Journal homepage: www.ijarpr.com e-ISSN: 3049-0103

International Journal of Advance Research Publication and Reviews

Volume 1, Issue 1,September 2024, pp 1-29

The Impact of Demographic Transition on Economic Growth of Pakistan

Umair Mahmood*, Naeem Abbas

National University of Modern Language Islamabad,Pakistan

Corresponding Author Email: umairpcrwr@gmail.com

ABSTRACT

The demographic transition system is always bringing social and economic changes in the countries. Economic growth can have many beginning, but the current study focuses on demographic transition as a main source of economic growth. It is also encouraging to observe the further connection between demographic transitions in promoting economic growth. Pakistan is also running with the demographic transition. Pakistan is in the early stages of the demographic transition in which the rate of birth starts to decrease. It creates many different situation, options and challenges and opportunities. This type of situation creates many dangerous situations for under developing countries like Pakistan. Pakistan 2019 population is estimated at 216 million people at midyear according to UN data. This thesis examines the demographic transition impacts on economic growth of Pakistan. When population growth is rising up day by day than problems creates in all the institutions of Pakistan. On the opposing, if suitable policies are not formulated, the demographic transition might in fact be a cost, leading to unemployment and an intolerable damage on education, health, and old age security. The analyses is based on the time series data starting from 1975-2018 using the technique of Generalized Method of Movements for estimation.

Key words: Demographic transitions, economic growth, population, labor force, challenges, economically, significantly.

1. INTRODUCTION

Demographic transition is a model used to symbolize the movement of high birth and death rates to low birth and death rates as a country develops from a pre-industrial to an industrialized economic system. It works on the basis that birth and death rates are linked to an associate with stages of industrial development. The demographic transition model is sometimes referred to as "DTM" and is based on historical data and trends.

Demographic transition is a global phenomenon. All regions of the world vary from high levels of mortality and fertility to low levels. The onset and pace of demographic transition vary between regions and countries as the timing of events and conditions that trigger transition varies. Changing in the population trends and ageing trends around the world. Demographics are associated with science and technology, economy, cultural transformation social and political processes.

The interaction between these processes is not at the population level but the individual level. Human's desire for a long and fulfilling life is the primary motivator for demographic transition. Science and technology provide instruments for controlling demographic processes, but the use of these instruments through economic and cultural change is conditional.

The transition from developing countries to developed countries is still an ongoing process. In fact, over the past decades, fertility has declined substantially in most countries, but in countries where population growth is still high; there can be many consequences to sustainable growth. Demographic transition can affect GDP growth through several channels. The First, low population growth directly means little wage input. Second, the small population growth has an indirect effect on the individual labor supply uniform as it leads to higher tax rates which reduce the incentive to work.

The transition involves five steps. At one stage; pre-industrial society, mortality and birth rate are balanced. In the second phase of the developing country, improving food supply and sanitation reduces mortality rates, increases life expectancy and reduces diseases. In the third stage, the fertility rate falls due to a number of fertile factors such as access to contraception, increase in wages, reduction of livelihoods, livelihoods agriculture, increase the status of women and education; decrease the cost of children's work, a child's increasing parental investment in education and other social changes. During the fourth stage, both births and deaths are low. Some scholars break a "step five" level down from fertility level, to stage four. Others have speculated on a different "phase five" that involves increasing fertility.

Pakistan is the 6th most densely populated country of the world. In 2019, Pakistan's population is estimated at 216.5 million according to UN data. In the long-ago, according to the census of 1998, it was world's 7th populous country with 130.5 million people. According to the UN projections, Pakistan will be the 3rd populous country of the world by 2050. Pakistan has a unique place in the demographic transition. Pakistan has undergone the first phase of demographic transition with the transition of advanced medical facilities from the developed countries, while Pakistan is in the second phase of the demographic transition and is still in the early stages of the second phase in which the rate of birth begins is to decline.

The primary objective of this study is to examine the effect of the demographic transition on the economic growth of Pakistan. Moreover, the study aims to assess the consequences of population trends of Pakistan in the past years. Furthermore, the study tried to investigate the different aspects of demographic transition and population growth going high day by day in Pakistan and its impacts on the economic growth rate of Pakistan.

The motivation to choose this topic is that Pakistan is trying to resolve the issues through the demographic transition. Further, the goal of the research is to find out the demographic transition impacts on economic growth rate.

Problem Statement

The primary demographic issues facing the world today include population growth, population ageing and its consequences, massive global inequalities in mortality and HIV prevalence, low fertility as well as food shortages and a growing obesity epidemic. The objective of the work to estimate the consequences of demographic transition creates an effect on the economy of Pakistan because Pakistan is passing with the second stage of demographic transition and it may be helpful for the stabilization process in the economy of Pakistan.

1.1. Work Already Done

In the past, there are many studies, some of which describes the demographic transition and its impacts on the economic growth rate of Pakistan. Many researchers estimated the powerful influence of demographic transition variables on the economic growth for the developed countries. Sunde (2009) explicitly calculated the expected effect of

age on economic growth, accounting for the role of demographic transition. Pardeep (2015) also resulted from that to counter the adverse impact of population ageing. Further, Feng (2011) and Reher (2011) concludes that the consequences from the poverty and inequality index that population ageing has a negative impact to the reduction of poverty while it is positive as refers to the equality during the process of demographic transition.

There is the number of researchers who conducted work on demographic transition and its effect on Pakistan's economy like Ali and Zahid (1998); Afzal (2009); Husain (2009); Yaseen (2015). These all researchers highlighted the effect of high population growth as an employed situation and neglected other economic development obstacles like adverse effects of population growth on the health sector, education provisions etc. The economic potential of this demographic change can have explosive social and political consequences.

1.3. Significance of Study

The significance of the study is to observe that how demographic transition creates impacts on economic growth of Pakistan economy. There is a need to explore different aspects of demographic change. The growth accounting framework of this study is based on endogenous growth theory and is comprehensive with the demographic transition as a further factor explaining country variations in economic growth. The method of estimating the effect of the demographic transition is to make a regression analysis on country data using the Generalized Method of Movements for estimation. Previous studies have captured many different aspects of demographic transition, but present study may be regarded as a better contribution to the existing literature. In the present study, data will be collected from 1975 to 2018.

1.4. Objectives of study

The objectives of the Study are:-

- To find out the influence of demographic transition on the economic growth of Pakistan.
- To analyze the short-run and long-run relation among the variables like GDP, Gross Capital formation, labor force, life expectancy and dependency ratio of Pakistan.
- Explore the different aspects of demographic transition and their association with economic growth.
- To assess the consequences of past and current population trends of Pakistan for future well being.
- Suggest practical policy implications in the light of the results of impacts of the demographic transition on economic growth.

1.5. Hypotheses

H_{Y1} = The effect of demographic changes on economic growth rate of Pakistan.

H_{01}= No effect of demographic changes on economic growth rate of Pakistan.

H_{Y2} = The effect of dependency ratio on economic growth rate of Pakistan.

H_{02} = No effect of dependency ratio on economic growth rate of Pakistan.

H_{Y3} = The effect of life expectancy ratio on economic growth rate of Pakistan.

H_{03} = No effect of life expectancy ratio on economic growth rate of Pakistan.

H_{Y4} = The effect of Gross capital formation on economic growth rate of Pakistan.

H_{04} = No effect of Gross capital formation on economic growth rate of Pakistan.

H_{Y5} = The effect of Labor force ratio on economic growth rate of Pakistan.

H_{05} = No effect of Labor force ratio on economic growth rate of Pakistan.

1.6. Research Question:

What is the influence of demographic transition on the economic growth of Pakistan?

2. REVIEW OF LITERATURE

2.1. Introduction

Many researcher in past have been working delicately to examine the theoretical and empirical fundamentals of the connection between demographic transition and economic growth. On the whole, the thought of linkage between demographic transition and economic growth has been resulting from the traditional theory begun in 1929 by the American demographer Warren Thompson, of the experiential changes, or transitions, in birth and death rates in developed societies over the past two hundred years or so. Afterward, empirical studies were approved out to observe the effect of demographic transition on the economic growth. Furthermore, the process is multidimensional in nature concerning its connection with economic growth. Considerable and significant research is necessary to discover the channels through which it affects economic growth. General research material is found in this field at international level but in container of Pakistan, researchers and strategy makers still have to find and effectual design for the procedure of demographic transition. Furthermore, the present developments in the theoretical and empirical literature must be contemplated to have a few obvious ideas about the procedure of demographic transition and its impacts on economic growth.

2.2. Theoretical review

Sunde (2009) unequivocally intended the predictable effect of age on economic growth, secretarial for the role of demographic transition. In adding to focusing on Empirical recognition Issues, this article emphasizes the role of particulars. A theory of economic and demographic transition where decisions on the education and fertility of individuals depend on their life expectation. The theory predicts that development in life expectancy previous to population alter essentially increases the population. Upgrading in life expectancy reduces population growth and

promotes the accretion of human capital after the start of the demographic transition**. S**howed that the result of life expectancy on population, human capital and per capita income is not the same before and after the demographic transition. Additional, the transition to a stable growth of income is predictable to be considerably greater in life. Supply evidence at the bottom of these predictions by means of irregular mortality decrease data in the circumstance of the epidemic revolution.

Lund-Thomsen (2014) argued that existing debates on the position of labor in global value manacles have to go further than a narrow focus on labor values and community social responsibility fulfillment and connect with economic, technological, and social improvement as factors that could produce continued improvements in real salary and workers' circumstances.

Sumpter (2015) An vital transition in the economic history of countries occurs when they move from a command of low wealth, high child mortality and high fertility to a state of high wealth, low child mortality and low fertility. Researchers have planned a variety of theories to explain this demographic transition and it's relative to economic growth. In this editorial, test the soundness of some of these theories by appropriate a non-linear lively model for the obtainable cross-country. Fills the hole between the micro-level models that talk about contributory mechanisms but do not believe if option models may fit the data well, and models from growth econometrics that show the crash of dissimilar factors on economic growth but do not comprise non-linarite and multifaceted connections. In our model, humanity and fertility refuse and economic growth are endogen zed by bearing in mind a concurrent system of equations in the alter variables. The model showed that the transition is best described in terms of a development cycle connecting child mortality, fertility and GDP per capita. Fertility rate decreases when child mortality is low, and is feebly dependent on GDP. As fertility rates fall, GDP increases, and as GDP increases, child mortality falls. Further test the hypothesis that female education drives down fertility rates quite than child mortality, but find only weak proof for it. The Bayesian methodology use ensures healthy models and identifies non-linear connections between indicators to imprison real-world non-linarite. Therefore, models can be used in policymaking to predict short-term evolutions in the indicator variables. And also discussed how our approach can be used to evaluate policy initiatives such as the Millennium Development Goals or the Sustainable Development Goals and set additional precise, country-specific development targets.

2.3. Empirical review

In literature, not only the theoretical studies about the belongings of demographic transition on economic growth are establish but empirical work is also there to give details this relationship. Researchers still has to find a clear relationship between demographic transition and economic growth as there is found uncertainty and variety in the conclusion of different researchers. This literature is separated into four categories; first demographic transition impacts on developed countries economic growth. Second, demographic transition impacts on developing countries economic growth. Third, demographic transition impacts on Pakistan's economic growth. Fourth is a demographic impact on developed and developing countries economic growth.

a) Demographic Transition Impacts on Developed Countries Economic Growth

According to Mason (1997), a study was conducted to inspect the connection between population change in

developed countries and the increase of eight Asian economies. The demographics of the Asian soothing countries resulted in labor force, higher incomes, investment, taxes and finally unparalleled economic growth. Population change in East Asia will hold up strong economic growth for at smallest amount two or additional decades. Successful policy as well as fertility and mortality rates have shaped a period of astonishing economic growth. The result found that Demographic factors such as changes in the age structure and the arrival of women into the work force have led to a senior proportion of the population in the workforce. Demographic change also amplified savings rates and augmented ability to save small families.

Hondroyiannis and Papapetou (2002) explored the belongings of demographic relocation in Europe. Annual data from nine European countries I-e Germany, France, Italy, the United Kingdom, Spain, Ireland, the Netherlands, Finland and Sweden were taken from International Financial Statistics throughout 1960-1998. Fertility rate was the needy variable while mortality, genuine wages and genuine per capita output were the independent variables. The results showed that real GDP growth per capita had a positive result on children's insist, while a genuine wage adds to and a reduction in mortality negatively impacted fertility rates.

b) Demographic Transition Impacts on Developing Countries Economic Growth

Watkins, Menken & Bongaart (1987) claims that the decrease of fertility required to attain demographic data will need reversal. Captivating education from the experiences of East Asian as well as Muslim countries such as Bangladesh, Iran, Indonesia and Malaysia, it was obvious that demographic refuse was very significant in sympathetic the population ratio and it was also significant in plummeting poverty. After decades of rapid population growth, the potential for slow growth is in front as fertility is moribund. The incentive for population growth in the prospect is very sensitive to the time and the degree of the refuse in fertility**.**

Line (1967) established that population growth is a hindrance to developing countries. Developing countries were lacking in resources, and young dependents made the situation worse by putting a burden on the economy. It was hinted that the economy could be developed and developed by providing job opportunities to the working class. In this way, the working class will no longer be dependent and will be active in promoting the economy. The complex relationship between population and economic growth was observed and countries should learn from their past experiences.

Mcnay (1995) highlighted on the demographic transition which has turn out to be a dramatic global occurrence, in which most developing countries are now participating. It has its collision of women's role and position on the transition, considerably less has been said about the association in the other direction, i.e., the implications of moribund morality and fertility for women's lives. This paper presents a review of the proof on this penalty in developing countries. The author argues and concludes that even though the demographic transition is usually a positive procedure for women, there is not always an uncomplicated link to improvements in female status and gender parity.

Singariya (2016) the creative capacity of an economy is straight linked to the size of its working – age population relative to its total population, it is essential to differentiate between the two components when exploring the impact of demographic change on economic presentation. This paper summarizes key trends in population size, fertility and mortality, and age structures during these transitions. The focal point is on the century from 1950 to 2050, which

covers the period of most rapid global demographic transformation. Thus the growth of reliant population slows down economic growth. However, elderly dependent population is fewer impediments in the process of economic growth in Rajasthan.

c) Demographic Transition Impacts on Pakistan's Economic Growth

Durrant & Arif (1998) posits that demographic factors in Pakistan cause poverty at both the macro and micro levels. Focusing on micro-levels, he explained the link between demographic factors and poverty dynamics in the countryside. It draws five conclusions from its analysis. First, household size increases the risk of living in chronic poverty or being "transiently poor" (entering or out of poverty). This means that due to demographic pressure, larger families are more likely to live in chronic poverty or temporary poverty. Second, the high dependency ratio is associated with both long-term (chronic) poverty and transitional poverty. Third, population growth is negatively related to chronic poverty at the time of employment, but they have no role in helping households escape poverty. Fourth, without efforts to improve both the health status of the poor and the poor and their educational level, it is difficult for households to avoid poverty. Fifth, household assets, especially housing, keep homes out of chronic poverty. Despite the importance of assets for domestic welfare, demographic pressure can put many families in poverty and make the movement out of poverty difficult.

Amjad, *et al.* (1997) has analyzed the disturbing situation of population explosion in employment viewpoint. He found that the most direct and socially volatile effect of this population increase was is on the employment scenario. As Pakistan will require creating 2 to 3% jobs every minute in 1990s because population of Pakistan will be increasing by 1.25 million annually in this period. This study only decorated the effect of high population growth on employment situation and neglected other economic development obstacles like adverse effects of population growth on health sector, education provisions, etc.

d) Demographic Transition Impact on Developed and Developing Countries Economic Growth

Gomez and decos (2003) assessed the change in per capita GDP due to modify in proportion of adult workers across countries. The results found that fall in birth rate had led to a decrease in the ratio of dependents to working age persons, positive effect on economic growth and increase in the size of work force. Growing working age population also affected saving rates and labor force productivity. Decline in birth rates changed the size and structure of the working age population. Cohort of working age persons had large positive impact while ratio of prime age workers had positive but diminishing effect on growth of per capita GDP. Growth was highest when the prime age worker's ratio was 0.36. South Asia's vigorous economic growth could be ascribed to the size and structure of the working age population. Rich nations have had aged working population while poor nations young one. Persistent decrease in birth rate will push down countries from optimal maturity ratio to dampening. The impact of ageing population was not clear cut on economic growth.

Prskawet (2007) conducted a research to estimate the effects of age structure on economic growth. The data of 97 developing and developed countries was used for the time period 1960 to 1995. The results indicated that the growth of the working age population had positive and significant impact on the GDP per capita growth rate while the growth rate of the population affected GDP per capita negatively and significantly. The results also exhibited that youth

dependency ratio's aftermath was negative and significant; whereas social infrastructure caused GDP per capita positively and significantly. A declining youth dependency ratio and a constant old dependency ratio were also forecasted for India.

3. HISTORY OF DEMOGRAPHIC TRANSITION OF PAKISTAN

Theory of demographic transition

The theory is based on an examination of demographic history developed by the American demographer Warren Thompson (1887–1973) in 1929.Adolph Landry of France made equivalent amplification on demographic patterns and population growth potential around 1934. Frank W. Notestein (1945) developed a more authorized theory of demographic transition. By 2009, the survival of a negative correlation among fertility and industrial development had become one of the most widely recognized conclusions in social science.

The observable fact and theory of the demographic transition refers to the historical move in demographics from high birth rates and elevated infant death rates in societies with insignificant technology, education (especially of women) and economic growth, to demographics of low birth rates and low death rates in societies with greater technology, education and economic development, as well as the stages between these two scenarios. Even though this shift has occurred in many developed countries, the theory and model are frequently blurred when functional to individual countries due to overt social, political and economic factors moving particular populations.

Stages of demographic transition

The demographic transition involves five stages.

- In stage one; pre-industrial society, death rates and birth rates are high and approximately in balance.
- In stage two, that of a developing country, the death rates drop rapidly due to improvements in food supply and sanitation, which increase life expectancies and diminish disease.
- In stage three, birth rates fall due to different fertility factors such as contact to contraception, urbanization, increases in wages, a reduction in survival agriculture, an increase in the position and education of women, a lessening in the value of children's work, an increase in parental investment in the education of the children and other social changes.
- For the duration of stage four there are both low birth rates and low death rates.
- Stage five linking an increase in fertility.

Demographic transition Model of Pakistan

Currently Pakistan is in stage two of the demographic transition model. Pakistan has a very elevated total fertility rate of 3.8 children per woman; excessively high to be calculated a stage three or stage four countries. Pakistan's population Pyramid as well states that is has a very immense plinth of younger people but a very minor peak of older people. Consequence the life expectancy is pretty low; a most important characteristic of a stage two country. Furthermore the birth rate and population pyramid Pakistan also has a very high infant progress rate of seventy-four deaths for each thousand live births. This is a dead haggle of the country creature in stage two.

The challenge of the demographic transition

The labor force growth rate has been quicker than on the whole population growth rate. Therefore the operational age population (ages 15–64) as a percentage of total population enlarged from 54 percent in 1998 to 57 percent in 2005. At the same time, the dependency ratio (the population below 15 and over 64 separated by the working-age population) declined from 0.86 to 0.75. These trends are estimated to keep on over the next two decades, and the dependency ratio will attain its lowest level by 2030.

The declining dependency ratio means additional working people pleasing care of fewer dependents. Hence it constitutes a window of chance for advanced economic growth if individuals of working age include access to dynamic employment. The data recommend that this so-called demographic transition in Pakistan will final until 2050 when the growth rates of population and the labor force are estimated to amalgamate. It has been projected that over 60 percent of Pakistan's population is lower than age 30. The labor force in the age group 15 to 49, projected at 96 million in 2010, is predictable to enlarge to 181 million by 2050, whereas the total labor force is projected to enlarge from 110 million to 235 million more the same gap. This means that 3.1 million persons, of which 2.1 million will be young, are projected to go in the labor force every year above the next four decades. if not they are provided with sufficient health, education, and livelihoods, this demographic change can have unstable social and political consequences.

Population growth rate in Pakistan remained rather very slow in the starting era and was less than 2% till 1960. In the era of Ayub Khan financial development accelerated population growth rate and it was over 2%. Throughout inter-censal period of 1981-98, Pakistan's population growth rate was 2.69% and it was one of the topmost in the world (Zaidi, 2006). As economic growth lengthened, population growth rate ongoing to turn down and it was below 2.5% between 1990 and 2010. The decaying inclination in population growth rate continues and it is decreased to 2%.

In case of Pakistan, high profitability led to elevated population growth in new past. During the 1960s abundance rate remained linking 6 and 7. According to Pakistan Fertility analysis of 1975 there were 6.3 births per woman. In 1990s there was disconnecting declining propensity in fertility rate. The PIHS of 1998 showed that TFR declined to the level of 5 (Sathar, 2001). According to the Economic Survey of Pakistan TFR in Pakistan has fallen to 3.3. Fertility rates are little older in rural areas than urban areas. The current population of Pakistan is 204.5 million as of Sunday, August 4, 2019, based on the latest United Nations projection. Pakistan population is comparable to 2.65% of the total world population.

Census in Pakistan

- In 1951 census, the territory of Pakistan had a population of 75 million populations, in which West Pakistan had a population of 33.7 million and East Pakistan (today Bangladesh) had a population of 42 million.
- In 1961 census, the population of Pakistan was 93 million, with 42.8 million settling in West Pakistan and 50 million settling in East Pakistan.
- In 1972 census, the population of Pakistan was 65.3 million. According to the 1981 census, the population of

Pakistan was 83.783 million.

- In 1998 census, the population of Pakistan was 132.3 million. In census authorized results, confirmed on August 25, 2017, the population of Pakistan was 207.7 million.

4. RESEARCH METHDOLOGY

4.1 Introduction

This chapter elaborates the data, its collecting source and the technique which is employ to estimates the data.

4.2. Theoretical Framework

According to Malthusian population trap (1798) is that population boost was spring to stop since life-sustaining income, which increase at an arithmetic rates, would be inadequate to support population growth. Secret impetus of population growth is the occurrence anywhere by population continues to increase yet following a drop in birth rates as the great accessible youthful population expands the population attractive ability.

The collision of Demographic transition on economic growth is investigated by the subsequent growth model:

$GDP=A\,f\,(K,L)$

$GDP = AK^{a}L^{\beta}$

Now taking log of both sides

$$\ln GDP = \ln A + \beta_1 \ln K + \beta_2 \ln L + \mu \quad \text{.....(1)}$$

While population includes together employees i.e. labor strength and non-workers. In arrange to comprise non-workers in the model we utilize proxy of addiction ratio as it calculate the weight on the dynamic population.

$$\ln GDP = \ln A + \beta_1 \ln K + \beta_2 \ln L + \beta_3 \ln DR + \mu \quad \text{..... (2)}$$

Where DR stand for addiction ratio in other terms quantity of the population that is dependent on work force. The age dependency ratio is the ratio of dependents (people 14 years or younger, or 65 and older) to the operational age population (those aged 15–64 years).

One more significant variable of demographic transition is life expectancy which shows that the standard number of year's toddler is predictable to live. Thus 2 equations becomes as:

$$\ln GDP = \ln A + \beta_1 \ln K + \beta_2 \ln L + \beta_3 \ln DR + \beta_4 LE + \mu \quad \text{.....(3)}$$

Somewhere LE represents the life expectancy. Life expectancy variable is worn as stage variable as it is further suitable to use in number form. (Bloom 2009).... Gross capital formation (GCF) consists of outlays on flourishes to the permanent property of the economy advantage net changes in the stage of inventories, and it also refers to the profit of GDP.

Now to locate the Demographic transition from 1975 to 2018 and its suggestion from economic growth. We can illustrate it by the subsequent distinction model.

First we will change our model in per capita form for year 1975.

$$\left(\frac{GDP}{Cap}\right)1975 = \left(\frac{Capital}{Capita}\right)1975 + \left(\frac{L}{Cap}\right)1975 + \frac{DR}{Capita} + LE + \mu$$

For year 2018.

$$\left(\frac{GDP}{Cap}\right)2018 = \left(\frac{Capital}{Capita}\right)2018 + \left(\frac{L}{Cap}\right)2018 + \left(\frac{DR}{Capita}\right) + LE + \mu$$

Now we have to find out the growth rate of the variables we have to get the usual log of the differenced variables:

In

$$\left(\frac{GDP}{Cap}\right)1975 - \left(\frac{GDP}{Cap}\right)2018 =$$

$$ln\left(\frac{Labor}{Cap}1975 - \frac{Labor}{Cap}2018\right) + ln\left(\frac{Capital}{Cap}1975 - \frac{Capital}{Cap}2018\right) + ln\left(\frac{DR}{Cap}1975 - \frac{DR}{Cap}2018\right) + Life\ Expenteny + \mu$$

$$ln\left(\frac{\left(\frac{GDP}{Capi}\right)1975}{\left(\frac{GDP}{Capi}\right)2018}\right) = ln\left(\frac{\left(\frac{Capital}{Capi}\right)1975}{\left(\frac{Capital}{Capi}\right)2018}\right) + ln\left(\frac{\left(\frac{Labor}{Capi}\right)1975}{\left(\frac{Labor}{Capi}\right)2018}\right) + ln\left(\frac{\left(\frac{Dependency\ Ratio}{Capi}\right)1975}{\left(\frac{Dependency\ Ratio}{Capi}\right)2018}\right) + LE$$

The on top of growth model is functional in the regression form and depicts relation among the natural log of GDP per capita as dependent variable and the log of capital per capita, labor per capita, total dependency ratio and life expectancy:

The complete regression model took year as follows:

$\ln (GDP/cap) = \beta_0 + \beta_1 \text{ In (Capital/Cap)} + \beta_2 \text{ In (Labor/Cap)} + \beta_3 \text{ (Dependency Ratio)} + \beta_4 \text{ (Life Expectancy)} +$ ----- (4)

Regression model will be given as:

$\triangle \text{In (GDP/cap)} = \beta_0 \triangle + \beta_1 \triangle \text{ In (Capital/Cap)} + \beta_2 \triangle \text{In (Labor/Cap)} + \beta_3 \triangle \text{ (Dependency Ratio)} + \beta_4 \text{ (Life Expectancy)} +$

The yearly modify in 43 years, from bottom year 1975 to present year 2018, and ε is the error phrase. GDP per capita, in(GDP/Cap), capital per capita in(Capital/Cap) and labor per capita, in(Labor/Cap), were log differenced in arrange to create them as expansion rates, because the rates of modify of its natural log are identical to the growth rates of the variables. Only the difference in the entirety dependency ratio (Dependency ratio) was intended. Life expectancy

at birth (Life expectancy) was functional as a variable stating the number of years, based on year 1988.

This is the generalized equation to analyze the impact of demographic transition and its complementary association on economic growth derived from the theoretical model and forms the basis of analysis of this study.

4.3. Econometric Technique

Previous studies used the standard least square (OLS) estimation technique to confine the result of demographic transition on economic process.

The econometric model of this study relies on associate degree over known equation having endogenous variables correlating with inaccuracy term. Remaining choice to deal the endogeneity drawback could also be instrumental variable (IV) technique. TSLS estimation technique is special variety that deals with the matter of endogeneity and over- known equation however doesn't provide standard error corrected for autocorrelation of unknown type. Additionally, 3 stages least square (3SLS) is additionally technique to follow here because it deals with the matter of endogeneity however applied within the presence of system of equations. Furthermore, it tackles with contemporaneous correlations. Lastly, Generalized Least square (GLS) estimation conjointly manages the endogeneity drawback however has some extra assumptions.

To deal endogeneity, the instrumental variable (IV) is that the best offered alternative that may be utilized in the multivariate analysis to unravel the issues of simultaneousness bias between informative variables, the variable and also the error measurement. Similarly, generalized method of Moment is that the extended type of instrumental variable technique that yields consistent result even within the presence of auto-correlation and hetroskedasticity. Secondly, it's the clear benefits to yield parameters through the maximizing the target perform which has the instant restriction during which correlation between the lagged regressor and also the error term is zero.

These 2 points of GMM build it superior to TSLS, 3SLS and GLS technique. Thus GMM estimation contains a clear advantage on particularly mentioned technique with applicable to its reliability and potency. Furthermore, the technique of GMM not solely takes into consideration the lower moment likes like mean, median, mode however conjointly higher order moments like lopsidedness and kurtosis additionally. Thus distinction GMM technique would be follow to estimate the expansion equations singly having completely different indicators of demographic transition. Distinction GMM works in 2 steps i.e., by running regression on level within the commencement and in second step it runs regression on 1st distinction of the parameters to be calculated able.

Mostly, the matter of endogeneity arises thanks to the presence of reverse causing and successively the endogenous variable correlates with the error term. During this scenario, normal regression toward the mean usually yields biased and inconsistent estimates. However, consistent estimate should be obtained, if associate degree acceptable instrument is on the market. In linear models, there square measure 2 main necessities for mistreatment associate degree IV:

- ✓ The instrument should be correlated with the endogenous informative variables.
- ✓ The instrument cannot be correlate or orthogonal to error term within the equation.

To tackle endogenously verify variables and omitted variable bias, the distinction GMM estimating procedure developed by Arellano and Bond (1991), Arellano (1993), and Aerllano and Bover (1995) has been used to estimate the expansion equation singly mistreatment lagged values of the variables as instruments. The economic code E-Views has been used for estimation purpose. However potency of GMM estimation, to a bigger extent, depends on however the instruments of endogenous variables square measure developed (Greene, 1997).

From offered selections in E-Views and within the light-weight of higher than discussion, ―GMM statistic (HAC)‖ possibility is chosen to induce commonplace errors consistent in presence of auto-correlation and hetroskedasticity. Throughout estimation, this method permits to correct serial correlation of unknown type additionally as hetroskedasticity. For a lot of accuracy, Newey-West west technique is employed to get the dissonance residuals. E-view mechanically calculates the likelihood price of J-statistics that may be a take a look at to envision the strength of the model and instruments utilized in the analysis. Furthermore, familiarity take a look at would be conducted to envision the traditional distribution of the residuals when the regression is run.

4.4. Diagnostic Test

Before obtainable to major estimation technique, several diagnostic tests are conducted ahead of running regression analysis. These whole tests are described in detail under in agreement with their proper ordering and reason.

4.4.1. Descriptive statistics

Descriptive statistics are reported at the first pace of analysis. Descriptive statistics is the regulation of quantitatively telling the major features of a compilation of information. Descriptive statistics aims to sum up a sample, somewhat use the data to learn about the population that the sample of data is consideration to symbolize. Some measure that are usually used to describe a data set are measure of central leaning take in the mean, median and mode.

4.4.2. Lagrange Multiplier Test

The Lagrange number (LM) test could be a broad standard for testing hypotheses relating to parameters throughout a chance framework. The hypothesis underside test is uttered joint or supplementary constraints on the principles of parameters. To carry out connect degree lumen make sure exclusively estimation of the parameters subject to the limitations is desirable. This is frequently in distinction with Wald tests, that area unit supported unobstructed estimates, and possibility quantitative relation tests that require each limited and clear estimates.

The name of the test is encouraged by the extremely information that it will be consideration to be testing whether or not the Lagrange multipliers worried in implementing the limitations area unit significantly completely dissimilar from zero. The term Lagrange number itself could be a wider mathematical utterance coined when the work of the eighteenth century man of science Joseph Louis Barrow Lagrange.

The lumen testing principle has established extensive pertinences too more than a few issues of attention in political economy. Furthermore, the notion of testing the worth of impressive the limitations, though at first developed throughout a chance framework, has been comprehensive to dissimilar estimation environments, jointly with technique of moments and sturdy assessment.

The name Lagrangian number makes sure was originally utilized by S. David Silvey in 1959. His work provided an ultimate treatment of testing issues throughout which the null hypothesis is nominative by constraints. The good quality benefit of this technique is that it permits the optimization to be determined while not articulate parameterization in terms of the constraints.

As a result, the strategy of Lagrange multipliers is broad familiar solve hard stressed optimization issues. The strategy will be summarized as follows: so as to search out the stationary points of a carry out f(x) subject to the parity constraint g(x) =0, types the Lagrangian perform.

4.4.3. Generalized method of moments

In economics and statistics, the generalized technique of moments (GMM) may be a common technique for estimating parameters in functional mathematics models. Usually it's practical inside the circumstance of semi regular models, where the parameter of concentration is finite-dimensional, while the taken style of the data's portion carry out capacity not be prominent, and for that reason maximum possibility judgment isn't related. The strategy needs that a convinced multiplicity of moment conditions were precise for the model. These moments state of dealings are functions of the model parameters and also the information, particular their hope is zero at the parameters' true standards. The GMM technique then minimizes a positive standard of the example averages of the immediate state of relationships. The GMM estimators are famous to be dependable, asymptotically customary, and capable within the grouping of all estimators that don't use a lot additional info to one side from that forbidden within the instant circumstances. GMM was wrought by Lars Peter Hansen in 1982 as a generalization of the strategy of moments, introduced by Karl Pearson in 1894. Hansen communal the 2013 accolade in economic science partially for this work. The population moment situation can are play a significant position within the speech communiqué thus its worth going back to the primitives to appreciate the technicalities of GMM. The uncooked egalitarian moments are simple to work out and that they reveal essential aspects of connect in nursing distribution. For example, the main four moments tell North American nation concerning the population denote, discrepancy, asymmetry and kurtosis.

Exploitation them we are talented to at once place confines consistent with our theory on the assignment, scale or form of the allocation with no specifying a full model or allocation. If we will noticed some info on the population, the question scraps a way to use the example to approximate the parameters of concentration. In ordinary, sample statistics each have a complement within the population, for instance, the association among the sample mean and also the population predictable value. The similar old next step inside the assessment is to use this similarity to allow cause for development the sample moments as foundation of estimators of the population parameters. The majority tactics were the in Karl Pearson’s work [1893], [1894], [1895] inside the late nineteenth century. The Pearson family of distributions may be a awfully lithe graphic character that has fairly a few essential and repeatedly used distributions among its members calculation on the parameterization you decide. Pearson’s disadvantage was to decide on a suitable member of the family for a specified dataset.

The economics literature offers the research worker a good multiplicity of inference ways contradictory within the amount of in succession they use, preliminary from completely parameterized likelihood-based techniques to antiseptic statistic ways and a stylish diversity in flanked by. Selecting one befittingly may be a reverential task as a

correctly such steady model provides a good deal superior brilliance estimates than ways that presume very little additional than mere connection among variables at one a advance. On the conflicting hand, this aptitude comes at a cost of perhaps false confines. From a new reason of read, semi- and non steady ways are a good deal improved to variations within the basic information generating practice and still could offer dependable estimates while not stunning additional assumptions. We've mentioned that GMM is additional brawny to model command than metric ability unit because it needs fewer in succession. This explains the increasing superiority of semi steady estimation frameworks like GMM, as they authorize to fit in precisely the maximum quantity restraint as theory implies. To state it in our have way, the GMM computer is constructed on a lot of common (unspecified) independence of the population than within the antique likelihood-based framework, because it needs fewer and weaker assumptions.

5. DATA PRESSENTATION & ANALYSIS

5.1. Selection of the variables and the data sources:

The variables are selected for this study is GDP per capita growth rate, gross capital formation, Labor Force, Dependency ratio and Life expectancy. This study will be use the time series data from the period 1975 to 2018. The data will be collected from Pakistan economic survey, IFS, World data bank. The definitions of the variables are given in the table.

Table 4.3: Definition of the variables

GDP per capita:	It is the total value of all goods and services that are formed in a country in an exacting time period divided by the population. GDP per capita is used to estimate the economic productivity of the country on accounts of number of people. It reflects the average of living of the people.
Gross capital formation	Capital formation is a term used to explain the net capital accrual for the duration of an secretarial period for an demanding country. The term refers to accompaniments of capital goods, such as equipment, tools, transportation property, and electricity. Countries need capital goods to put back the grown-up ones that are used to create goods and services. If a country cannot put back capital goods as they arrive at the end of their practical lives, manufacture declines. Usually, the higher the capital formation of an economy, the quicker an economy can produce its collective income.

Labor Force	The labor force is defined as the people who wanted to work and they have aptitude for working appropriately. The size of labor forces to arbitrator the unemployment rate. Employed and unemployed completed the labor force. Those people who are not measured employed or unemployed, they are not in grouping of labor force.
Dependency Ratio	Dependency ratio is used to compute the load on the productive population. It is defined as the age population ratio among non-workers (i.e. those not in the labor force) and workers (i.e. those in the labor force). Non-workers comprise those individuals of age 0 to 14 years and above 65 years. Workers comprises of individual of age 15 to 64 years. As the generally age of the population rises, the ratio can be moved to imitate the inflamed needs associated with an aging population.
Life expectancy	Life expectancy is defined as the number of years person is expected to live. Average age, a person can live is used as the base of the life expectancy. This number is firm based on the statistical standard, allowing for many factors, including year and place of birth, race, education level, income, and medical history. There are a lot of varied types of life expectancy calculations, and the number varies in surplus of time.

5.2. Description of variables

5.2.1. GDP Per Capita

The finest proxy, which elaborates the economic presentation of the country, is the gross domestic product. GDP is amplification as the merit of goods and services which are contrived inside the restrictions of a country in one year time border. It also includes the last goods and services of all foreigners corporation which exists in the border of the country. To a few extents some services like educational and protection which are completely beneath the management of the government are also parts of gross domestic product.

On the other hand, gross domestic product can be explained by the assist of three opinion i.e. income, move toward, production approach and expenditure approach, first consideration says that income which are shaped by the

production in recognized as income consideration, while some worth which unite to the manufacture on each step is the making and the preceding one came into organism final consumer bought this good recognized as the expenditure consideration.

A well-known method to compute the GDP is to calculate all the ended goods and services which are shaped in the four ways all of a country in an exact time frame usually one year time boundary equivalent to the asset, government expenditure and sum shopper plus exports value deficiency bring in value. GDP is the recognizable calculate growth, national income and acquiesce. Researchers discover two types of GDP. Real GDP reveals the gross nominal GDP number for rise, making real GDP more helpful for historical comparisons. At the same time as nominal GDP discover the money spending and called a little bit money GDP. And real GDP called a little bit steady price GDP or inflation-corrected GDP.

The GDP shows the rising rate what economies have shaped all through the year. Tax revenue and government spending are connected with GDP. a little bit government inflict new taxes to gather revenue, which influence economy unenthusiastically and a little bit government increase its expenditure which, sometime hold back its revenue to a fund a scheme of public attention example authority plant, development of mines or project like Gwadar port etc. because government can pay for that long and enormous amount of money.

Gross Domestic Product of Pakistan grew 5.5% in 2018 compared to previous year. This rate is 3 -tenths of one percent superior to the figure of 5.2% available in 2017. The GDP figure in 2018 was $314,588 million; Pakistan is number 41 in the position of GDP of the 196 countries that we distribute. The complete value of GDP in Pakistan dropped $10,021 million with admiration to 2017. The GDP per capita of Pakistan in 2018 was $1,565, $21 less than in 2017, when it was $1,544. To view the development of the GDP per capita, it is attractive to look back a few years and contrast these data with those of 2008 when the GDP per capita in Pakistan was $1,038. If we order the countries according to their GDP per capita, Pakistan is in 154th location; its population has a small level of wealth contrast to the 196 countries whose GDP we distribute. Conversely, projections for the coming years forecast that GDP will grow at a rate underneath 3 percent in the pending years.

Many researchers have done their researches on GDP and evaluate different results. According to Kelly and Schmidt (1994) describes in the study that when population growth will be high brakes to impede average growth rates when calculated as per capita gross domestic product (GDP). They presented good analysis of under developed and very poor countries and a negative.

5.2.2. Gross Capital Formation

Gross capital formation is (also known as gross domestic investment) consists of outlays on trimmings to the permanent property of the economy plus net changes in the stage of inventories. Preset property include land improvements (fences, ditches, drains, and so on); plant, machinery, and start purchases; and the building of roads, railways, and the like, including schools, offices, hospitals, private housing dwellings, and profitable and manufacturing buildings. Inventories are stocks of goods under arrest by firms to get jointly provisional or unexpected fluctuations in produce or sales, and 'work in growth. According to the 1993 SNA, net acquisitions of burgle are also cautious capital formation. Gross fixed capital formation is essentially net benefit. It is a part of the expenditure method of scheming

GDP. To be more precise Gross fixed capital formation events the net supplement in fixed capital. Gross capital formation can be rotten into the next parts: gross fixed capital formation and investment in inventories. Gross fixed capital formation consists of the worth of producers' acquisitions of new and obtainable non-financial possessions less the worth of their disposals of non-financial property.

Conversely, some time gross capital formation affects channel the economic growth rate. Enhanced capital investment allows for additional examine and growth in the capital association. This growing capital structure raises the original capability of labor. As labor becomes well-organized, supplementary goods are wrought (higher gross domestic product) and the economy will be growing highly. The two main sources of Sources of Capital Formation are domestic and outside sources of which domestic sources enclose charitable and instinctive savings, public borrowings, recruitment of inactive resources, and shortfall financing. In 2017, gross capital formation for Pakistan was 5,026,831 million %. Between 1998 and 2017, gross capital formation of Pakistan grew considerably from 583,673 million to 5,026,831 million % rising at an increasing annual rate that reached an utmost of 36.09 % in 2006 and then decreased to 11.05 % in 2017.

Evidence from the literature review indicated that gross capital formation is the potential work force in developing countries is assumed to develop by an average percent (Maliha Mahru Rehman et al. 2017).

5.2.3 Labor force

The labor force is the information of people who are working benefits the unemployed who are looking for work. The labor puddle does not enclose the jobless who aren't looking for work. For example, stay-at-home moms, retirees, and students are not element of the labor force. Disheartened workers who would have been like a job but have specified up looking are not in the labor force both. To be measured part of the labor force, you must be easy to get to excited to work, and have looked for a job lately. The official unemployment rate events the jobless who are at rest in the labor force. The size of the labor force depends not only on the number of adults but also how probable they experience they can get a job. So, the labor puddle shrinks during and after a curve. That's true even though the number of people who would like a full-time job if they could get it may wait the similar. The genuine unemployment rate events all the jobless, even if they're no longer in the labor force.

Pakistan has one of the largest labor and manpower belongings in the world, suitable to its large population, which is the sixth largest in the world. According to data shaped by the CIA World Fact book, the total number of Pakistan's labor force is 57.2 million, formation it the ninth largest country by available human workforce. About 43% of this labor is concerned in agriculture, 20.3% in industry and the outstanding 36.6% in other services. The circumstances under which Pakistan's blue-collar labor works have often been raised by deal unions and workers' rights organizations. There is also a renowned, yet broad use of child labor in Pakistan. All beside with other countries in the South Asia, Pakistan usually exports much of its labor to seal to Persian Gulf countries of the Middle East.

Many researchers are working on labor force and they also give the many different results and aspects on the economic growth rate. However, that negative effects of growth in the total population and the young population on economic growth while showing positive effects of growth in the working age population and the working age population ratio (Sijia song 2013). Fang *et al.* (2014) has studied the labor force and the relationship between long run

growth and unemployment. They believe increases in unemployment compensation, increases in hiring costs, increases in workers bargaining power all lower employment and long run economic growth affecting female labor participation.

5.2.4 Life expectancy

Life expectancy is approximation of the standard number of added years that a person of a known age can be expecting to live. The most ordinary measure of life expectancy is life expectancy at birth. Life expectancy is a hypothetical calculate. It assumes that the age-specific death rates for the year in query will apply all through the life span of individuals born in that year. The estimation, in result, projects the age-specific humanity (death) rates for a given period over the whole lifetime of the population born (or alive) throughout that time. The calculation differs significantly by sex, age, race, and geographic location. Therefore, life expectancy is commonly given for specific categories, rather than for the population in universal. Life expectancy reflects local situation. In less-developed countries, life expectancy at birth is comparatively low, compared with more-developed countries. In some less-developed countries, life expectancy at birth may be lesser than life expectancy at age 1, because of high infant mortality rates (commonly due to communicable disease or lack of contact to a clean water supply).

Life expectancy is planned by constructing a life table. A life table incorporates data on age-specific death rates for the population in question, which requires inventory data for the number of people, and the number of deaths at each age for that population. Those numbers characteristically are resulting from national survey and vital statistics data, and from them the average life expectancy for each of the age groups within the population can be calculated.

This admission contains the typical number of years to be lived by a compilation of people born in the similar year, if mortality at each age remainder stable in the prospect. Life expectancy at birth is also a gauge of largely worth of life in a country and summarizes the humanity at all ages. It can also be consideration of as representative the potential revert to on asset in human capital and is essential for the computation of a variety of actuarial events. Both sexes have dual. The standard number of years of life unsurprising by a hypothetical cohort of individuals who would be focus during all their lives to the mortality rates of a given era. It is expressed as years. Life expectancy at birth for Pakistan was 66.63 years. Life expectancy at birth of Pakistan increased from 51.62 years in 1968 to 66.63 years in 2018 growing at an common yearly rate of 0.52 %.

Evidence of the literature review that life expectancy improvements of life expectancy do, on the other hand, reduces population growth. This implies that the things of life expectancy on population, human capital and income per capita are not the similar before and subsequent to the demographic transition. A study found a marked relationship between economic disparity and life expectancy on the other hand, a study by José (2013). The authors propose that when people are working additional hard during good economic times, they experience more stress, experience to pollution, and likelihood of damage amid other longevity-limiting factors. A study conducted by Mason (1988) on the healthcare status of the labor force shows that life expectancy has been an optimistic smash on economic growth. In this study, life expectancy next to with labor productivity has been an apathetic collision on economic growth. This negative growth is unsettled to slow down healthcare expenditures (less than 2 per cent of the GDP) in decision to a superior population growth rate.

5.2.5. Dependency Ratio

The age-dependency quantitative relative will confirm that stage within the Demographic Transition Model and precise country is in. The dependency quantitative relative acts type of a rollercoaster once researching the stages of the Demographic Transition Model. All through stages one and a pair of, the dependency quantitative relation is elevated thanks to considerably elevated crude birth rates golf fondle weight onto the lesser working-age population to need care of all of them. In stage 3, the dependency quantitative relative begins to reduce as a result of fertility and mortality rates start to lessen that shows that the proportion of adults to the young and old area unit plentiful larger throughout this stage. Bit by bit four and five, the dependency quantitative relation starts to enlarge all over once more because the working-age population retires.

As a result of fertility rates caused the younger population to reduce, once they get older and start in service, there'll be extra heaviness for them to need care of the preceding working-age population that just retired since there'll be extra young and old folks than working-age adults all through that point amount. The population structure of a bucolic is a very significant issue for important the economic position of their country. Japan could be a pleasant example of relate aging population. They require a 1:4 quantitative relation of individuals sixty five years and older. These causes difficulty for them as a result of there don't seem to be sufficient folks inside the working-age population to hold up all of the elders. African nation is one more example of a population that struggles with a younger population (also called the "youth bulge"). Each of those countries area unit battling high dependency ratios in spite of the fact that each countries area unit on conflicting stages of the Demographic Transition Model.

The dependency ratio has an inverse relationship with the average of living (level of material soothe in terms of goods and services obtainable), which means the superior the dependency ratio is the inferior the excellence of life. The youth dependency ratio of Pakistan is approximately 53.4 percent, which adds to the total of 60.4 percent.

Evidence of the literature review that unfair changes when mortality and fertility rates changes from elevated to low levels, we have established that three things may temporarily slow down economic growth during the process of demographic transition. The growth differential between the working age and the total population, the child dependency ratio and old age dependency ratio. Bloom and Williamson *et al.* (1998) and Tanveer (2010) described that dependency ration sometimes positive and significant and sometime it creates negative impact.

5.3. Data presentation and Analysis

The data for the regression analysis and the definition of the variables were taken from the Pakistan economic survey and World Bank development indicators.

5.4. Description of the variables.

The dependent variable is GDP and Gross capital formation, labor force, life expectancy dependency ratio are independent variables.

5.5. Statistical Analysis

5.5.1 Descriptive Analysis

Statistical analysis starts with descriptive analysis. This is the first step before conducting any analysis or following any estimation technique.

Table 5.5.1: Descriptive Statistic

Variables	Obs.	Mean	Std.Dev	Min	Max
Per capita GDP Growth rate	42	14.52776	5.05291	5.7669	30.2116
Gross capital formation	42	16.8818	11.3573	1.8813	48.52482
Labor force	42	38.6435	12.9414	20.6400	63.2600
Life expectancy	42	61.3538	3.3189	55.2700	64.4800
Dependency ratio	42	81.1238	8.5591	64.9700	88.8700

This study is based on the time series annual data having 42 observation of every variable used in the analysis. Descriptive statistics shows that per capita GDP growth rates has mean value of 14.5 with the minimum value of 5.76 and maximum value of 30.2. The smaller value of standard deviation indicates that data is not highly dispersed and data points are close to mean average value. Economically, it may be reasoned here that the growth rate of per capita GDP has been stagnant over the years in Pakistan and several economic, social, political factors are responsible for this.

The value of Gross Capital Formation ranges from 1 percent to 48 percent with the average value of 16 percent. Moreover, the value of standard deviation shows that the data points differ from mean value by 11 percent. Economically, it may be interpreted here that the level of even though rigorous challenges, the economy has shown flexibility in these years.

The minimum value of labor force is 21 percent and maximum value is 64 percent with the average value of 39 percent. The value of standard deviation is 13 percent which shows that the higher level of variation present in the data.

The other is life expectancy rate and its mean value is 62 percent with the range of data 56 to 65 percent. It may be interpreted here that there has been a sharp change in life expectancy rate over the year in Pakistan. Life expectancy at birth of Pakistan increased from 52 years in 1968 to 67 years in 2017 growing at an average annual rate of 0.54 %.

The dependency ratio indicates ranges from 65 percent to 89 percent with the average value of 82 percent.

Again the higher value of standard deviation shows a higher level of variation present in data for dependency ratio. The age dependency ratio for Pakistan is calculated as follows: Age dependency = (people younger than 15 and older than 64) / (working age people ages 15-64). A higher value for Pakistan means that employed people have to support more non-working people, either young or old.

5.6. Results & Discussion

5.6.1. Results of the model

The potency of the regression analysis mostly depends on the condition of model, statistical and economic significance and edifice of the variables in the analysis. The process of demographic transition is multidimensional in nature and due to this; five indicators of demographic transition are constructed here to capture their effects on the economic growth. Furthermore, the balancing association between variables of demographic transition is analyzed by interactive expression. This equation is projected by using the technique of generalized method of movements to examine the impact of demographic transition on economic growth.

Estimation Equation

TABLE OF 5.6.1: RESULTS

Results of GMM estimation: Dependent variable

Variable	Coefficient	t-Statistics	Probability Value
Intercept	2.4227	0.0633	0.9498
Gross capital formation	0.8621	1.86	0.07
Labor force	1.6921	1.7682	0.0857
Life expectancy	3.1354	2.6286	0.04
Dependency ratio	-1.3353	-2.7251	0.04
R^2	0.8213	**Adj R^2**	0.81
D.W Stat	0.8466	**LM test of Serial Correlation**	P-value (0.23)

5.6.2. Discussion

After applying the simplify Method of Movement (GMM) technique on model, we get the principles of coefficients of our model. Now let's we start to talk about the contact of every independent variable on dependent variable.

The important growth determining variable included in the regression analysis is Gross capital formation. It can be observed that results obtained of all the variables are in accordance with the economic theory and reflects the economic conditions of Pakistan. Gross capital formation to GDP ratio is a very important growth determining variable in different growth theories, and results obtained that it has a positive and statistically significant impact on economic growth.

The relationship among Gross capital formation and GDP is attuned with conventional theory of economic growth like Solow growth model (1956) and other exogenous growth theories. According to theory, that specified the neoclassical growth model showing how capital and technology influence economic growth. Gross capital formation has a positive impact on economic growth through the channels of technology and knowledge circulation see, e.g., [Solow (1956)]. As the result shows that Pakistan is poor because we contain low level of capital stock while modern economies contain more capital stock per worker, so they are rich nations.

According to the estimated results, that a positive association between gross capital formation and economic growth, implying that gross capital formation is beneficial for the economic growth in Pakistan. Several empirical studies have also revealed that gross capital formation positively influences economic growth in Pakistan [Kemal and Arby (2004)]. According to the theory, gross capital formation is the potential work force in developing countries is assumed to develop by an average percent. [Maliha Mahru Rehman (2017)]. On the same theoretical grounds it may be reasoned here that gross capital formation enhances economic growth by increasing innovation and technological diffusion.

Next regression is run to analyze the association between labor force and economic growth. The impact of labor force on economic growth is analyzed in the presence of GDP, using GMM estimation technique. Labor force has positive and statistically significant impact on GDP of Pakistan in given period. Other things held constant if labor force increases by one unit on average GDP will increase by 1.69 units. According to the theory, it was predicted that working age share would drop, and depress economic growth. The ratio of old age to young and female labor force participation would increase [Bloom (2009)]. According to the theory, Pakistan is surrounded by the top in terms of population growth rate in the world, so it does not mean that elevated growth of population matters in economic growth. Somewhat it is labor force and labor participation that actually matters in the growth path [Singariya (2012)]. According to the theoretical point of view, that the decrease in infant mortality rate and fertility rate accelerated the economic growth. Increase in wage rate had a positive impact on growth while growth of labor force had no positive impact on the economic growth of Pakistan. [Hussain (2009)].

Next two independent variables of our model are core variables of our study. Both variables are used as proxies of demographic transition. The first variable is life expectancy. The magnitude life expectancy is more than gross capital formation and labor force. The coefficient of life expectancy is 3.13 with implies that as augment in life expectancy by one unit then on average GDP will enlarge by 3.13 units. The negative relationship between life expectancy rate and GDP is possible in developing country like Pakistan.

These results are broadly in line with the other studies that have found the same negative association between life expectancy and per capita GDP growth in Pakistan [see e.g., Johnson (2007); Qureshi and Ahmed (2012)]. As we identify that life expectancy is conclude by health facilities to the people. As health facilities get better straight in an

economy additional it brings improvements in GDP. There are a variety of high impact studies in economics, who claimed that health of human beings bring wealth and health of economy. Our findings are well-matched with Weil (2005). According to the theory of Weil, that investment in health related projects are positively related with economic growth in the long run.

Dependency ratio is our further independent variable, which has been also statistically considerable but has unpleasant impact on GDP. It is as dependency ratio augment it reduces the usefulness that further brings reduce in GDP. Mostly rising nations are suffered by high dependency ratio which curtails the growth ways. Pakistan is also a developing nation which is straightly pretentious by high dependency ratio. In case of Pakistan, we have high population weight as well as large hidden impetus of young population. There is almost 66% is youth in on the whole population. This two third population can be approval for Pakistan. If channelize this young population into creative labor force via dipping the dependency ratio. With changes to the dependency ratio, the impacts of population aging on economic growth become more considerable in Pakistan. According to the theory, the growth of the working age population affected GDP per capita negatively and significantly [Prskawet (2007)].

These results result are broadly in line with the other studies that have found a negative association between dependency ratio and economic growth in Pakistan [see e.g., Kelly and Schmidt (1994); David Truesdell (2012)].

The results of selected control variables next to the variables of demographic transition confirm the burly and significant relationship of these variables with economic growth. in spite of of the fact, which display of demographic transition is incorporated in regression analysis, the manage variables like gross capital formation, labor force, and life expectancy has highly significant and positive crash on economic growth while dependency ratio have negative relationship with economic growth.

At the concluding stages, we talk about our model. The high value of R^2 show on the complete good fit of our model. The value of R^2 is 0.82, which implies that 82% variation in GDP is due to these four independent variables. The in general model is good fit. Now, we talk concerning the logical test of our model. Here we report D.W value which shows that our model is not free from autocorrelation. But whenever we take lags of variables then DW test never give us suitable information about autocorrelation. For this reason we used Langrage Multiplier (LM test of serial correlation. LM test accept the null hypothesis of no autocorrelation. The LM test point out that the residuals are not in sequence correlated and our equation is meticulous for hypothesis tests and forecasting reason. As we know that by failure to pay time series data undergo from autocorrelation. It is due to exactly selection of instruments of Generalize method of moment (GMM).

6. Conclusion

Demographic transition plays very important role in the economic growth rate of all country furthermore its developed or developing country. It is an exceptional theory which led to population studies. Demographic transition is making cause on the economic situation of the country. Due to Demographic theory Demographic transition is multi phase's procedure which takes 50 to 150 years in completion. With the passage of time country attributes changed and humanity transition and fertility transition cause of demographic transition. Pakistan is the 6th crowded country in the world. In 1998, census Pakistan was the 7th heavily populated country in the world. According to a survey of UN,

Pakistan will be the 3rd largest populous country in the world in 2050. Most OECD countries have faced low birth rates in combination with higher rates of the aged population, which have led to a retreating population growth rate and quickly changing age compositions. Keynes (1937) predicted that decreasing population growth affects aggregate demand and output growth negatively(see also Hansen,1939, and Myrdal, 1940).Previous research has shown that population aging will influence the constitution of industrialized economies through its impacts on labor markets, claim, savings rate and capital accretion (Hageman & Nicoletti, 1989).

The purposes of the work are to investigate the impacts of demographic transition on economic growth of Pakistan. In this study try to indicate the problems and verdict solutions on these matters. This study utilizes the five variables i.e. per capita GDP rate, gross capital formation, labor force, life expectancy and dependency ratio. This study will be use the time series data from the period 1975 to 2019. The study utilizes the economic techniques like over acknowledged equation.

Additional, we talk about our model. The high value of R2 show usually good fit of our model. The value of R2 is 0.82, which implies that 82% variation in GDP is due to these four independent variables. The generally model is good fit. Now, we have to talk about the diagnostic test of our model. Here we report D.W value which shows that our model is not praising from autocorrelation. But at any time we take lags of variables then DW test not at all give us appropriate information relating to autocorrelation. For this point we opt Langrage Multiplier (LM test of serial correlation. LM test permit the null hypothesis of no autocorrelation. The LM test point out that the residuals are not serially connected and our equation is meticulous for hypothesis tests and forecasting purpose. As we know that by evade time series data go through from autocorrelation, but in case autocorrelation is not a problem. It is due to properly selection of instruments of Generalize method of moment (GMM).

Results indicate that the important growth determining variable included in the regression analysis is Gross capital formation. It can be observed that results obtained of all the variables are in accordance with the economic theory and reflects the economic conditions of Pakistan. Gross capital formation to GDP ratio is a very important growth determining variable in different growth theories, and results obtained that it has a positive and statistically significant impact on economic growth. According to the estimated results, that a positive association between gross capital formation and economic growth, implying that gross capital formation is beneficial for the economic growth in Pakistan. Next regression is run to analyze the association between labor force and economic growth. The impact of labor force on economic growth is analyzed in the presence of GDP, using GMM estimation technique. Labor force has positive and statistically significant impact on GDP of Pakistan in given period. Next two independent variables of our model are core variables of our study. Both variables are used as proxies of demographic transition. The first variable is life expectancy. The magnitude life expectancy is more than gross capital formation and labor force. The negative relationship between life expectancy rate and GDP is possible in developing country like Pakistan. Dependency ratio is our further independent variable, which has been also statistically considerable but has unpleasant impact on GDP. It is as dependency ratio augment it reduces the usefulness that further brings reduce in GDP.

Demographic transition is essentially passing in nature. Due to lack of previous planning Pakistan has almost exhausted the first 15 years of the chance demography has presented it. On the other hand, age structure will persist to be a significant force in the country for the next fifty years. How economic growth is wrought by demographic changes in the coming years will depend on the ways policies and institutions respond to the challenges and opportunities the future

holds. Time is going out to put suitable policies in place, the absence of which may result in large-scale unemployment, massive difficulty on health and education systems. In short a socio-economic disaster may take place creation the demographic transition more of a demographic danger.

Recommendations

Following are the suggestion in the light of the empirical evidence:

- It requires an incorporated and consistent policy framework in health, education and in labor sectors to gather this dividend and capitalize the window of possibility in Pakistan.
- Government should make concerted efforts to increase the women participation in work force and vast investments are obligatory in education sector to expand the young generations to utilize their full latent.
- Saving rates are very low down and are not fully utilized; hard work should be completed to lift the level of savings and their productive utilization.
- Family Planning policies should be approved out with new zeal and strength to stop the impetus of rate of natural boost which is stressing our income and hampering economic growth.
- The Population and Development policy has to have a pro-poor perspective to ensure that family planning services, educational opportunities, and job creation are available in particular to poorer women and households.
- The greatest significance should be given to augment the education and skill preparation of the working age population to develop their potential optimally.
- Government should facilitate all the trained and skilled work force because they can significantly contribute to economic growth.

REFRENCES

Afzal, M. (2009). Population Growth and Economic Development in Pakistan. The Open Demography Journal, 2, 1-7.

Aghion, P. Comin, D., Howitt, P. (2006). When Does Domestic Saving Matter for Economic Growth? NBER Working Paper No. 12275.

Ahmed, Munir. (2018). age-structure economic growth economic regions human capital developing economies demographic dividends. Pakistan Journal of Commerce and Social Sciences (PJCSS). Volume: 12.

Ahmed, Viqar and Rashid Amjad. (1984). The Management of Pakistan's Economy 1947–82. Karachi: Oxford University Press.

Amjad, Rashid and A. Kemal. (1997). ―Macroeconomic policies and their impact on poverty alleviation in Pakistan,‖ Pakistan Development Review 36(1): 39–68.

Amjad, Rashid, Musle-ud Din, and Abdul Qayyum. (2011). ―Pakistan: Breaking out of stagflation into sustained growth,‖ Lahore Journal of Economics 16: Special edition.

An, C., & Jeon, S. (2006). Demographic Changes and Economic Growth in Korea. Paper presented at the APEA Conference 2006.

Arellano, M. And Bond, S. (1991). Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations, The Review of Economic Studies, Volume 58, Issue 2, April 1991, Pages 277–297, https://doi.org/10.2307/2297968.

Arellano, M. (1993). Journal of Econometrics, Volume 59, Issues 1–2, September 1993, Pages 87-97. https://doi.org/10.1016/0304-4076(93)90040-C.

Arellano, M. and O. Bover. (1995), another look at the instrumental variables estimation of error- components Models. The journal of Econometric 68; 1, 29-51.

Arif, G.M., Nasir Iqbal, and Shujaat Farooq. (2011). ―The persistence and transition of rural poverty in Pakistan: 1998-2004,‖ PIDE Working Papers. Islamabad: Pakistan Institute of Development Economics.

Attanasio *et al*, O., Kitao, S. & Violante, G. (2006). Quantifying the Effects of the Demographic Transition in Developing Economies. Advances in Macroeconomics, 6(1), pp. 1-44. Retrieved 20 Dec. 2019, from doi:10.2202/1534-6013.1298

Awan, Shehzadi Zamurrad (2016). Relevance of Education for Women's Empowerment in Punjab, Pakistan. Journal of International Women's Studies, 18(1), 208-229. Available at: https://vc.bridgew.edu/jiws/vol18/iss1/14.

Azomahou, T. (2009). Spatial persistence of demographic shocks and economic growth. Journal of Macroeconomics, ISSN: 0164-0704, Vol: 31, Issue: 1, Page: 98-127.

Barro, R. (1991). Economic growth in a cross section of countries. The Quarterly Journal of Economics, 106 (2), 407-443.

Becker, G. S., Glaeser, E. L., & Murphy, K. M. (1999). Population and Economic Growth. American Economic Review, 89 (2), 145-149.

Been-Lon Chen, Mei Hsu and Chih-Fang Lai (January, 2014). Labor force and Relationship between Long-run Growth and Unemployment.

Birdsall, Nancy, Allen C. Kelley, and Stephen W. Sinding. (2001). Population Matters: Demographic Change, Growth, and Poverty in the Developing World. New York: Oxford University Press.

Black, J. (2002). Oxford Dictionary of Economics (2nd edition). Oxford University Press.

Bloom, D.E., and J.G. Williamson. (1998). Demographic transition and economic miracles in emerging Asia. World Bank Economic Review 12: 419-55.

Bloom, D. E., & Finlay, J. E. (2009). Demographic Change and Economic Growth in Asia. Asian Economic Policy Review, 4, 45-64.

Bloom, D.E., Canning, D., &Sevilla, J. (2002). The demographic dividend: A new perspective on economic consequences of population change. RAND, Santa Monica.

Bloom, Canning, & Fink, G. (2010). Implications of population ageing for economic growth, Oxford Review of Economic Policy, Volume 26, Issue 4, Winter 2010, Pages 583–612, https://doi.org/10.1093/oxrep/grq038.

Bloom, E. D., Canning, D., & Sevilla, J. (2011). Economic Growth and the Demographic Transition. Massachusetts Avenue. Cambridge. Working Paper 8685. NBER.

Bongaart, John and Judith Bruce. (1995). ―The causes of unmet need for contraception and the social content of services,‖ Studies in Family Planning 26(2): 57–75.

Bongaart, John and Rodolfo Bulatao. (1999). ―Completing the demographic transition,‖ Population and Development Review 25(3): 515–529.

Bongaart, John. (2002). ―The End of the Fertility Transition in the Developing World.‖ Working Paper No. 161. New York: The Population Council.

Burki, Shahid Javed. 2011. ―How rich are the Pakistani rich?‖ The Express Tribune, 16 May.

Brown, R. L., Durbin, J., & Evans, J.M., (1975). Techniques for testing the constancy of regression relations over time. Journal of the Royal Statistical Society, 37: 149-192.

Burki, S.J. (2011). Historical Trends in Pakistan's Demographics and Population Policy. Reaping the Dividend Overcoming Pakistan's Demographic Challenges, 56-75. www.wilsoncenter.org/asia. http://fffp.org.pk.

Bowden, R. J. and D. A. Turkington. (1984). Instrumental Variables. Cambridge: Cambridge University Press.

Sathar, Zeba A., Susheela Singh, and Fariyal Fikree. (2007). ―Estimating the incidence of abortion in Pakistan,‖ Studies in Family Planning 38(1): 11–22.

Schultz, T. Paul. (1985). ―Changing World Prices, Women's Wages and the Fertility Transition: Sweden, 1860–1910.‖ Journal of Political Economy 93(3), 1126–1154.

Schultz, T. Paul. (2007). Population Policies, Fertility, Women's Human Capital, and Child Quality. Volume 4, 2007, Pages 3249-3303.

Shea, J. (1997). Instrument relevance in multivariate linear models: A simple measure. Review of Economics & Statistics 79(2): 348–352.

Siddiqui, F., & Mahmood, N. (1998). Population Growth and Development Prospects for Pakistan. The Pakistan Development Review, 37(4), 557-574. Retrieved January 13, 2020, from www.jstor.org/stable/41261071.

Siddiqui, F., Jabeen, B., & Mahmood, N. (2001). Importance of a Population Policy in Pakistan.The Pakistan Development Review, 40(4), 345-369. Retrieved from www.jstor.org/stable/41260405.

Siddique, R. (1993). Household Saving Behavior in Pakistan. The Pakistan Development Review 32:4, 1281–1292.

Simon, J. (1981). the Ultimate Resource. Princeton, N. J.: Princeton University Press.

Simon, J. (1986). Theory of Population and Economic Growth. New York: Blackwell.

Singariya (2016). An Empirical Study of Inter-Sectoral Linkages and Economic Growth in India. American Journal of Rural Development, 4(4), 78-84.

Solow, R. M. (1956). A contribution to the theory of economic growth. Quarterly Journal of Economics, 65–94.

Song, Sijia. (2013). ―Demographic Changes and Economic Growth: Empirical Evidence from Asia". Honors Projects. 121. https://digitalcommons.iwu.edu/econ_honproj/121.

Srinivasan, T. N. (1988) Population Growth and Economic Development. Journal of Policy Modeling 10, 7–28.

Staiger, D. and J. H. Stock. (1997). Instrumental variables regression with weak instruments. Econometric 65(3): 557–86.

Sunde, U. (2009). Cervellati, M. Life expectancy and economic growth: the role of the demographic transition. *J Econ Growth* 16**,** 99–133.

Tamura, R. (1991). ―Income Convergence in an Endogenous Growth Model,‖ Journal of Political Economy 99, 522–540.

Tiffen. (1995). Population Density, Economic Growth and Societies in Transition: Bose up Reconsidered in a Kenyan Case-study. Volume26, Issue1.

Truesdell, David M. (2012). ―China's Demographic Limits to Economic Growth.‖ https://apps.dtic.mil/dtic/tr/fulltext/u2/a563449.pdf.

Watkins, S., Menken, J., & Bongaart, J. (1987). Demographic Foundations of Family Change. American Sociological Review, 52(3), 346-358. Retrieved from www.jstor.org/stable/2095354.

Weil, David, (2013). ―The Effects of Health and Demographic Change on Economic Growth: Integrating Micro and Macro Perspectives—Part I,‖ Pop Pov Research Network, updated December 2010. As of December 4.

http://www.poppovresearchnetwork.org/Portals/1/documents/papers/1.Weil.pdf.

Weiss and Saba Gul Khattak (eds.), Development Challenges Confronting Pakistan. Sterling, VA: Kumarian Press.

White, H. (1980). A hetroskedasticity-consistent covariance matrix estimator and a direct test for hetroskedasticity. Econometric 48: 817–838.

Zaidi, S. A. (2005). Issues in Pakistan's economy (2nd Ed.). Karachi, Pakistan: Oxford University Press.