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DETERMINING THE ROLE OF AGRICULTURE TOWARDS URBANIZATION

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ABSTRACT

The current study has examined the role of agriculture towards urbanization. The study used time series data from 1983-2017. The order of integration of data suggested the estimation of auto regressive distributed lag model for analysis. The study also used (Bayer and Hanck, 2012) combine cointegration to check the consistency of the cointegration relationship among agriculture growth and urbanization in the presence of other regressors. The empirical results showed that growth in the agriculture sector decreased urbanization. Whereas, problematic urbanization can be controlled through the development of the agriculture sector of the economy. The government can improve the agriculture sector by providing incentives to the farming community in the selected potential areas of agriculture, Like value addition and livestock. Improvement of the agricultural financial system of Pakistan can play a significant role.

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INTRODUCTION

Urbanization corresponds to the proportion of total population living in urban areas. According to the United Nation's projection on urbanization, it will increase more than 65 million people in a year in developing countries from 2000 to 2030. Urbanization will increase in future years and people will migrate to urban areas for modern facilities. Urbanization and growth move together. Any country could not reach at middle income level without rural urban migration. Urbanization is an important factor for the growth of developing countries. Controlling and managing the urbanization is a necessary factor for eliminating the rural poverty and agriculture growth. Urbanization is also a reason of many problems such as, traffic jam in rush hours, sanitation problem, overcrowding in major cities of a country, less housing facilities, beggar's problem, fear of crimes and unemployment due to large population (United Nations, 2019). Urbanization put pressure on food demand, demand for biofuels, the increasing competition for water resources (Khan *et al.*, 2009), soil pollution, and flooding risks (Chen, 2007).

There is a negative role of urbanization on agriculture. High urbanization rate increases the farmland use efficiency which improve the agriculture productivity (Deng *et al.*, 2020). The argument is that the increased agricultural productivity provides food and other agricultural products with less manpower and allows for a shift of excess labor from agriculture to industry. The low level of urbanization in old times was largely attributed to the low agricultural productivity (Deng *et al.*, 2020). According to this point of view, agricultural improvements are a precondition for urbanization to grow. As a whole, improvement in agricultural productivity is necessary to push the surplus labor in urban areas. On the other hand, increase in agriculture output will affect to increase in urbanization because when agriculture output will increase, farmers' income

will also increase. It could be easy for them to migrate from rural to urban areas due to high income level. As a result, they will prefer to live in urban areas to get the modern facilities and better opportunities of urban areas (Jiang *et al.*, 2013). Many studies (Johnston and Mellor, 1961; Vogel, 1994; Gollin *et al.*, 2002; Cheremukhin *et al.*, 2016) have focused on the role of agriculture in economic development and industrialization but there are few studies highlighted the relationship between agricultural productivity and urbanization. Industrialization and urbanization are typically considered as synonymous and being associated with economic development (Todaro and Smith, 2006).

In Pakistan, majority of population lives in rural areas, almost 38.6% of total population lives in urban areas but trend is changing rapidly (GOP, 2020). According to the United Nation's Population Division, in 2025 half of the total population in Pakistan will live in urban areas. Major reason of urbanization is natural population growth. The Pakistan population is ranked at number 6 in world population. The sole objective of the study is to determine the role agriculture towards urbanization. Urbanization is modelled on the base of push and pull theory. According to this theory, people may migrate to urban areas because poverty, unequal land distribution, floods, storms and lack of modern facilities in rural areas push them. People may migrate to urban areas because they are pulled by urban attraction, employment opportunities, high wage rates and higher education facilities in urban areas. Living in rural areas is very difficult and with low income, survival is tough. Therefore, people migrate from rural to urban areas. A person with more holding lands to cultivate will not be migrating to urban areas (Urooj *et al.*, 2020), indicating a negative relationship between agriculture and urbanization.

LITERATURE REVIEW

Hofmann and Wan (2013) used panel data of 229 countries to determine the relationship between growth and urbanization. By targeting Asian and African countries in the study, they found that there exists long run relationship between gross domestic product and urbanization of the selected countries. Brückner (2012) found positive impact of value-added share of agriculture and per capita growth of gross domestic product on urbanization. Malik and Ali (2015) examined the social economic factors that cause the land loss. They explored the impact of agriculture value added and gross domestic product on urbanization. In their study, a sample data of the years 2000 to 2003 was used and targeted area was Khyber Pakhtunkhwa. Researchers used Ordinary Least Square (OLS) econometrical technique for empirical results. Empirical results showed that agriculture value added and gross domestic product have negative relationship with urbanization. As agriculture value added decreased agriculture land converted in urbanization and when agriculture land converted in urbanization. Tripathi and Rani (2017) studies the impact of agricultural activities on urbanization for India. The study used data for 15 agricultural states of India from the period of 1981 to 2015. The empirical results show that higher share of agriculture in GDP, amount of cultivated land area and rural male employment in agriculture have had a negative effect on urbanization in India.

There are very few studies on the role of agriculture towards urbanization. The results of the available studies show that agriculture development contributes negatively in rapid urbanization which shows that rapid migration from rural to urban areas can be controlled through the development of agriculture and problem of high urbanization and its after effects can be controlled.

METHODOLOGY

To analyze the relationship between agriculture growth and urbanization, this study has utilized time series data from the period of 1983 to 2017 for Pakistan. The study has estimated the model taking urbanization as dependent variable and agriculture value added growth as independent variable. The variables i.e., GDP per capita, literacy rate and population growth have been included in the model as control variables. The data has been obtained from World Development Indicators (WDI) and Economic Survey of Pakistan. The following model has been estimated for the relationship between urbanization and agricultural growth.

$$Urb = f(GDPPC, AgriG, Litr, PopG) \dots\dots\dots\dots (1)$$

$$Urb_t = \beta_0 + \beta_1 GDPPC_t + \beta_2 AgriG_t + \beta_3 Litr_t + \beta_4 PopG_t + \mu_t \dots\dots\dots\dots (2)$$

ARDL Bound Test for Cointegration

In time series case, standard cointegration approaches required the order of integration of the series. For this purpose, unit root tests i.e. Augmented Dickey-Fuller and Phillip Perron are applied to check of order of

integration of the series. Literature suggests different cointegration techniques to apply based on the order of integration of the series. Engle and Granger (1987) cointegration, (Johansen, 1991) cointegration, (Phillips and Ouliaris, 1990) cointegration, (Boswijk, 1994) F-test, and (Banerjee *et al.*, 1998) t-test are suitable when all the series are integrated of order one *I(1).* When series have mixed order of integration, i.e. some are integrated of order zero and some are integrated of order one, the ARDL bound test approach by (Pesaran and Shin, 1999) and (Pesaran *et al.*, 2001) is most suitable one. It is also appropriate to handle the small sample. The study has used ARDL bound test approach to test for cointegration and to estimate the long-run and short-run coefficients. The ARDL specification of the model is as under:

$$(3)\quad \Delta Urb_t = \alpha_{10} + \sum_{i=1}^{p_{11}} \delta_{11i}\Delta Urb_{t-i} + \sum_{i=1}^{p_{12}} \delta_{12i}\Delta GDPPC_{t-i} + \sum_{i=1}^{p_{13}} \delta_{13i}\Delta AgriG_{t-i} + \sum_{i=1}^{p_{14}} \delta_{14i}\Delta Litr_{t-i} + \sum_{i=1}^{p_{15}} \delta_{15i}\Delta PopG_{t-i} + \partial_{11}Urb_{t-1} + \partial_{12}GDPPC_{t-1} + \partial_{13}AgriG_{t-1} + \partial_{14}Litr_{t-1} + \partial_{15}PopG_{t-1} + \varepsilon_{1t}$$

$$(4)\quad \Delta GDPPC_t = \alpha_{20} + \sum_{i=1}^{p_{21}} \delta_{21i}\Delta GDPPC_{t-i} + \sum_{i=1}^{p_{22}} \delta_{22i}\Delta Urb_{t-i} + \sum_{i=1}^{p_{23}} \delta_{23i}\Delta AgriG_{t-i} + \sum_{i=1}^{p_{24}} \delta_{24i}\Delta Litr_{t-i} + \sum_{i=1}^{p_{25}} \delta_{25i}\Delta PopG_{t-i} + \partial_{21}GDPPC_{t-1} + \partial_{22}Urb_{t-1} + \partial_{23}AgriG_{t-1} + \partial_{24}Litr_{t-1} + \partial_{25}PopG_{t-1} + \varepsilon_{2t}$$

$$(5)\quad \Delta AgriG_t = \alpha_{30} + \sum_{i=1}^{p_{31}} \delta_{31i}\Delta AgriG_{t-i} + \sum_{i=1}^{p_{32}} \delta_{32i}\Delta GDPPC_{t-i} + \sum_{i=1}^{p_{33}} \delta_{33i}\Delta Urb_{t-i} + \sum_{i=1}^{p_{34}} \delta_{34i}\Delta Litr_{t-i} + \sum_{i=1}^{p_{35}} \delta_{35i}\Delta PopG_{t-i} + \partial_{31}AgriG_{t-1} + \partial_{32}GDPPC_{t-1} + \partial_{33}Urb_{t-1} + \partial_{34}Litr_{t-1} + \partial_{35}PopG_{t-1} + \varepsilon_{3t}$$

$$(6)\quad \Delta Litr_t = \alpha_{40} + \sum_{i=1}^{p_{41}} \delta_{41i}\Delta Litr_{t-i} + \sum_{i=1}^{p_{42}} \delta_{42i}\Delta GDPPC_{t-i} + \sum_{i=1}^{p_{43}} \delta_{43i}\Delta AgriG_{t-i} + \sum_{i=1}^{p_{44}} \delta_{44i}\Delta Urb_{t-i} + \sum_{i=1}^{p_{45}} \delta_{45i}\Delta PopG_{t-i} + \partial_{41}Litr_{t-1} + \partial_{42}GDPPC_{t-1} + \partial_{43}AgriG_{t-1} + \partial_{44}Urb_{t-1} + \partial_{45}PopG_{t-1} + \varepsilon_{4t}$$

$$(7)\quad \Delta PopG_t = \alpha_{50} + \sum_{i=1}^{p_{51}} \delta_{51i}\Delta PopG_{t-i} + \sum_{i=1}^{p_{52}} \delta_{52i}\Delta GDPPC_{t-i} + \sum_{i=1}^{p_{53}} \delta_{53i}\Delta AgriG_{t-i} + \sum_{i=1}^{p_{54}} \delta_{54i}\Delta Litr_{t-i} + \sum_{i=1}^{p_{55}} \delta_{55i}\Delta Urb_{t-i} + \partial_{51}PopG_{t-1} + \partial_{52}GDPPC_{t-1} + \partial_{53}AgriG_{t-1} + \partial_{54}Litr_{t-1} + \partial_{55}Urb_{t-1} + \varepsilon_{5t}$$

Where;

Δ represents the difference, α'_s represents the constant term, δ'_s represent the short coefficients, ∂'_s represent longrun coefficients, p'_s represent the optimal lag length and ε'_s are the error terms.

Bayer and Hanck Combined Cointegration

Many studies have found contradictory results by applying different cointegration tests (Engle and Granger, 1987), (Johansen, 1991), (Phillips and Ouliaris, 1990), (Boswijk, 1994) and (Banerjee *et al.*, 1998). Recently (Bayer and Hanck, 2012) proposed a new approach to cointegration combining all cointegration tests for the null of no-cointegration. The robustness of ARDL approach to cointegration has been checked with Bayer-Hanck test of cointegration. The Fisher-type Bayer-Hanck cointegration follows the following for computation of values.

$$(8)\quad EG - JOH = -2\left[ln(P_{EG}) + (P_{JOH})\right]$$

$$(9)\quad EG - JOH - BO - BDM = -2\left[ln(P_{EG}) + (P_{JOH}) + (P_{BO}) + (P_{BDM})\right]$$

Where P_{EG}, P_{JOH}, P_{BO}, P_{BDM} are the P-value of the individual cointegration tests. The null hypothesis of no-cointegration can be rejected if the calculated value is greater than the critical value provided by (Bayer and Hanck, 2012).

RESULTS AND DISCUSSION

The descriptive statistics are shown in Table 1. The literacy rate has the highest value of standard deviation which shows the highest volatility in the literacy rate. Similarly, urbanization and population growth rate are less volatile as compare to other variables.

The results of unit root tests are shown in table 2. The results of Augmented Dickey-Fuller and Phillip-Perron show that agricultural growth and GDP per capita are stationary at level while the literacy rate, urbanization and population growth rate are stationary at first difference.

Table 1. Descriptive Statistics.

Variables	Urb	GDPPC	AgriG	Litr	PopG
Mean	3.35	2.11	3.42	45.57	2.37
Median	3.27	2.17	3.25	47.10	2.29
Min	2.53	-1.45	-5.29	27.10	1.65
Max	4.18	5.50	11.72	60.00	3.42
Std. Dev.	0.42	1.73	3.65	11.16	0.61
Skewness	0.53	-0.03	-0.10	-0.23	0.43
Kurtosis	2.74	2.43	3.68	1.56	1.76

Table 2. Unit Root Analysis.

PP Unit Root Test (Intercept & Trend)			ADF Unit Root Test (Intercept & Trent)		
Variables	At Level	At 1st Difference	At Level	At 1st Difference	Decision
GDPPC	-3.58**	-12.72**	-3.57**	-7.37**	I(0)
AgriG	-13.23**	-34.08**	-7.36**	-6.84**	I(0)
Litr	1.97	-7.28**	2.69	-1.30	I(1)
Urb	-1.76	-5.08**	-3.04	0.17	I(1)
PopG	-0.58	-3.55**	5.84**	-1.30	I(1)

Source: Authors' Estimation

Notes: Significance at 1% is Shown by * and 5% is shown by **

Table 3. ARDL Bound Test.

Test Statistic	Value	k
F-statistic	35.74	4
Critical Value Bounds		
Significance	I(0) Bound	I(1) Bound
10%	3.03	4.06
5%	3.47	4.57
2.5%	3.89	5.07
1%	4.4	5.72

Source: Authors' Estimation

As both unit roots tests confirm the mixed order of integration of the variables and this order of integration suggests us to apply ARDL bound testing approach to cointegration. The result of ARDL bound test are reported in Table 3. The value of F-statistics is greater than the critical value of the upper and we can reject the null hypothesis of no cointegration. It can be concluded that there exists long-run relationship between urbanization and explanatory variables. The consistency of ARDL Bound test is checked with the newly developed test of combine cointegration by (Bayer and Hanck, 2012). The results in table 4 show that F-statistics values for EG-JOH and EG-JOH-BO-BDM are greater than the 5% critical value. Therefore, we can reject the null hypothesis of no cointegration and concluded that there exists long-run relationship between urbanization and explanatory variables. Table 5 presents the long-run results showed that growth in per capital gross domestic product and growth in population have positive impact on urbanization. Growth in agriculture value added has negatively and significantly affected the urbanization. Literacy rate has negative but insignificant impact.

Table 4. Bayer and Hanck Combined Cointegration Test.

Test Type	Test Statistics	Significance Level	Lags	Critical Values	Cointegration
EG-JOH	56.34	5 %	2	10.58	Yes
EG-JOH-BO-BDM	111.60	5 %	2	20.14	Yes

Table 5. Long Run Analysis.

Dependent Variable: Urb			
Variable	Coefficient	Std. Error	t-Statistic
PopG	2.450	0.264	9.27
Litr	-0.006	0.019	-0.28
GDPPC	0.098	0.020	4.83
AgriG	-0.030	0.014	-2.13
Constant	-4.595	1.265	-3.63
Time Trend	0.117	0.020	5.81
R-squared	0.99		
F-statistic	276.97		
Prob F-stat	0.000		

Source: Authors' Estimation

Table 6. Short Run Analysis.

Dependent Variable: Urb			
Variable	Coefficient	Std. Error	t-Statistic
D(PopG)	-1.625	0.144	-11.30
D(PopG(-1))	2.003	0.158	12.70
D(Litr)	0.002	0.007	0.28
D(GDPPC)	-0.010	0.007	-1.49
D(GDPPC (-1))	0.018	0.007	2.58
D(AgriG)	0.003	0.003	1.32
D(AgriG(-1))	-0.005	0.003	-1.58
D (Time Trend)	-0.043	0.005	-8.22
ECM	-0.370	0.048	-7.69

Source: Authors' Estimation

Table 6 presents the results of error correction model which shows the speed of adjustment towards equilibrium. It implies a specified adjustment from disequilibrium towards equilibrium after a short run shock. The error correction value is -0.37 which shows that in each period 37 percent disequilibrium is adjusted in each time period. The results of the study show a negative and significant impact of agricultural value addition on urbanization. The study shows the negative relation between agriculture with urbanization. An individual living in a rural area having landholding has a negative impact on intentions to urban migration (Urooj *et al.*, 2020), which shows that involvement in agriculture could stop the individual from migrating to a metropolitan area.

CONCLUSION AND RECOMMENDATIONS

The study concluded that agricultural growth has negative effect on urbanization. The rapidly increasing urbanization can be controlled through the growth of agricultural sector of the economy. On the other side, gross domestic product per capita and population growth have positive and significant impacts on urbanization. Literacy has no role in determining the level of urbanization. Pakistan is facing the problem of increasing population burdens in urban areas which lead

to increase in city housing scheme and industries for the fulfillment of increasing urban population. The study also concluded that less growth in agriculture is the main reason of increasing urbanization. By adopting modern agriculture techniques, the productivity and growth of agriculture can be increased which, both, can contribute in overall economic growth and will cause to decrease the population burden from major cities. Rural-urban migration problem can be resolved by providing support to agriculture sector. The policies for industrial development in urban areas must be accompanied by the agriculture development policies in rural areas so that burden from urban areas can be reduced due to rural-urban migration.

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