</td>
<td>5.77</td>
<td>6.68</td>
</tr>
<tr>
<td>1%</td>
<td>6.84</td>
<td>7.84</td>
</tr>
</tbody>
</table>

Source: Author’s calculation.

As F=17.2715 > 5.73 (upper bounds value) at all levels of significance; 10%, 5%, 2.5% and 1%. so we reject null hypothesis and accept Alternative hypothesis and concluded that there is co-integration among variables; variables has long run association. Both variables will move together towards equilibrium in the long run. Following tables explain either relationship among dependent variable; LAG and independent variable; LRU is significant or not.

Dependent Variable: LAG

Table No 12(a): co-integrated form

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>CointEq(-1)</td>
<td>-1.0825</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Source: Author’s calculations.

Table No 12 (b): long run relationship among variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficient</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRU</td>
<td>-0.4366</td>
<td>0.3665</td>
</tr>
</tbody>
</table>

Source: Author’s calculation.

Table 12 (a) shows co-integrated equation with negative coefficient showing that the model will converge towards equilibrium in the long run and this equation is strongly significant. And table 12 (b) shows that LRU has value -1.0825 which indicate that 1% decrease in LRU will boost agriculture sector growth by 1.08 % in a year. But the impact of LRU on LAG is insignificant. The reasons are disguised unemployment in rural sector and rural urban migration. These are notable obstacles in the growth of agriculture sector.

Conclusion and Policy Recommendations

This study examine the effect of Institutional agricultural credit by ZTBL, COP and CB, GDP, Infrastructure and total cropped area (TCA) on rural unemployment rate and agriculture
sector growth and the impact of rural unemployment rate on agriculture sector growth. To estimate this impact 3 model are build and time series data from 1981 to 2014 is used. Before estimating the model unit root of the variables is tested. And to check unit root Augmented Dickey Fuller test (ADF) is applied and obtained results explore that ZTBL, COP, CB, RU (rural unemployment rate), GDP, Infrastructure and TCA (Total Cropped Area) are stationary at first Difference and Agriculture sector Growth is stationary at level.

To analyzing the impact of ZTBL, COP, CB, GDP, Infrastructure and TCA On rural unemployment rate we use Toda and Yamamoto approach and come to the conclusion that all these variables individually has long run association with RU. When test these variable’s joint effect we find their impact on RU and the impact is strongly significant individually as well as jointly. After that we check either this long run association is only from independent variables to dependent variables cause or all the variables have granger causality among them. We got that ZTBL Granger caused RU and RU effect ZTBL so RU and ZTBL has bidirectional causality. The granger causality between RU and COP is also bidirectional i.e. RU effect COP and COP has impact on RU.CB, INFRA and TCA has unidirectional causality for RU; only CB, INFRA and TCA granger cause RU but RU has no impact on them. The Causality between GDP and RU is bidirectional i.e. both grangers cause each others. When we estimate the granger causality among independent variables we conclude that ZTBL has bidirectional causality for GDP only. COP, CB, INFRA and TCA grangers cause ZTBL but ZTBL has no impact on them. COP and CB have no effect for each other. COP has bidirectional granger causality for GDP. INFRA and TCA has impact on COP but COP did not affect them. CB has bidirectional Causality with TCA no causality with INFRA and has unidirectional causality for GDP; CB has impact on GDP but GDP did not affect CB. INFRA and TCA granger cause GDP but GDP did not affect them. Infrastructure has impact on TCA but TCA did not have any impact for Infrastructure.

To estimate the impact of rural unemployment on agriculture sector growth we apply ARDL approach and find out that both variables has long run association they will move together in the long run. The co-integrated equation is negative and strongly significant which shows that model will converge towards equilibrium in the long run. The long run impact of rural unemployment rate on agriculture sector growth is negative with the coefficient value of RU, - 0.4367. This indicates that 1% decrease in RU will increase agriculture sector growth 0.43% or vice versa. The impact of rural unemployment rate on agriculture sector growth is insignificant. The reasons of insignificant impact are disguised unemployment and rural urban migrations. There is a notable amount of disguised unemployed person in the rural sector of Pakistan such people luck busy in agriculture activities but has no contribution in production if such peoples will send away from agricultural activities then there will be no effect on production in agriculture sector but there is not an easy task to find out the exact amount of these unemployed. The second reason of insignificant impact is that mostly people move to city to get employed as big cities has handsome salary packages while in agriculture sector earnings are not satisfactory. So after their movement
towards cities for jobs can reduced the unemployment rate but even after getting they employed their role is nothing for agriculture sector growth.

To the assumptions of ARDL we check either data is normally distributed or not and is data free form hetroskadasticity and autocorrelation problems or not. To test serial correlation, we apply Breusch-Godfrey serial correlation LM test and find out no serial correlation between variables. For testing hetroskadasticity problem Breusch-Pagan-Godfrey test and got result that data is free from hetroskadasticity problem. By making Histogram we explore that data is normally distributed.

In the last step we explored either the variables which affect rural unemployment may directly affect that variable which is affected by rural unemployment rate; agriculture sector growth or not. We regress the impact of ZTBL, COP, CB, Infrastructure, GDP and TCA on agriculture sector growth. Our findings showed that ZTBL, COP, CB, INFRA GDP and TCA individually as well as jointly granger cause Agriculture sector growth (AG) i.e. the variables which affect rural unemployment also affect agriculture sector growth which is affected by their affect variable; rural unemployment rate. When we find that either this causality is unidirectional or bidirectional we find out that Ag has bidirectional granger causality with ZTBL, CB and GDP i.e. these variable caused change in AG be their change and AG also affect all of the three. The granger causality of AG with COP, INFRA, and TCA is unidirectional i.e. COP, INFRA and TCA have granger causality for AG but AG did not granger cause any one of them. By testing the relationships of independent variables with each other we find out that COP, CB, INFRA, and GDP granger caused ZTBL but ZTBL did not cause variation in any one of them; unidirectional causality. The causality between ZTBL and TCA is bidirectional i.e. both can cause variation in each other’s. COP, CB, INFRA and GDP has no causality for each other’s. COP has unidirectional causality with TCA; COP cause change in TCA but TCA has no impact COP. CB, INFRA and GDP has unidirectional causality for TCA i.e. CB, GDP and INFRA all granger cause TCA but TCA has no causality impact for any of three.

At last we arrive at final conclusion that institutional Agricultural Credit provided by ZTBL, COP and CB, GDP, Infrastructure and TCA has granger causality impact on rural unemployment rate. Rural unemployment has negative and insignificant relationship with agriculture sector growth. And agriculture sector growth is also directly affected by those variables; ZTBL, COP, CB, INFRA, GDP and TCA, which affect Rural unemployment rate.

References


