

Agglomerations, Urbanization and Economic Prosperity in Pakistan: A Demographic Analysis Using Ardl Approach for Time Series Data

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Abstract

The current study aims to explore the relationship between agglomerations, urbanization and economic prosperity in Pakistan. The empirical analysis is based on secondary dataset i.e. World Development Indicators and Autoregressive Distribute Lag Model (ARDL) has been applied for the time period 1960-2016. The findings depicts that in the long run agglomeration economies are contributing positively more to economic prosperity compared to the share of overall urban population. However in the short run the effect of the latter variable is found negative. All these results suggest that the governments should focus on policies specifically related to the infrastructure building and the provision of basic services in the cities to improve the process of urbanization. This is the only way to increase the agglomerations in the economy and its outcome in the form of generating more economies of scale.

Keywords: Urban population, Agglomeration Economies, Economic Growth.

JEL Classification: C32, J11, O43, Q56, R20, P25, E01.

Introduction

Urbanization has been proven to be a key economic factor driving the economies towards growth and development not only in Pakistan but in each and every nation which has made an attempt to gain economies of scale and achieve efficient utilization and distribution of resources. Urban sectors not only play an important role in the growth of the economies but it has an influential impact towards development in each and every sector of the economy including the market structures, social reforms and welfare, manufacturing and services sectors etc. Urbanization and agglomeration economies have a direct and significant relationship with the economic growth and development factors usually in the long-run leading to the prosperity of economies (Ali & Zulfiqar, 2018; Henderson, 2010; Kasarda & Crenshaw, 1991; Moomaw & Shatter, 1993; Tripathi, 2015). It is necessary to make such long-run measures through good governance structures in the urban centers in order to sustain urbanization which may further provide much more stable economic growth and development in the long-run. Agglomeration economies not only provide economies of scale but they are considered to be the fundamental socio-economic factor which sustains Urbanization if entertained with good long-run policies formulated by the administrative bodies. On the other hand, institutional structures of the economy significantly influence the capability, productivity, efficacy and threshold of the urbanization towards stimulating the economic growth and development of the economy in the long-run, which has been critically explained in (Turok & McGranahan, 2013).

Urban cities have always been the nerve centers of the communities which were predisposed by certain historical activities that enabled the growth of the economic network amongst all the sectors of the economy (Abu-Lughod, 1991; Braudel, 1984). It is important to understand the various dynamic functions of urbanization patterns integrated with the structural changes over time in the respective regions. Since industrial revolution, urbanization have directed the accelerated economic growth which had been influenced primarily by the functional outputs from the industrial revolution as explained by the forms institutional structures working indifferently aspired by the mechanisms of imperialism and colonialism (Acemoglu, 2010) Thus, economists have declared the '*big cities*' to be heterogenous which further fosters the economies of scale (Randinelli, 1983). With the diffusion of knowledge and education and stimulating the technological aspects by research & development, division of labor and specializations; agglomeration economies have been proven to be the key driving force behind sustainable

urbanization which favors stable economic growth and development (Turok & McGranahan, 2013). Agglomeration economies or densely populated urban environment also provides the suitable conditions and capabilities to the firms and the workers in economy to be much more productive and efficient (Puga, 2010). It can be clearly stated that the role of agglomeration economies and dense urban sectors encourage productivity and efficient resource and capital accumulation which contributes significantly towards economic growth and development.

Pakistan is placed under the category of the developing nations and is currently facing a variety of urbanization problems that are also undermined in the respective cases for almost every developing nation around the globe. The nation has been always found to be in a struggle to cope up with the issues which are continuously being faced by the economy. A study has provided an estimate of 3% growth in the urban sectors of Pakistan on average while the country withholds the highest pace of urbanizing in South Asia (Kotkin & Cox, 2013). Considering the urbanization in the context of Pakistan, economists have been working hard to formulate long-run policy measures in order to resolve the urbanization problems throughout the nation but unfortunately due to multiple social and political constraints, the practical implications of the urban planning is not observed. Most of the economists have coined the main problem of instable urbanization is poor performance of local government or inadequate governance structures (Haider & Badami, 2010). Urbanization requires long-run policies and regulations while in the nation has witnessed the adverse effects of the vested political interests and inadequate market structures which hinders the productivity and efficacy of the urbanization in Pakistan. Economists have also observed the indifferent provincial functionalities and resource allocations which have created multiple problems including uncontrolled Rural-Urban migrations, Urban burden and unjust distribution of resources at various regions etc.

It is important to understand the urbanization trends and functionalities in Pakistan specifically in terms of urban areas where there is population in a large number forming agglomeration economies and areas where the population is relatively less than a million, so that we might be able to identify the role of agglomeration economies and current situation of the impact of urbanization over economic growth and development. It is fact that most of the capital accumulation and various economic activities endure in the urban sectors, while the markets in the urban areas provide relatively higher returns to the businesses (Iqbal, 2013). During the structural transformations, resource allocations are observed to be moving from the lower productivity agricultural sectors towards the higher productivity sectors i.e., industrial, services sectors etc. Hence, urban cities and the respective urban market structures, in the presence of agglomeration economies, play a role as a magnet which attracts the resource allocations as it provides higher rate of opportunities to achieve economies of scale (Hussain, 2014). Although urbanization provides multiple benefits to the economy in form of better resource utilization and economies of scale but it hampers the rural growth and development and often creates an inefficient land utilization as the fertile land that was to be used for agricultural purposes is now being used for residential purpose which lowers agricultural production. Local Governance requires to control such issues in a critical way (Hardoy, Mitlin, & Satterthwaite, 2001). Although urbanization contributes significantly towards growth and development of the nation but unfortunately in case of developing nations like Pakistan despite the rapid growth in urbanization process, the outcome is not satisfactory. This study therefore tries to explore that how does this new shift in the development strategy of our nation through focusing on sustainable cities as per the 11th goal of sustainable Development Goals (SDGs) is contributing to the overall increase in income. For this purpose both the impact of the total share of urban population and agglomerations above one million is taken into consideration. One million is taken as the threshold because the study aims to see the impact of large agglomerations as existence literature provides the guidance that cities with inhabitants less than one million are considered as small agglomerations (Deb, 2017).

Objectives

- To investigate the impact of urbanization on national prosperity in Pakistan.
- To explore the effect of agglomerations of over one million on the national prosperity in Pakistan.

Literature Review

Urbanization is becoming an important economic factor on which economists have been working hard to achieve sustainable urbanization as the industries are progressing rapidly in each and every sector of the economy. According to certain statistics, people have migrated to urban areas in a large number due to which the world has witnessed 39% to 52% increase in the urbanizing rates during the past three decades (Ritchie & Roser, 2018). Technological change and economic growth are positively correlated as any improvement in the technology enables the economies to be more productive and efficient (Malecki, 1997). The increase in technology have incentivized the markets to develop specifically in the developed urban sectors which are usually densely populated. This further influences the choices of the people, prompting them to move towards the urban areas which shall give them the opportunity to achieve a better standard of living. Both the globalization patterns and economic re-structuring have an influential impact over the urban economies worldwide. There has been observed an exponential growth in the services sectors and fall in the agricultural sectors which have an impact over the labor market structures enabling the polarization of the income generation at the urban areas (Hussain, 2014; Moomaw & Shatter, 1996; Un-Habitat, 2009). Most of the people in Pakistan have abandoned the agricultural sectors and moved towards those sectors which can provide better returns in order to achieve a higher living standard (Mughal, 2019). Multiple studies have also indicated that the higher urbanization level regions have been having a relatively higher GDP per capita or income levels on average. Furthermore, the developing nations tend to have a relatively higher urbanizing rates as these economies usually make a higher effort with an advantage of higher capital gains despite of retaining lower GDP per capita. There has been a strong correlation of R^2 equal to 0.57 between urbanizing proportions and gross national income per capita income (Henderson, 2010). Economists have suggested that the impact of urbanization needs to be direct or positive with the level of GDP per capita and in order to achieve a positive impact of the urbanization over economic growth and development, utilization of good urban policies are vital to ensure a sustainable long-run economic growth and development (Chen et al. 2014).

Although, there is no simple linear relationship between urbanization and economic growth rates, economies have to take care of a variety of economic factors which shape the sustainable urbanization. Institutional structures functioning in the economies have a key influence over urbanization patterns while it is important for a government to keep a record of the social problems which hampers the stable urbanization growth and development and produce a number of supportive policies at both short and long-run in order to keep the impact of urbanization to be significantly positive over the economic growth (Turok & McGranahan, 2013). Urban population plays an important role in the economy as these people are found to be having a higher capital accumulation than the rural population. Rural-Urban migration had always been a key issue behind urbanization while the nations' productivity greatly influences the structural changes within the economies. People move from the rural areas towards urban areas which not only means the demographic mobility but also the sectoral shifts primarily from the agricultural sectors towards the manufacturing and services sectors.

As most of the economic resource allocations are inclined towards the densely populated areas, it creates cost-advantages and enhancing human capital in those respective regions creating them into agglomeration economies. There is a positive relationship between GDP and urbanization and an increase in the GDP per capita raises urbanization level (Moomaw & Shatter, 1993; Tripathi, 2015). Higher spatial concentrations or agglomeration economies boosts the economic growth and development but on the other side it may be the cause behind the mobilization of urban unrests (Brühlhart, & Sbergami, 2008). Agglomeration economies inspire innovativeness as it has the capability and synergy to make the research and development much more efficient and productive. Such production sectors which are knowledge-intensive have higher innovativeness while market competition incentivize the population to be more productive. Such production sectors are usually clustered in cities with large agglomerations which furthers the positive contributions of the respective urban regions towards the economic growth and development (Malecki, 1997).

Rapid urbanization does not mean that there will be an output of higher economic growth but poor urbanization policies may result in a large number of economic problems including over-urbanization i.e., over-burdening the urban cities, over-population and unemployment, higher costs of living, uprising of social and political unrests,

constrained access to efficient resource allocation patterns, lack of flexibility amongst the firms, strong environmental and ecological pressures, rise in the levels of corruption and lack of accountability, increase in the prices of real estate, biased competitions etc. (Borowiecki, 2015; Turok & McGranahan, 2013). Urbanization or urban areas which are not able to provide economies of scale to the producers may stimulate inefficient resource utilizations that further creates a variety of social, political and economic unrests in the long-run. Some of the economies which have socially destabilizing urban processes may lead towards a negative correlation between urbanization and economic growth as such form of urbanization carries a strong link with the socio-political unrests (Blanco & Grier, 2009; Goldstone, 2010). Urbanization do have a positive impact over the economic development but at some point, if the population keeps on increases with lack of control from the urban regulatory authorities might change the impact of urbanization towards economic development (Williamson, 1965). Smooth population mobility is assumed to be the pre-requisite of stable urbanization which can withstand the challenges of rural-urban migrations, inter-city movements and growth and development of the market structures inspired by good governance (Henderson, 2010).

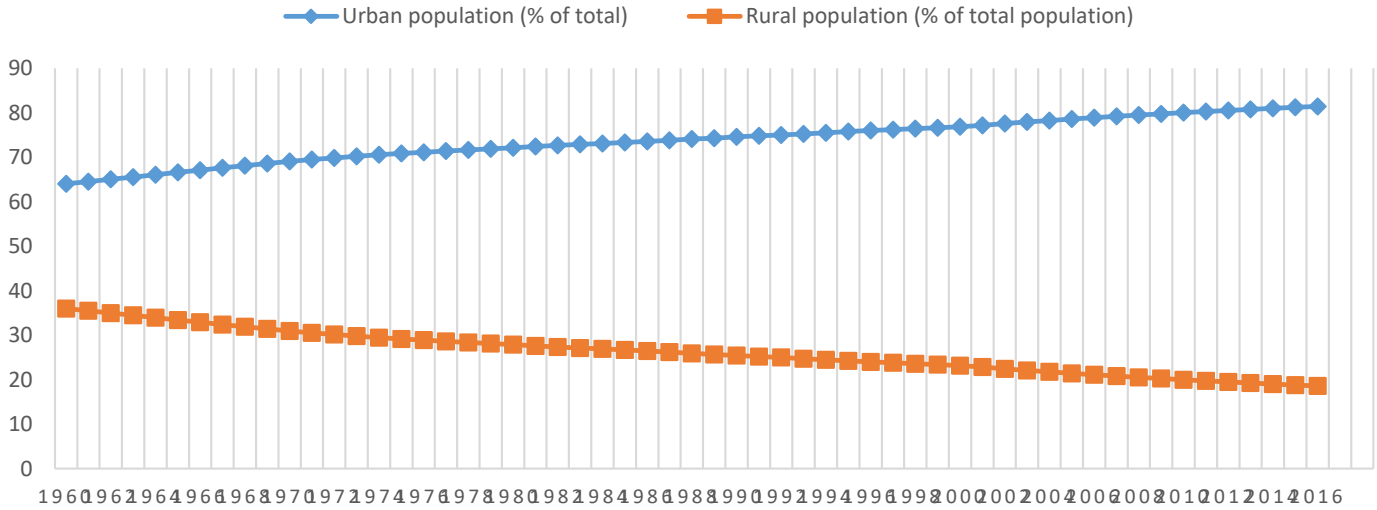
Agglomerations are also found to be having a positive and significant impact over the derived socio-economic outcomes from the firm’s efficiency and social inclusions. Agglomerations enhance the firm’s productivity while clusters of large agglomerations in different regions of the nation can greatly help improve the nations’ economic growth and development (Azhar & Adil, 2017). In Pakistan, the state of municipal services, federal and provincial resource allocations and infrastructure development have been badly hampered by the poor governance structures. There have been a variety of political tensions which have uplifted the social and economic unrests further creating instable labor mobility factors (Haider & Badami, 2010). In order to successfully resolve the urbanization problems in Pakistan, there is a need to critically analyze the key differences or urbanization patterns at different regions of the nations. A good governance has to be formulated and implemented in order to raise human capital, developing skills of labor from good education, access to knowledge, infrastructure development with a decentralized approach, linkages between agricultural sector and quality education and most importantly a good relationship between the corporate sector and civil society organizations. A good governance can be a solution to the inefficient resource allocations that creates indifferent urbanization patterns at different regions (Jabeen, Farwa & Jadoon, 2017).

As it is above mentioned that over the years, urban population has been expanding while the rural population is reducing due to a variety of factors enriched in the literature. The big thing to observe is that the trends are not the same for all the levels of income groups. Below in Figure 1, 2, and 3 are given these trends for the overall global economies while Figure 4 exhibits the same series for the economy of Pakistan soecifically. Data has been taken from World Bank to show the difference between the trends of high/middle/low-income countries and a difference can be observed in the respective trends, which clearly highlights the evidence of the impact of income levels over the urbanization. World Bank categorizes the groups of income levels under the following criteria:

Threshold	(GNI) Gross Net Income/Capita (Current US\$)
Low-Income	< 1,005
Lower-Middle Income	1,006 - 3,955
Upper-Middle Income	3,956 - 12,235
High-Income	> 12,235

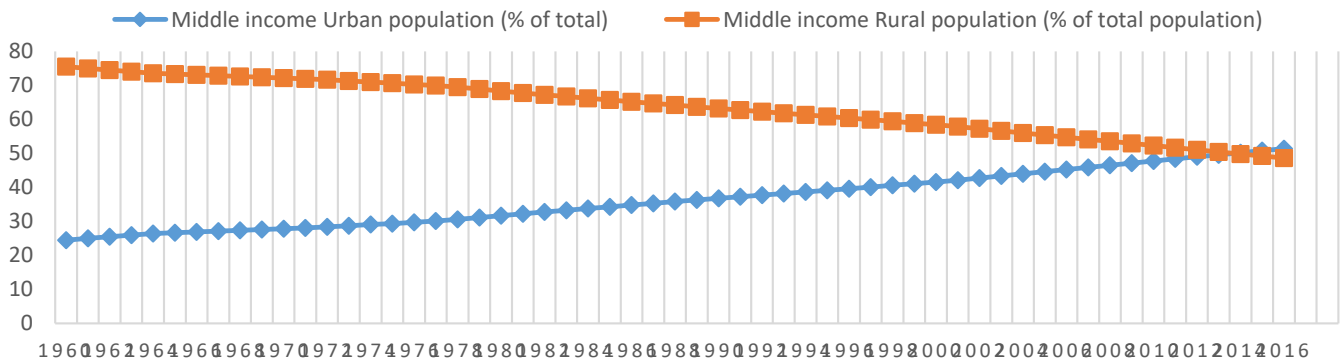
Source: World Bank data team, 2017

FIGURE 1. HIGH INCOME COUNTRIES
URBAN/RURAL POPULATION (% OF TOTAL) GLOBAL



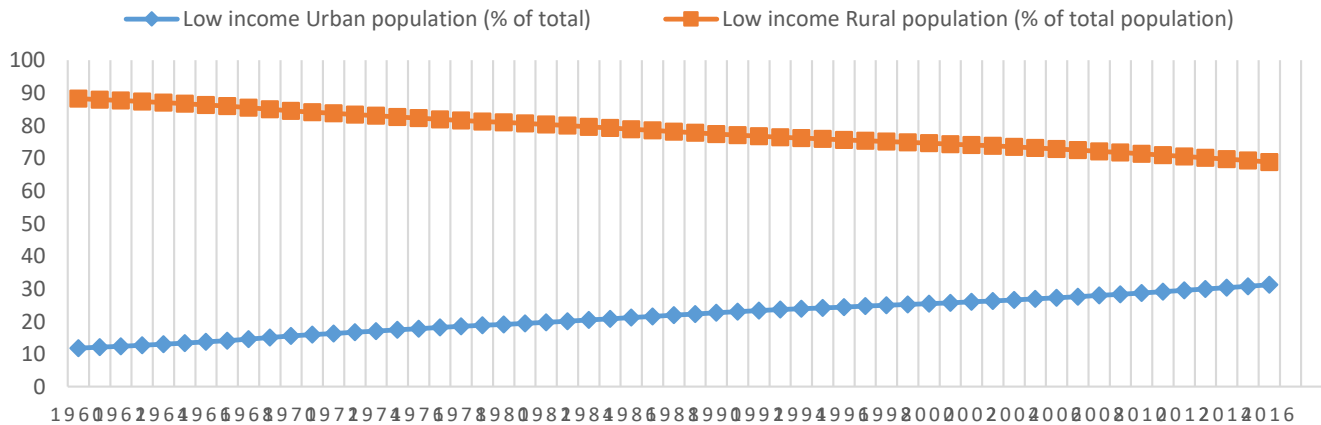
Source: World Bank, WDI (world development indicators)

FIGURE 2. MIDDLE INCOME COUNTRIES
URBAN/RURAL POPULATION (% OF TOTAL) GLOBAL



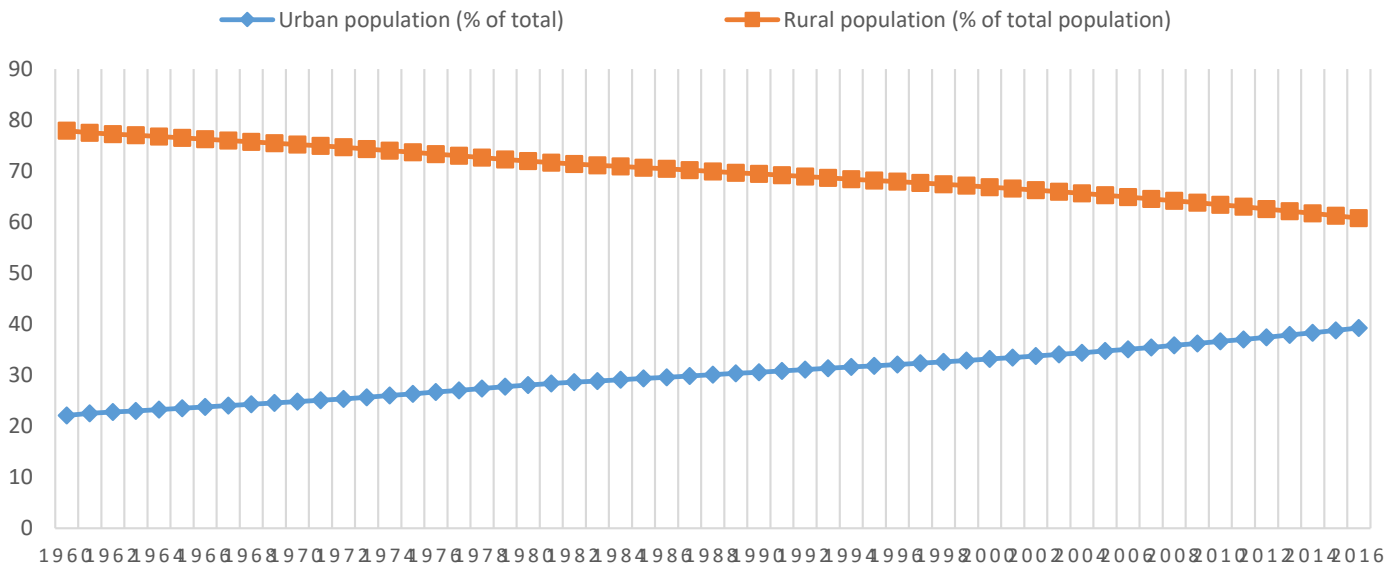
Source: World Bank, WDI (world development indicators)

FIGURE 3. LOW INCOME COUNTRIES
URBAN/RURAL POPULATION (% OF TOTAL) GLOBAL



Source: World Bank, WDI (world development indicators)

FIGURE 4. URBAN/RURAL POPULATION (% OF TOTAL POPULATION) IN PAKISTAN



Source: World Bank, WDI (world development indicators)

In case of Pakistan, the trend of the urban and rural population resembles with the lower income countries which can be beneficial for future studies.

Theoretical Framework

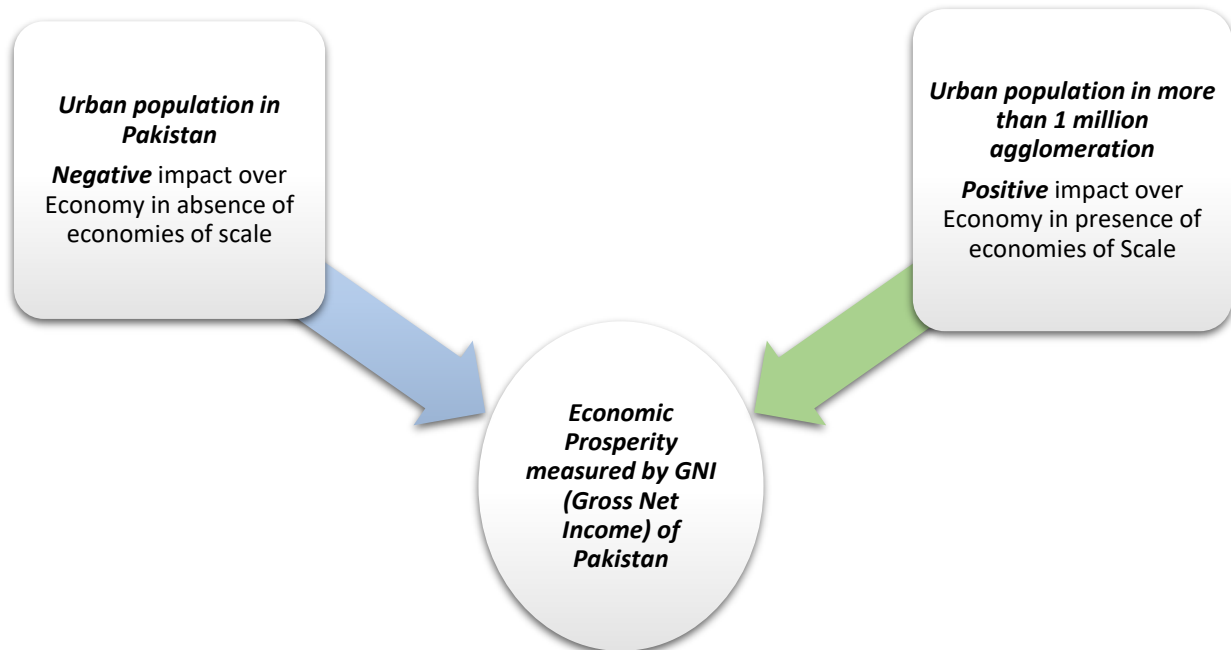
During the past few decades, government authorities and policy makers inclined their respective policies in favor of the spatial roles of populations and how the labor mobility impacts the structural and institutional changes in an economy. History have labeled the industrialization and enhancements in the manufacturing and services sectors to be the driving force behind urbanization. Urbanization with the influx of mass developments in the cities raised the income levels and economic activities in the cities which further gained the attention of the labor surplus in the rural areas or less developed urban areas to move towards the big cities (Awais, Ellahi, & Sher, 2019; Awais, Zulfiqar, Saghir, Sohail, & Rana, 2022). We can simply understand the problem by the principles of Rural-Urban migration and a large number of economists have been working over this issue (Lewis, 1954). The problem starts when a few urban cities grow into urban giants while the many cities face problems of insufficient resources or attention from the government authorities. Although the urban giants contribute significantly towards the economic growth, the rest of the urban areas which are less developed fail to be productive enough to contribute positively towards the national economy relatively. This issue was addressed by a theory which was proposed in the 1970s labelled as the Haris-Todaro Model (HTM), differentiating the expected wages and the actual wages which the people had faced after the Rural-Urban migration. Increasing the expectations of the community towards urban sectors without enhancing the actual productivity of those urban sectors and failing to provide efficient resource allocations incentivized a small portion of the economy while hampered the larger portion of the rest of the economy (Harris & Todaro, 1970). Modernization and higher living standards can be seen in the urban giants with large agglomerations but the regions which lack both the economic and non-economic incentives faced lack of growth and development while moved from these areas towards a few numbers of urban giants (Mazumdar, 1987).

Agglomeration economies can be gained by the clustering of the firms and people closer to each other and form a city with large and diverse communities and strong market structures. An example to understand this concept

is the reduction of the transportation costs. Economists state that a proper and successful urbanization is when the urban areas are able to provide higher local wage rates and higher willingness to pay. Population density or urban concentration have been found to be having a significant and positive impact over Gross metropolitan product and housing prices which indicate that such urban economies might get more pleasant to live and be more productive (Glaeser, 2010). The main driving forces behind the agglomeration economies are economies of scale and division of labor. Economies of scale primarily improves the growth and provides a variety of opportunities for development, while the internal economies of scale greatly reduce the average costs. On the other hand, the external economies of scale (also related to agglomeration economies) provides incentives to the firms and people by bringing them closer to each other and incentivizing them with a bigger and better economic network, strong market structure, low transportation costs, better communication, better research and development etc. Such agglomeration economies in big cities provide the opportunities to gain better education and learnings which further provides a much more efficient and skillful environment to firms so that they can be more productive and cost-affective. Division of labor enables specialization which also enhance the productivity of the respective economies (Turok & McGranahan, 2013).

On the basis of these theoretical footings, below in figure 5 the theoretical framework of current study is provided.

Figure 5. Theoretical Framework



Source: Author’s own coceptulization based on edixting theoriesof urabanization

Two concepts explain the advantages of agglomeration economies or concentration economies; economies of scale and division of labor. The economies of scale enable the growth of the economic units. Internal economies of scale allow the industries to reduce cost barriers and raise economic productivity while the external economies of scale (agglomeration economies) provide the benefits to the firms and industries for being closer to other industries and gain the benefits of economic growth altogether such as bigger economic network, reduction in transportation costs etc. Cities provide superior markets which enables the economy to grow; having higher tendency of communications and technological innovations. Cities provide firms the institutes that play the role of the provision of learnings and innovation which enables the firm an environment to perform much better and raise the economies of scale. The division of labor allows specializations which raise the productivity and efficiencies of production patterns (Turok & McGranahan, 2013). Urban population in more than 1 million urban agglomerations tend to have a higher impact over the economic growth rate rather than population having less population density or the rural regions.

Data Sources

This paper utilizes secondary source for the data collection of respective Pakistan’s economic factors. The data has been collected for the period of 1960-2016 of the variables given below in Table 1:

Variable	Code	Description (WDI metadata)	Source
<i>Economic Prosperity</i>	GNI	It is being measured by using GNI (formerly GNP) which is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad. Data are in current U.S. dollars.	World Bank. WDI (world development indicators), data.worldbank.org
<i>Urbanization</i>	upop	People living in urban areas defined by national statistics, includes both World bank estimates and urban ratios from UN urbanization prospects.	World Bank. WDI (world development indicators), data.worldbank.org
<i>Agglomerations</i>	popagglo	Population in urban agglomerations of more than one million represents the country's population living in metropolitan regions that in 2000 had a population of more than one million people.	World Bank. WDI (world development indicators), data.worldbank.org

Methodology

This study aims to find a relationship between urban population, agglomeration and economic prosperity measured through Gross National Income (GNI). To investigate such kind of relationships, existing econometric literature has abundant econometric techniques like Johansen (1988); Johansen & Juselius (1990); and Johansen’s (1995). However now the recent studies have been found in using ARDL approach for cointegration analysis and preferring this to Engle and Granger (1987), and Gregory and Hansen (1996). One of the reasons for preferring the ARDL is that it is applicable irrespective of whether the underlying regressors are purely I(0), purely I(1) or mutually co-integrated. The statistic underlying this procedure is the familiar Wald or F-statistic in a generalized Dickey-Fuller type regression, which is used to test the significance of lagged levels of the variables under consideration in a conditional unrestricted equilibrium error correction model (ECM) (Pesaran et al., 2001). Another reason for using the ARDL approach is that it is more robust and performs better for small sample sizes (such as in this study) than other cointegration techniques. The ARDL approach involves two steps for estimating long run relationship (Pesaran et al., 2001). The first step is to investigate the existence of long run relationship among all variables in the equation under estimation. The ARDL method estimates $(p + 1)k$ number of regressions in order to obtain optimal lag length for each variable, where p is the maximum number of lags to be used and k is the number of variables in the equation. The second step is to estimate the long-run relationship and short-run bi-directional causality between running actors. We run second step only if we find a longrun relationship in the first step (Narayan et al., 2005). This study uses a more general formula of ECM with unrestricted intercept and unrestricted trends (Pesaran et al., 2001).

The following model has been developed to understand the mechanism.

$$\text{prosperity}_t = \alpha_t + \beta_1(\text{popagglo}_t) + \delta_1(\text{upop}_t) + \varepsilon_t$$

In order to standardize our variables and gain the coefficients in form of elasticities, the data has been converted into log form. Hence, we shall obtain the double-log model for national level analysis;

$$\log(\text{prosperity})_t = \alpha_t + \beta_1 \log(\text{popagglo}_t) + \delta_1 \log(\text{upop}_t) + \varepsilon_t$$

Empirical Estimation

Before econometric analysis using ARDL Model, certain assumptions were necessary to be satisfied. Therefore, a number of tests were conducted which are detailed below along with their results. ADF Unit Root For the econometric analysis of time series data, it is necessary that the data should be stationery. Therefore, the data was transformed to logarithm and then in order to determine stationarity of the data, ADF test was used. The test checked integration order. The results of the ADF unit root test are given in Table 2. ADF test is utilized to ascertain the structural breaks alongside the stationary feature of the data in time-series form. Here we see that

automatic selection (using the Akaike Information Criterion) was used with a maximum of 12 lags of both the dependent variable and the regressors. Out of the 343 models evaluated, the procedure has selected an ARDL(6,3,3) model with 6 lags of the dependent variable Ln (GNI), and three lags for two independent variables.

As the data is time series, we need to determine the level of stationarity of the respective variables. So using the breakpoint unit root test, the variables are stationary at the following difference levels with respective specifications. As the stationarity test shows that variables are not stationary at single level of integration. Therefore OLS estimates will not be having BLUE properties. In order to satisfy the condition of consistency of means and variances ARDL method is applied. ARDL does not require the variables to be stationary at level, and can be of different levels i.e. of order I(0) or I(1) or both; while the dependent variable must stationary at 1st difference. Presence of a variable which is stationary at 2nd difference may cause the ARDL model to crash (Pesaran, Shin & Smith, 2001). Cointegration tests examines that how the time series can be paired such that workings of equilibrium forces making sure that they do not drift far away from oneself and highlights the relationship between the long-run relationship amongst the economic time series that is converging over time. Thus, a stronger empirical statistic for the error correction model is formed that brings together both the short-run and long-run information in the modeling techniques. The long-run relationship is determined by the F-stat (Wald test), when the F-stat exceeds the critical bound. ARDL is further advantageous in case of presence of multiple cointegrating vectors. Bounds Test and ARDL long-run cointegrating techniques shall allow us to evaluate the presence of long-run relationships amongst the variables (Greene, 2003; Nkoro & Uko, 2016).

Table 2: Stationarity Results

Specifications	Null Hypothesis: Variable has a unit root	
	Trend Specification: Trend and intercept	
	Break Specification: Intercept only	
	Break Selection: Minimize Dickey-Fuller t-statistic	
Variable	Stationary at difference	Break Date
Ln Prosperity	1	2003
Ln UPOP	0	2013
Ln POPAGGLO	1	1980

Table 2 shows the detailed information about the stationarity of variables. It can be observed that economic prosperity and POPAGGLO are stationary at first difference while UPOP is stationary at level. As the integration levels are different then the estimates through the Ordinary Least Square Model shall be spurious and inefficient. Therefore we shall move towards auto-regressive distributive lag model (ARDL) for estimating the Model (Greene, 2003). Using the ARDL technique, our model shall observe the lag terms of the both the dependent and independent variables. The breakpoint unit root test indicates the break dates which have been incorporated for creating dummies of the variables having ‘0’ from the initial date till the break date, and ‘1’ from the break date till the final date. So, adding the dummies into our model to obtain reliable coefficients, we shall obtain the final model for the national level estimates of the research as follows:

$$\begin{aligned} \log \Delta(\text{gni})_t = & \alpha_t + \omega_1 \log \Delta(\text{gni})_{t-1} + \omega_2 \log \Delta(\text{gni})_{t-2} + \omega_3 \log \Delta(\text{gni})_{t-3} + \omega_4 \log \Delta(\text{gni})_{t-4} + \omega_5 \log \Delta(\text{gni})_{t-5} \\ & + \omega_6 \log \Delta(\text{gni})_{t-6} + \beta_1 \log \Delta(\text{popagglo})_t + \beta_2 \log \Delta(\text{popagglo})_{t-1} + \beta_3 \log \Delta(\text{popagglo})_{t-2} \\ & + \beta_4 \log \Delta(\text{popagglo})_{t-3} + \delta_1 \log(\text{upop})_t + \delta_2 \log(\text{upop})_{t-1} + \delta_3 \log(\text{upop})_{t-2} + \delta_4 \log(\text{upop})_{t-3} + \text{dum}_{\text{gni}} \\ & + \text{dum}_{\text{upop}} + \text{dum}_{\text{popagglo}} + \text{ecm}_{t-1} \end{aligned}$$

$\text{dum}_{\text{gni}} = 1960 \text{ to } 2002 \text{ equals } 0 \text{ \& } 2003 \text{ to } 2016 \text{ equals } 1$

$dum_{upop} = 1960 \text{ to } 2012 \text{ equals } 0 \ \& \ 2013 \text{ to } 2016 \text{ equals } 1$

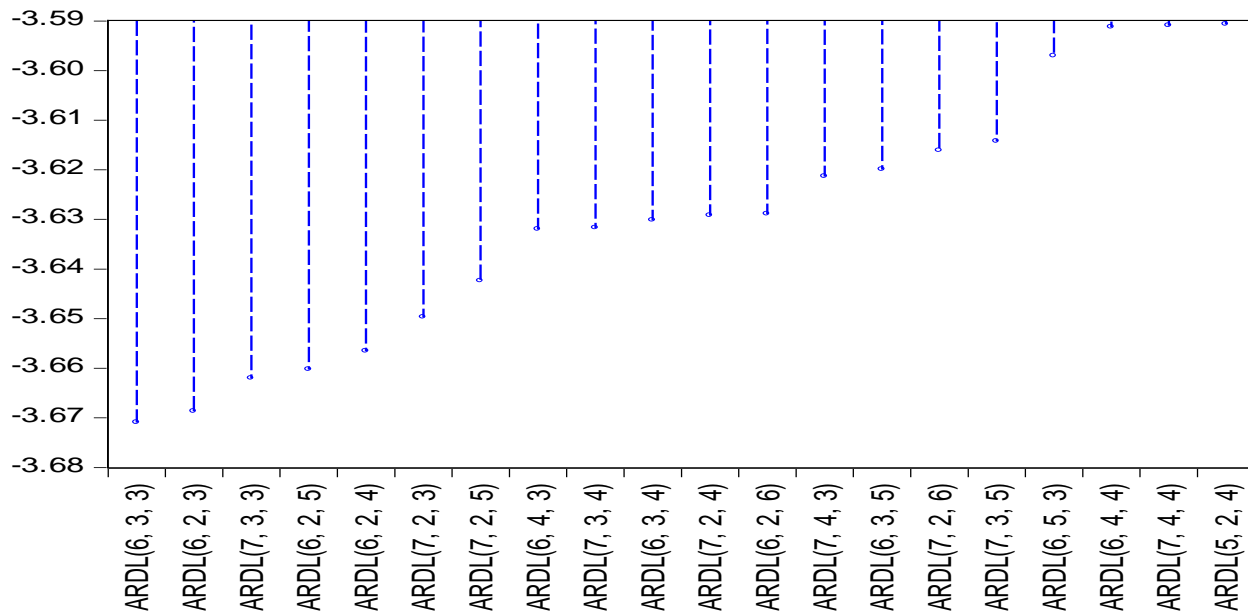
$dum_{popaglo} = 1960 \text{ to } 1979 \text{ equals } 0 \ \& \ 1980 \text{ to } 2016 \text{ equals } 1$

Now next step is to process the data for evaluating the nature of relationship among the desired variable using STATA 9 software. In this regard we will start from ARDL Bounds Test which confirms the existence of relationship.

ARDL Bounds Test Result

After knowing the time series properties of the data, now ARDL bound test is conducted to test whether there exists any long run relationship among the selected variables. Akaike information criteria is used for the selection of lag length in the model At this length and the results revealed that ARDL (6,3,3) is the best lag combination for our ARDL model estimation amongst 20 models because the literature suggests that the model with the least AIC should always be preferred (Greene, 2003; Shivakumar & Kotreshwar, 2017). Figure 5 given below confirms this test result.

Figure 5: Akaike Information Criteria
Akaike Information Criteria (top 20 models)



Source: Based on author’s estimations

Now the next step is the estimation of the long-run equilibrium relationship among the variables, and the result of the estimation is given in Table 3. The estimation results revealed that all the variables have a strong cointegration relationship as indicated by the estimated F-statistic value of 6.6770, which appears to be higher than lower and upper bounds critical values at 1 percent, regarded as more stringent. Therefore, it can be concluded that all the series are highly cointegrated, and they move together in the long-run.

Test Statistic		
F-statistic	6.6770***	
Number of independent variables (k)	2	
Critical Values Pesaran et al (2001) ^a	Lower Bound	Upper Bound
10%	3.17	4.14
5%	3.79	4.85

2.5%	4.41	5.52
1%	5.15	6.36

^a Critical values are obtained from Pesaran et al (2001).

Now as the bound test revealed the existence of the long run relationship among the three variable i.e. income growth, agglomeration and urban population, therefore the next step is to estimate the nature of the relationship between variables and the coefficient of error correction term. Table 4 given below shows the coefficients of short run and long run estimates of ARDL Model.

Table 4: ARDL Short Run and Long Run estimates			
Dependent variable: (Ln prosperity)			
Method: Unrestricted ECM Model			
Selected Model: ARDL (6, 3, 3)			
Short Run Estimates			
$\Delta (\ln prosperity)_t$	1.2971	3.4576	0.0017
$\Delta (\ln popaggl)_t$	37.8029	2.6023	0.0142
$\Delta (\ln upop)_t$	-99.2542	-3.5303	0.0014
ECM (-1)	-2.3846	-4.4579	0.0001
ECM = ln prosperity – 10.6107 (ln Popaggl)_t -0.0179 (ln upop)_t + 0.3520			
Long Run Estimates			
Ln popaggl _t	10.6107	3.6960	0.0009
Ln upop _t	0.0179	0.4884	0.6288
Constant	-0.3520	-1.0525	0.3009

Source: Author's calculations

This Table 4 shows both the short run and long run estimates of the variables being included in the analysis. The error correction term -2.3846 as reported in the upper part of Table 4 satisfies all the three econometric conditions of being negative, less than one, and statistically significant. The existence of these conditions confirms a long-run equilibrium relationship among the series as well (Alogoskoufis & Smith, 1991; Greene, 2003; Siddiqui, 1997). Moreover the coefficient of the error correction term -2.38 signifies that there is a solid and fast speed of convergence in case of dynamic shortrun disequilibrium back to the equilibrium position. The speed of convergence back to equilibrium position is approximately more than 200 percent every year within the sample study period. Moreover the model estimates have shown that in short run total urban population has a significant negative impact over GNI while the urban population in agglomerations of more than one million states a significant positive impact over GNI supporting the Henerson's (2003) hypothesis that urbanization has less effect on economic growth of developing economies than share of urbanized people living in the largest city. Similarly our results are in line with Brühlhart and Sbergami (2009) who proved that agglomeration boost the economic growth. It is an evidence in support of agglomeration economies and in case of Pakistan, the agglomeration economies over 1 million population are contributing towards the national income while the only increase in the share of urban population which lacks in agglomeration economies has negative impact over the national economy. However in long run both of the variables are affecting positively to the income level but impact of agglomeration is far greater than the role of urbanization. On the basis of these results, we reject both of our null hypotheses and conclude that there is a positive and significant impact of agglomerations and share of urban population on national income in Pakistan. All these results seems quite attractive however until the post estimations do not support the model, we cannot process further in discussing the implications of the study. Below in Table 5, Diagnostics are presented related to knowing the problem of serial correlation, heteroskedsticity and omitted variable issue in the model. The F-statistics of Breusch-Godfrey and Breusch-Pagan-Godfrey test asserts that there is no serial correlation among selected variable and no heteroscedasticity. For knowing about the errors

specification or misspecification in the model, Ramsey Test is applied and F-statistics supports the null hypothesis says errors are specified accepted since the p-value of the test is insignificant.

Table 5: Diagnostics of the Model			
Breusch-Godfrey Serial Correlation LM Test			
F-statistic	1.137472	Prob. F (2,28)	0.3350
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.363008	Prob. F (17,31)	0.9847
Ramsey RESET Test (Functional Form Test)			
Statistics	Value	df	Probability
t-statistic	2.856213	29	0.0078
F-statistic	8.157953	(1, 29)	0.0078
Significance of the Model			
R Squared			0.6738
Adjusted R Squared			0.4781
F-Statistic			3.4435
Prob(F-Statistic)			0.0013

Furthermore the lower part of the Table 5 also represents the R-square which measures the number of variations or changes in the explanatory variable that is jointly explained by the explanatory variables in the model. It shows that 67 percent change in income growth is explained jointly by the urban population and agglomerations. The F-statistic value measured all the independent variables' joint significance in explaining the dependent variable in the specified model. The estimated value of F-statistic is statistically significant, which indicated that urban population and agglomerations are jointly significant in explaining changes in income growth in Pakistan. Now the next step in ARDL analysis is to perform the causality analysis.

Causality Analysis

Granger causality test using a VAR model has been performed to check the direction of causal relation among variables in the short run. The testing of the direction of relationship after observing the existence of co-integration among the variables i.e. income levels, urban population and agglomerations.

Table 6: Causality Test			
Null Hypothesis:	Obs	F-Statistic	Direction of the causality
GNI does not Granger Cause POPAGGLO	55	1.67093 (0.1984)	$GNI_t \rightarrow POPAGGLO_t$
POPAGGLO does not Granger Cause GNI	55	4.40479** (0.0173)	$POPAGGLO_t \leftarrow GNI_t$
UPOP does not Granger Cause POPAGGLO	55	6.27957*** (0.0037)	$UPOP_t \rightarrow POPAGGLO_t$
POPAGGLO does not Granger Cause UPOP	55	42.1152*** (2.E-11)	$POPAGGLO_t \leftarrow UPOP_t$
UPOP does not Granger Cause GNI	55	4.26574** (0.0195)	$UPOP_t \rightarrow GNI_t$
GNI does not Granger Cause UPOP	55	0.13077 0.8777	$GNI_t \leftarrow UPOP_t$

*** 1% level of significance, ** 5% level of significance, * 10% level of significance, respectively. In

parenthesis the P-values are given. Source: Author

Table 6 shows the direction of nexus between all the possible pairs and only in case of UPOP and POPAGGLO there exists significant bidirectional relationship while in case GNI to agglomerations we find no relationship however the reverse exists. Similarly GNI is not adding to the process of urbanization but urbanization is contributing to economic prosperity i.e. national income (GNI) .

Conclusions and Policy Recommendations

This research aimed to find the relationship between economic prosperity, urbanization and agglomerations for the economy of Pakistan. For this purpose Autoregressive Distributed lag Model (ARDL) was applied and both the short run and long run cointegrations among the selected variables is found. According to the results obtained from the model estimates, urbanization in large agglomerations have shown a direct and significant relationship with GNI both in short run and long run (Chen et al., 2014; Robinson et al., 2012). The same is supported by the findings of a recent research by Ahmad and Jabeen (2020) who tried to relate urban agglomeration with electricity consumption, construction industry and economic performance for china's economy using dataset of 30 provinces. The results showed the importance of urban agglomeration in economics performance. Our findings also supported the study by Deb (2017) who carried out the research for exploring the role of city systems of South Asian Economies in urbanization and economic growth. The author highlighted that majority of urban agglomerations in Pakistan, Srilanka and Bangladesh are seen in the cities where population is found either less than 5 million or even lesser than this and his findings purports that small and medium cities are contributing to economic growth more than primary or large cities. Therefore it can be concluded that Urbanization lacking agglomeration can be assumed to have diseconomies of scale which can further have an adverse effect over the economic performance.

Turning to the another variable i.e. share of urban population, the results showed a negative association of this variable with national income in short run but positive and significant in long run (Nguyen; 2018; Turok, & McGranahan; 2013). This also directs us to better understand the Rural-Urban migration problems in Pakistan as people leave the rural areas because they lack the opportunity to achieve economies of scale at rural areas. These people move towards the urban areas having large agglomerations as it provides them higher opportunity to avail economies of scale and higher gains which substantially increases the urban burden due to inefficient resource allocations and land-use.

On the basis of these findings, this paper recommends the policymakers and administrative bodies to re-evaluate the policies related for the promotion of urbanization. Agglomeration economies play an important role in strengthening a nation's economy while in case of Pakistan, the urban population at large agglomerations i.e. of more than 1 million urban population, can creates opportunities to achieve better economic environment for prospering the nationals. Here there are few recommendations which can be used by the policymakers for improving the process of urbanization and magnitude of urban agglomeration in Pakistan:

- Development of the cities with urban population of more than 1 million is vital as these economies contribute significantly towards the national prosperity
- The concerned authorities need to grow and develop the urban areas with controlled population so that those regions can provide balanced opportunities to achieve economies of scale and people can move to those areas. This will help in reducing the urban burden in large cities and favor equality in economic resource distributions. Improving market structures, infrastructure and development of social welfare including the provision of better health and education can help attract people to these regions specifically and making the regions dense and productive.

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