DEMOGRAPHIC DIVIDEND AND ECONOMIC GROWTH NEXUS IN ASIAN COUNTRIES: PANEL AUTO REGRESSIVE APPROACH (VAR)

Submitted By

Shazia Anwar

Registration No. PIDE2018FMPHILETS10

A Dissertation Submitted to the
Pakistan Institute of Development Economics,
in partial fulfillment of the requirements of the Degree of
Master of Philosophy in Econometrics

Supervised By

Dr. Amena Urooj

Dr. Saud Ahmed Khan

Assistant Professors,
Pakistan Institute of Development Economics
Islamabad, Pakistan.

Department of Economics & Econometrics

Pakistan Institute of Development Economics

Islamabad, Pakistan

2021

Pakistan Institute of Development Economics

CERTIFICATE

This is to certify that this thesis entitled: **"Demographic Dividend and Economic Growth Nexus in Asian Countries: Panel Auto Regressive Approach (VAR)"** submitted by Ms. Shazia Anwar is accepted in its present form by the Department of Economics & Econometrics, Pakistan Institute of Development Economics (PIDE), Islamabad as satisfying the requirements for partial fulfillment of the degree of **Master of Philosophy in Econometrics.**

External Examiner:

Dr. Muhammad Arshad Khan
Associate Professor
COMSATS, Islamabad

Supervisor:

Dr. Amena Urooj
Assistant Professor
PIDE, Islamabad

Co-Supervisor:

Dr. Saud Ahmed Khan
Assistant Professor
PIDE, Islamabad

Head, Department of Economics & Econometrics:

Dr. Shujaat Farooq
Head
Department of Economics &Econometrics
PIDE, Islamabad

Scanned with CamScanner

DECLARATION

I Shazia Anwar hereby state that my M. Phil thesis titled ***"Demographic Dividend and Economic Growth Nexus in Asian Countries: Panel Auto Regressive Approach (PVAR)"*** is my own work and has not been submitted previously by me for taking any degree from this University "Pakistan Institute of Development Economics Islamabad" or anywhere else in the country/world.

At any time if my statement is found to be incorrect even after my Graduation the University has the right to withdraw my M. Phil degree.

Date: ______________ Shazia Anwar

DEDICATION

Every challenging work needs self-efforts as well as guidance of elders especially those who were very close to our heart.

My humble effort I dedicate to my sweet and loving parents, brothers and sisters, whose affection, love, encouragement and prays of day and night make me able to get such success and honor.

Along with all hard working and respected Teachers.

ACKNOWLEDGEMENT

A major research work like this is never the work of anyone alone. As a matter of fact, people tend to forget those who are behind their achievements and have stood for them whenever they have needed assistance. Realizing the fact, it will be right to say that without their cooperation this effort may have ended up in disaster. Completion of this thesis was possible with the support of several people. First of all, thanks to Allah Almighty for His blessings upon me during this thesis and my whole life. I would like to express my gratitude to my supervisors Dr. Amena Urooj and Dr. Saud Ahmed Khan, whose supervision and support helped me to progress smoothly even having many difficulties involved in this thesis.

I am thankful to my parents, my brothers, and my sisters whose prayers make difficulties of life into easiness. They always pray for my success; may God live them long. My special gratitude goes to my mother for their unconditional support.

Shazia Anwar

CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

PVAR	Panel Vector-Autoregressive
PCR	Per capita Growth Rate
PCI	Per capita income
ESR	Economic support ratio
WAP	Growth Rate of working age population
POP	Population growth rate
GER	Gross Enrollment
OLS	Ordinary least square
ARDL	Autoregressive Distributed Lag
ECM	Error Correction Model
GMM	Generalized Method of Moment

ABSTRACT

This research study highlights the importance of demographic dividends in relation to economic growth by choosing three different emerging South Asian countries. Specifically, we have shown that demographic dividend in terms of increasing working age population in Pakistan, India, and Bangladesh contributes to economic growth. In this regard, this research study has two basic objectives which are to examine the relationship between demographic dividend & economic growth and to examine the pass-through channel between demographic dividend and economic growth in context of three South Asian Economies; India, Pakistan and Bangladesh for the period 1980-2019. Most of the studies about demographic dividend have employed time series data using different econometric models such as Iqbal et al. (2015), but in this research study we have used Panel Vector Autoregressive to check the transmission of demographic dividend pass through different channels. While conducting an empirical analysis using panel data methods, initially the unit root was tested using Levin Lin and Chu test and showed that Economic support ratio, Gross enrolment rate, Per capita growth rate and growth of working age population are first difference stationary whereas Per capita income and population are level stationary. Based on Hurlin panel causality test, we can conclude Economic support ratio, does cause Per capita growth rate significantly and Per capita growth rate does not cause Economic support ratio, and thus reveals that there is unidirectional causality. Moreover, Population can cause Per capita growth rate statistically but the converse is not true. It means that there exists unidirectional causality. In the same way, growth rate of working age population causes economic support ratio significantly but there is no reverse causality. Results obtained through impulse response function shows, when there comes one standard deviation shocks to the system, per capita growth rate (PCR) response downward and stays stable in the subsequent periods. Similarly, when there comes one standard deviation shocks to the system, per capita income in log (LPCI) increases from period 1 to period 2 and then stays stable in the subsequent periods.

Keywords; Demographic dividend, Economic Growth, Panel VAR, Pakistan, India, Bangladesh.

CHAPTER

INTRODUCTION

1.1 Introduction

In the late twentieth century, East Asian countries have experienced successful growth in their economies, and this economic miracle was largely credited to Demographic dividend. Bloom & Williamson (1998) findings suggests that demographic dividend has contributed almost 20-25% of economic growth in East Asian countries. According to them, the role of changing age structure in East Asian countries were significant during the period, and demographic transition in terms of both increasing working age population as well as declining dependency ratio, was the larger contributor to economic growth. Others such as Bloom & Sachs (1998); Bloom & Williamson (1998); Bloom et al. (2000) and Mason (2000) have confirmed these findings and maintain that economic growth can be explained by demographic dividend. In this research study, we are not interested to highlight the theoretical importance of demographic dividend models, instead we want to relate demographic dividend model with economic growth by choosing three different emerging Asian economies. Here one can asks an important scholarly question that, why is it important to relate demographic dividend model with economic growth, particularly when there is already an established literature that relates demographic dividend model and economic growth.

In this regard, this study is unique as it would relate demographic dividend model with economic growth by choosing three emerging Asian economies as most of the scholarships available on this nexus between demographic dividend and economic growth have employed time series analysis and constantly ignored the cross-sectional aspects of the phenomenon. Alternatively, literature is full of studies that have employed time series analysis to investigate the nexus between demographic dividend models with economic growth in Asian economies (Koga, 2006; Choudhry et al., 2010; Hussain et al., 2009; Iqbal et al., 2015; Mehmood et al., 2012). However, in this research study we have selected three emerging Asian countries namely Pakistan, India, and Bangladesh and want to investigate the phenomenon both over time and across the three countries. Alternatively, we want to investigate the phenomenon using panel setting that is both across countries and over the period of time and will employ Panel Vector Autoregressive (PVAR) model as our econometric technique.

Demographic Transition Theory (DTT) was developed by Frank Notestein in 1945. This theory provides an explanation of how fertility and mortality rates impact the age distribution and growth rate of populations. The ideals expressed in the DTT originate with the work of Warren Thompson in 1929, who described population growth using three categories of countries (groups A, B, and C). Group A includes Northern Europe, Western Europe, and the United States. These countries were predicted to experience a slow rate of population growth and eventually population aging and decline due to both low fertility and mortality rate. Group B includes Eastern and Southern Europe where both fertility and mortality rates decline; however, the decrease in mortality precedes that of fertility and occurs at a faster rate than that of fertility. Low rate of mortality coupled with higher fertility rate, would result in a period of rapid population growth and an increasing proportion of younger individuals.

According to Coale and Hoover (1958), sustained high fertility and falling mortality create enormous challenges for government and households as these bring higher youth dependency rates, thus lowering tax revenues and household savings which play crucial role in economic growth. Many economists have recently started focusing on the impact of changing age structure of the population apart from the

Malthusian emphasis on population growth [Bloom and Sachs (1998); and Bloom and Williamson (1998)]. The interest in relation between population change and economic growth has reignited because of the demographic transition taking place in the developing countries, which are at varying stages in experiencing declining fertility and mortality rates.

The two important factors that make demographic dividend possible to occur are declining birth and mortality rate and three phases or demographic scenarios are likely to happen, first, there would be a decline in crude death rate, mostly impacting young age groups, and therefore it would lead to decline in the working age ratio. In the second phase, it is the crude birth rate that would start declining and transfers the population bulge from young age group to working age group. As a result, growth in working age population exceeds growth in overall population, and ultimately associated with an increase in working age ratio. And finally in the third stage, there would be a fall in working age ratio as in this stage the population bulges transfer from working age group to elder age group (Nayab, 2007).

The overlapping generations (OLG) model proposed by Samuelson is one of the dominating frameworks of analysis in the study of macroeconomic dynamics and economic growth. Earlier, Ramsey-Cass-Koopmans neoclassical growth model was frequently employed by different scholars in which it was assumed that individuals are infinitely-lived. However, in the OLG model individuals live a finite length of time, long enough to overlap with at least one period of another agent's life. The main focus of OLG model is to investigate implications of the allocations of resources across different generations on economic growth measured by real GDP per capita, and to identify factors that triggered the fertility transition. OLG model is also important as it endogenize population growth which was earlier assumed to be exogenously determined. According to this theory, in the long run, the contribution of the rise in the return to human capital and the decline in fertility to the transition from stagnation to growth.

In nature, similar to other countries in the world, Asian countries have actually come into the demographic window of chance to increase economic growth and these opportunities are mostly credited by changing population age structure. Demographic transition has been noted for Pakistan, India, and Bangladesh, as currently these three countries have more than 60% of working age population. Therefore, it is appurtenant to investigate the impact of demographic transition on economic growth both across countries and over the period of time. Alternatively, panel analysis is highly significant to explore the connection between demographic dividends and economic growth. By doing so, this research study would be helpful in scheming and adopting suitable policy for these emerging economies through in-depth comprehension of the situation under which this favorable demographic situation is related with economic growth.

In this regard, this research study is interested to investigate the relationship between demographic dividend and economic growth by choosing three Asian countries i.e., Pakistan, India, Bangladesh. To our observation past research studies have investigated this relationship via employing time series analysis and have missed the cross-sectional aspects of the phenomenon. However, we are using PVAR model by transforming time series data into panel setting in order to investigate the relationship between demographic dividend and economic growth. By achieving this objective, we will be able to add some valid empirics into this field, and validity of these empirics can be justified based on our selection of econometric method. More specifically, our contribution to econometric literature is that we are transforming time series data into panel setting, and by using PVAR model we are allowing endogenous interaction between demographic factors and economic growth. In other words, our selection of PVAR model to investigate this relationship gives us an advantage over the past studies, as a greater portion of available literature have relied on time series analysis. We have offered a detail note on the econometric significance of PVAR model over time series analysis in econometric modeling section.

1.2 Problem Statement

South Asian countries have indeed entered into the demographic window of opportunity and they should need to invest more energy and resources on the promotion of economic growth, and these opportunities in terms of demographic dividend are mostly credited by changing population age structure or demographic transition in these countries. By doing so, this research study would be helpful in providing appropriate policy recommendations for these emerging economies. Pakistan is also currently experiencing demographic transition, as both Pakistan's fertility rate and the dependency ratio are the on decreasing trend. Therefore, it is pertinent to investigate the impact of demographic transition on economic growth both across countries and over the period of time. Alternatively, panel analysis is highly significant to explore the connection between demographic dividends and economic growth.

1.3 Research Questions

- How demographic dividend effect the economic growth in Pakistan, India, and Bangladesh?
- What is the exact channel through which demographic dividend affects the economic growth in Pakistan, India, and Bangladesh?

1.4 Objective of Study

- To investigate the relationship between demographic dividend and economic growth in Pakistan, India, and Bangladesh.
- To examine the pass-through channel between demographic dividend and economic growth in Pakistan, India, and Bangladesh.

Justifications for research objectives: The role of changing population age structure has contributed huge economic benefits in many developing countries. The three selected countries are also developing countries and this investigation allows to highlight the role of changing age structure in these developing countries. Second, the three selected countries are also emerging economies in terms of high economic growth as both India and Bangladesh are growing at 5-6% annually from the last decade. For these two reasons, it is pertinent to investigate the role of demographic dividend in promoting economic growth in these developing countries.

1.5 Significance of the Study

This study is important as it relates demographic dividend and economic growth by using panel data set and by applying Panel Vector Autoregressive Approach (PVAR). This method is needed because most part of literature directly find-out the relationship which sometimes ignores the channel that are either direct or indirect channels. Therefore, focusing on Panel VAR we are be able to check the transmission of demographic dividend pass through different channels. This consistency and accuracy lead to more accurate prediction and results. Secondly, this study contributes to current understanding of demographic dividend model by providing an empirical analysis of three emerging economies. The three countries selected in this study are experiencing demographic transition as well as high rate of economic growth from the last decade. Therefore, it is more pertinent and suitable to analyze the implications of demographic transition on economic growth in these countries.

Third, this study also contributes to the demographic transition theory by providing more accurate results for parameters. Because, in this study we are using PVAR which allows endogenous interactions between variables and avoiding this specific econometric problem guarantees authenticity of regression results. In most of the empirical analysis, different scholars have employed econometric techniques that do not allow endogenous interactions between variables. Thus, results obtained through PVAR improve authenticity of empirical investigation and contributes to demographic transition theory.

In a nutshell, it has been the case that standard econometric specification is required to find the exact channel that relates demographic dividend and economic growth through applying PVAR model. Alternatively, literature gap of this study is such that we are using Panel VAR model by changing time series data set into panel data set and want to investigate the impact of demographic dividend on economic growth after choosing three Asian emerging economies.

1.6 Organization of the Study

The first chapter presents introduction. Literature is reviewed extensively in the second chapter. Chapter includes research methodology such as theoretical framework, econometric modeling, and variable description. Data analysis is given in chapter four while conclusion and policy recommendations are presented in chapter 5.

CHAPTER 2

LITERATURE REVIEW

2.1 Demographic Dividends and Its Key Drivers

Every society in the world continuously experiencing changes in the age structure demographics, especially in her population. This continuous change and growth in population is what enables an economy to experience demographic transition over the time. Demographic transition depicts transition from large rural agricultural societies with high mortality and fertility rates to a predominantly urban and industrial society with low mortality and fertility rates. It has been pointed out by Ray (1996); Koga (2006); Lee & Anderson (2002) that the changing age structures have higher potentials and capabilities to a society for either lower the dependency ratio i.e. more resources can be invested in the economy or either the increasing life-expectancy improves the population's saving behavior creating positive impact on the income level. Most of advanced economies have largely completed their transitions in demographics while developing countries are still in the process of transition (Lee & Anderson, 2002). Those economies which lies between advanced and developing are potentially in a favorable position to enjoy demographic transition with respect to their economies because the availability of large working age population.

For instance, Ray (1996) found the greater generality in the demographic demand system. Using four demographic indicators of expenditure (fuel, light and power, clothing and footwear, housing, and food) through maximum likelihood estimations and GMM, the author found that publishing the cell averages yield well determined the estimates of the demographic generalization indicators. The idea is been further investigated by Entrof & Spengler (2000) claimed that demographic indicators i.e. being young and unemployed increases the probability of crimes and detoriate the transformational procedure. The study made by Koga (2006) focusing on Japan's saving rate relating it with dependency ratio, the ratios of the population of dependent groups such as the elderly working to the working age population showed that indicators are co-integrated which highlights that the demographic factors were a main cause of decline in the saving rate of Japan since 1990's. Similarly, Kankal et al. (2011) examined the model of the energy consumption in Turkey to forecast the energy consumption using socio-economic and demographic indicators focusing on GDP, export, import, and employment as input variables and predicted that GDP is key driver of employment that enhance the local community to get easily transform into transformation.

Hence, we can conclude that demographic transition, the population moves from one demographic shape to a further that is usually linked with mortality and fertility levels change the age shape of a population from few elderly and many children, leading to a circumstance where the growth rate of labor force increased that of the dependents resulting in the surplus resources and capitals for investment in family welfare and economic development. The circumstance of having a comparatively larger working population is associated to the so-called first demographic dividend. When the working age population matures, the prospects and chances of retirement can provide motivations to save for financial security which either can be consumed or can be used to prolong the economic growth. This economic growth stage has been termed as second demographic dividend. This second stage can occur in the later stages of the demographic transition. Now in the next section we briefly elaborate the relationship between demographic dividend and economic growth.

2.2 Relationship between Demographic Dividend and Economic Growth

Demographic dividend and economic growth are closely linked and there are evidences of a positive role played by demographic dividend in promoting economic growth. For instance, the overall effect of demographic transition on economic growth of Pakistan, India, Bangladesh, and China has been analyzed in (Misbah et al. 2010). Using time series data from 1961-2003, their study suggests that GDP per capita growth is positively associated to the growth differential between the working –age population and the total population, and negatively associated to child and old –age dependency ratio.

Most of the studies conducted in this domain have employed time series analysis. In Pakistan, Hussain et al. (2009) investigated the role of demographic dividend in promoting economic growth by using time series data from 1972-2006. Findings of this study suggests that three variables such as infant mortality, total fertility, and Growth of labor force are negatively related with economic growth while wage rate is positively related. In their opinion, demographic transition has resulted into massive labor force which Pakistan's economy has failed to engage in productive employment. In similar instance, Iqbal et al. (2015) analyzed demographic transition and economic growth in Pakistan by using time series data from 1974 to 2011 for Pakistan. Findings of this suggests contrasting results in different time horizon. For instance, in short run the relationship is significantly negative while it is positive for long run.

In the same way. Other scholars have also contributed in this domain. For instance, Drummond, et al., 2014) quantify the potential demographic dividend based on the experience of other regions. The dividend will vary across countries, depending on such factors as the initial working age population as well as the speed and magnitude of demographic transition. It will be critical to ensure that the right supportive policies, including those fostering human capital accumulation and job creation, are in place to translate this opportunity into concrete economic growth. In similar instance, Munir, et al. (2020) analyzed the long-run and short-run impact of demographic factors, i.e. life expectancy, Fertility rate and young dependency ratio in determining economic growth in South Asian countries. The study uses annual panel data of four South Asian courtiers, i.e. Bangladesh, India, Pakistan and Sri Lanka from 1980 to 2018 and utilizes panel ARDL model to analyze the Long run and short run impact of demographic factors on economic growth. Results show that real stock of capital, fertility rate and life expectancy are positively related with economic growth, while an increase in young dependency ratio reduces economic growth in South Asian countries in the long run. Short-run dynamics show that real stock of capital and life expectancy have insignificant impact on economic growth, while young dependency ratio has negative and significant as well as life expectancy has positive and significant impact on economic growth in South Asian countries. Unidirectional causality exists from young dependency ratio and fertility rate to GDP per capita in the short run.

2.3 Debate of Demographic dividend in Pakistan, India and Bangladesh

The two important factors that make demographic dividend possible to occur are declining birth and mortality rate and three phases or demographic scenarios are likely to happen, first, there would be a decline in crude death rate, mostly impacting young age groups, and therefore it would lead to decline in the working age ratio. In the second phase, it is the crude birth rate that would start declining and transfers the population bulge from young age group to working age group. As a result, growth in working age population exceeds growth in overall population, and ultimately associated with an increase in working age ratio. And finally in the third stage, there would be a fall in working age ratio as in this stage the population bulges transfer from working age group to elder age group (Nayab, 2007).

The extent of benefits a country can accrue largely depends on the extent of favorable transition in education, employment and technology. For instance, Navaneetham & Dharmalingam (2012 have reviewed the age structural transition and demographic dividend in South Asia, suggested that there must be accompanying transition in order to avail maximum benefits from the demographic dividend and therefore South Asian governments should need to take into account transition in education, employment and technology. Similarly, Abusaleh (2017) suggested equitable opportunity of quality education for all, in order to secure lifelong income by taking advantage of demographic transition in Bangladesh. According to the researcher, Bangladesh has a huge number of working aged people in comparison to dependent aged structure and supposed to remain till 2050. Further, Aiyar & Mody (2011) found that economic growth in India from 1980 onwards was largely contributed by the by changing age structure in India.

2.4 Panel VAR Development

In applied macroeconomics, VAR (Vector Autoregressive) models are well established. One of the major advantages of VAR models is that it treats almost each variable in the model as endogenous in both dynamic as well as static sense (Lewbel, 2007). Sometimes VAR is deteriorating into its short-run and its long-run elements, ass per these scholars (Beveridge & Nelson, 1981; Blanchard & Quah, 1989). Similarly, Blanchard & Quah (1989) argue that Panel VARs have the identical shape as VAR models, in the sensibility that all indicators are assumed to be endogenous whereas a cross sectional dimension is included to the portrayal. Beveridge & Nelson, (1981) suggested that the PVAR is used to address and captures a variety of challenges of interest to applied economists and policy makers. Panel VARs are particularly suited to analyzing the transmission of idiosyncratic shocks across units and time. At last, but not the least, Panel VARs have been frequently used to construct average effects possibly across heterogeneous groups of units and to make distinctive unit specific differences linked to the average.

First, using panel VAR approach in this study we can allow for the endogenous interaction between variables such as labor force, human capital formation economic support ratio, output per worker growth rate, population growth rate and labor force dynamic. Second, to identify the direction of a possible link between these variables we applied Granger causality test that will identify the intricate link between demographic dividend and economic growth.

2.5 Contribution to the literature or Literature Gap

Literature gap of this study is such that we are using Panel VAR model by changing time series data set into panel data set and want to investigate the impact of demographic dividend on economic growth after choosing three Asian emerging economies. One of the reasons that motivate us to go for Panel VAR instead of time series investigation is that, using panel VAR approach we can allow for the endogenous interaction between demographic and economic growth variables selected for this study. While such endogenous interaction between these variables cannot be investigated using time series analysis. For instance, Lee & Anderson (2002) investigated the macroeconomic-demographic variables in England by choosing data set between 1540 to 1870) and OLS as econometric technique. Similarly, Iqbal et al. (2015); Koga (2006) & Entrof & Spengler (2000) also analyzed the connection between demographic indicators, economic growth and energy consumption by choosing time series data set and ARDL and ECM as econometric techniques.

Secondly, Panel VAR models are helpful when one is interested to examine the conveyance of idiosyncratic shocks across units and time. While time series analysis usually disregards the transmission of such idiosyncratic shocks across units and only takes into account the time dimension. In Asian countries perspective a few studies based on the demographic study's as Misbah et al. (2010) analyzed the demographic transition impact on the economic growth of Asian countries but using OLS as econometric technique the author has avoided the transmission of idiosyncratic shocks across different Asian countries. And finally, Panel VARs have been often utilized to develop average effects perchance across diverse groups of units and to distinguish unit specific differences relative to the average.

In a nutshell, it has been the case that standard econometric specification is required to find the exact channel that relates demographic dividend and economic growth through applying PVAR model. Alternatively, literature gap of this study is such that we are using Panel VAR model by changing time series data set into panel data set and want to investigate the impact of demographic dividend on economic growth after choosing three Asian emerging economies.

CHAPTER 3

DATA AND METHODOLOGY

3.1 Introduction

The current chapter aimed to provide a brief overview of demographic dividends impact on the Asian Economies i.e. India, Bangladesh, and Pakistan. The brief introduction helped us to understand the importance of research area and the contribution of researcher in the existing literature while the literature review section showed how the behavior of relationship among focused variables been observed in different countries and regions. The literature gap supports our contribution in the existing literature. In the current chapter the researcher is going to discuss research tools and techniques that will be use to find the selected research objectives and research aim. Because research methodology is a systematic way of setting research tools and techniques to find the solution or set steps to meet the desired goal. After introductory paragraph researcher will briefly elaborate theoretical framework of the current research study. In section 3.3 researcher will discuss the econometric models and Panel VAR steps elaboration. In section 3.4 the researcher will present the description of focused variables especially highlighting their description, explanation, measurement, and data sources.

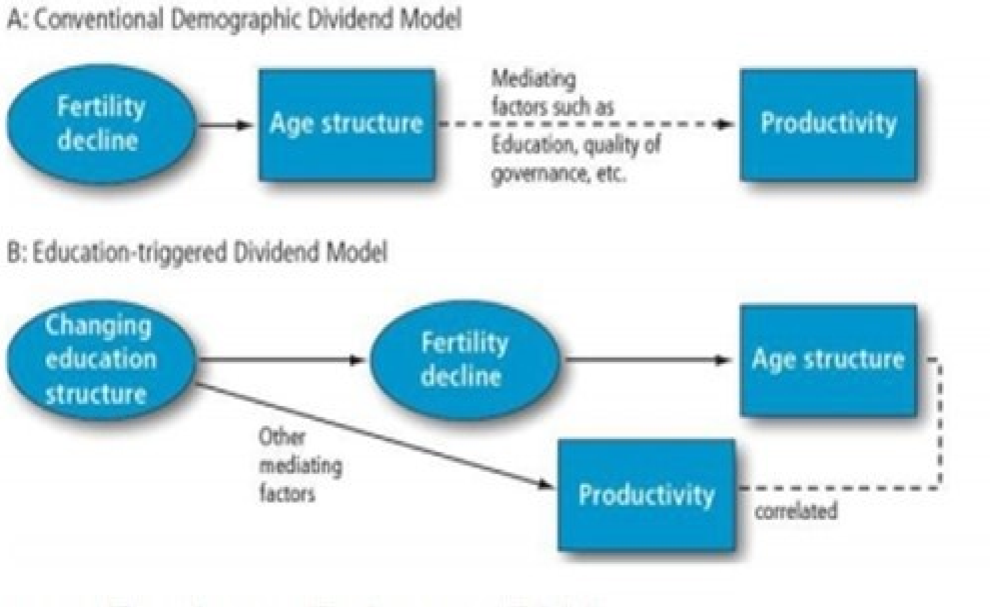
3.2 Theoretical Framework

Demographic dividend leads to opportunities for economic growth for two key reasons (Furankranz-Prskawetz & Sambat, 2014; Bloom & Canning, 2005). First, the rising ratio of the working age group to the total population i.e. increasing ratio of producers to consumers increases economic growth. That is, an increase in labor supply due to growing working age population promotes productivity and contributes to the growth of output per capita (Kankal et al., 2011). This is because during the demographic window consumption per effective consumer increases at the same time that the share of GDP consumed declines because of the higher value and favorable age distribution.

Secondly, demand for the resources and goods to support elderly population consumption begin to emerge which help the behavioral effects that operates through saving which explains second demographic dividend (promoting saving either for later consumption or used for future investments (Furankranz- Prskawetz & Sambat, 2014). The conventional demographic dividend model supports the views that fertility decline as an exogenous factor for an increasing proportion of the population being in the working age that through certain terms and conditions can lead to faster economic growth with higher productivity. In the same manner, education triggered dividend believes that together by human capital theory that assigns and depicts to education having dual role of helping to bring down the fertility rate which enhance the productivity (Lawbel, 2005; Blanchard & Quah, 1989).

Lawbel (2005) claims that human capital is as much significant as physical capital is and can also be accumulated like physical capital accumulation to improve productivity in the economy. As per Podrecca & Carmeci (2001) human capital accumulation and demographic transition are closely related and both matter for economic growth. For instance, Hartwig (2010) argues that demographic transition affects both labor supply and level of individual’s income that implies the life-cycle accumulation of human capital. The below figure shows the diagrammatical representation of our theoretical framework adopted from the Frunkranz- Prskawetz (2014).

Figure 1 Channel of first demographic dividend



Source: Frunkranz -Prskawetz (2014)...

Figure 1 illustrates two fundamental models I.e., Conventional demographic dividend model and education triggered Model. in the first model, when fertility rates decline it is associated with changing age structure and leads to higher productivity. In this model, there are mediating factors such as increasing working age population and human capital that plays effective role in increasing productivity. In the second model, changing education structure lowers the fertility rate which in turns changes the age structure in the economy. Changing education structure can effect via two channels. In the first channel, it affects fertility rate, age structure and then increases productivity. While in the second channel, it works through other mediating factors (political conscience and fair distribution of resources).

3.3 Econometric Model

Blanchard & Quah (1989) argue that Panel VARs have the identical shape as VAR models, in the sensibility that all indicators are assumed to be endogenous whereas a cross sectional dimension is included to the portrayal. There are many advantages

PVAR model compared to other VAR models. First, other VAR models do not allow endogenous interaction between variable of interests. That is, by using PVAR we can allow the endogenous interaction between variables such as labor force, human capital formation economic support ratio, output per worker growth rate, population growth rate and labor force dynamic. Then following PVAR model will be estimated.

$$Y_{it} = A_{oi}(t) + Ai(\partial)Y_{t-1} + \mu_{it} \qquad i = 1, \dots\dots, N \quad t = 1, \dots., T \qquad (3.1)$$

In equation 3.1, Yi_t be a G*1 vector of endogenous variables and both time and unit subscripts indicates that its value changes across sections and over the period of time. Where $Ai(\partial)$ is a polynomial in the lag operator, both $A_{oi}(t)$ and $Ai(\partial)$ depends on the unit, and μ_{it} is a G*1 vector of random disturbances.

PVAR has been used in discussing similarities and convergences among G7 business cycles. However its significance lies in the fact that it allows the transmission of idiosyncratic shocks across units and time. And to develop average effects bechance across heterogeneous groups of units and to make distinctive unit specific differences relative to the average (Canova et al. 2007). In this study, the choice of a panel VAR approach has been stimulated by mainly three reasons. First, the panel VAR approach allows us to explore the endogenous interaction between human capital accumulation, economic support ratio, output per worker growth rate, population growth rate and labor force dynamic. Second, panel Granger causality analysis allows us to identify the directions of the intricate link between demographic dividend and economic growth, which allows a discussion of a possible link. Third, Impulse Response Functions help us to evaluate the dynamic links between demographic dividend and economic growth.

The model has the following form:

$$PCR_{i,t} = \alpha_1 + \sum_{k=1}^{m} \beta_{11,k} PCR_{i,t-k} + \sum_{k=1}^{m} \beta_{12,k} PCI_{i,t-k} + \sum_{k=1}^{m} \beta_{13,k} ESR_{i,t-k} + \sum_{k=1}^{m} \beta_{14,k} WAP_{i,t-k} + \sum_{k=1}^{m} \beta_{15,k} POP_{i,t-k} + \sum_{k=1}^{m} \beta_{16,k} GER_{i,t-k} + \varepsilon_{1i,t} \quad (3.2)$$

In left side of the equation 3.2, there is dependent variable rate of growth of income per capita represented by PCR, while the first variable in right side of the equation is the lag of dependent variable which is treated here as independent variable. Rate of growth of income/output per worker indicated by PCI is the second independent variable in the model. ESR represents economic support ration, WAP represents working age population, POP stands for Population and GER represents gross enrolment rate. Similarly, here, (i=1,……, N) represents our cross-sectional units or country, (t=1,……,T) refers to the time period, and m refers to the lag number and $\varepsilon_{i,t}$ white noise error.

$$PCI_{i,t} = \alpha_2 + \sum_{k=1}^{m} \beta_{21,k} PCR_{i,t-k} + \sum_{k=1}^{m} \beta_{22,k} PCI_{i,t-k} + \sum_{k=1}^{m} \beta_{23,k} ESR_{i,t-k} + \sum_{k=1}^{m} \beta_{24,k} WAP_{i,t-k} + \sum_{k=1}^{m} \beta_{25,k} POP_{i,t-k} + \sum_{k=1}^{m} \beta_{26,k} GER_{i,t-k} + \varepsilon_{2i,t} \quad (3.3)$$

In equation 3.3 only dependent variable is replaced by rate of growth of income/output per worker while the rest of the variables and explanations are similar to equation 3.2.

$$ESR_{i,t} = \alpha_3 + \sum_{k=1}^{m} \beta_{31,k} PCR_{i,t-k} + \sum_{k=1}^{m} \beta_{32,k} PCI_{i,t-k} + \sum_{k=1}^{m} \beta_{33,k} ESR_{i,t-k} + \sum_{k=1}^{m} \beta_{34,k} WAP_{i,t-k} + \sum_{k=1}^{m} \beta_{35,k} POP_{i,t-k} + \sum_{k=1}^{m} \beta_{36,k} GER_{i,t-k} + \varepsilon_{3i,t} \quad (3.4)$$

In equation 3.4 only dependent variable is replaced by Economic support ratio while the rest of the variables and explanations are similar to equation 3.2.

$$WAP_{i,t} = \alpha_4 + \sum_{k=1}^{m} \beta_{41,k} PCR_{i,t-k} + \sum_{k=1}^{m} \beta_{42,k} PCI_{i,t-k} + \sum_{k=1}^{m} \beta_{43,k} ESR_{i,t-k} + \sum_{k=1}^{m} \beta_{44,k} WAP_{i,t-k} + \sum_{k=1}^{m} \beta_{45,k} POP_{i,t-k} + \sum_{k=1}^{m} \beta_{46,k} GER_{i,t-k} + \varepsilon_{4i,t} \quad (3.5)$$

In equation 3.5 only dependent variable is replaced by working age population while the rest of the variables and explanations are similar to equation 3.2.

$$POP_{i,t} = \alpha_5 + \sum_{k=1}^{m} \beta_{51,k} PCR_{i,t-k} + \sum_{k=1}^{m} \beta_{52,k} PCI_{i,t-k} + \sum_{k=1}^{m} \beta_{53,k} ESR_{i,t-k} + \sum_{k=1}^{m} \beta_{54,k} WAP_{i,t-k} + \sum_{k=1}^{m} \beta_{55,k} POP_{i,t-k} + \sum_{k=1}^{m} \beta_{56,k} GER_{i,t-k} + \varepsilon_{5i,t} \quad (3.6)$$

In equation 3.6only dependent variable is replaced by population while the rest of the variables and explanations are similar to equation 3.2.

$$GER_{i,t} = \alpha_6 + \sum_{k=1}^{m} \beta_{61,k} PCR_{i,t-k} + \sum_{k=1}^{m} \beta_{62,k} PCI_{i,t-k} + \sum_{k=1}^{m} \beta_{63,k} ESR_{i,t-k} + \sum_{k=1}^{m} \beta_{64,k} WAP_{i,t-k} + \sum_{k=1}^{m} \beta_{65,k} POP_{i,t-k} + \sum_{k=1}^{m} \beta_{66,k} GER_{i,t-k} + \varepsilon_{3i,t} \quad (3.7)$$

In equation 3.7 only dependent variable is replaced by Gross enrolment ratio while the rest of the variables and explanations are similar to equation 3.2.

This study also uses Granger causality test to analyze the nexus between demographic dividend and economic growth. In many studies, Granger causality tests have been employed. For instance, Hartwig (2010) used Granger causality test to analyze the nexus between public health variables and economic growth. Similarly, Podrecca & Carmeci (2001) used Granger causality test to analyze the nexus between investment and economic growth, and Hsiao (2006) used Granger causality test to analyze the nexus between foreign direct investment and economic growth.

Granger causality test is one of the post-estimation requirements and therefore we have presented the estimated results in table 3. As we have fitted the reduced-form PVAR, now we are interested to identify whether the lagged values of our first variable are useful in predicting the values of our second variable (conditional on the lagged values of our second variable). Alternatively, we want to perform whether our first variable is affecting our second variable in a way suggested by Granger-causality or not. Granger hypothesis to be tested in the current study are given as follows.

Table 3.1 Granger Hypothesis

S. No	Forward (A)	Backward (B)
1.	PCR Granger Causes PCI	PCI Granger Causes PCR
2.	PCR Granger Causes ESR	ESR Granger Causes PCR
3.	PCR Granger Causes WAP	WAP Granger Causes PCR
4.	PCR Granger Causes POP	POP Granger Causes PCR
5.	PCR Granger Causes GER	GER Granger Causes PCR

The correct choice of lag length before testing for causality is measured to avoid misguiding findings on Granger causality. Both Akaike Information Criterion (AIC) and Schwartz Information Criteria (SIC) reveal two as an optimal lag length.

3.4 Sample Selection

Sample selection criteria is much more important and both features and characteristics of one cross sectional unit to another cross-sectional unit are not constant. In this regard, we have chosen three Asian countries which means we have already control for geographical heterogeneity but still the selected countries do possess varying features to one another. Our selection of samples are aligned to our research objectives, as we are interested to investigate the relationship between demographic dividend and economic growth, therefore we have to consider features related to population and economy. For instance, we have selected Pakistan, India, and Bangladesh, and we explain selection criterion in the next paragraph.

In the first place, the three selected counties represents roughly a quarter of global population. For instance, the total population of these three countries are 1.755 billion and approximately represent 22.5 % of global population. And secondly, as an emerging economic markets there are huge potential in all these three countries. In this regard, India and Bangladesh has achieved tremendous economic growth in recent decades, while Pakistan is still struggling and needs valid policy directions. And finally, all these three countries do have potentials to promote industries related to export and becomes world exports hub.

3.5 Variable Description, justifications Measurement and Data Sources

As discussed, this study analyzed the nexus between demographic dividend and economic growth, in which we consider human capital accumulation, economic support ratio, output per worker growth rate, and population growth rate dynamic as key determinants of real GDP per capita growth. The panel data will be sourced from International Financial Statistics (IFS) and World Development Indicator (WDI) spanning from 1980 until 2019.

Our measure of dependent variable is PCR which can be obtained G/N, where G is change in size of population in numbers while N is the initial population. Our first independent variable is PCI and we have included this variable to represent economic growth. Since, we are interested to analyze the nexus between demographic dividend and economic growth, therefore we have included these two variables. Other control variables in the model are ESR, which is the ratio of the share of the working-age population to the overall population. ESR is important because Support ratios and dependency ratios are widely used as indicators for measuring the effects of population ageing on economic growth. Therefore, we have included ESR in this model.

Further, we have modeled Growth of working age population. Growth of working age population is critical for economic growth as per demographic transition theory and for that reason we have included this variable into our model. Similarly, as per Solow growth model higher population growth rate reduces the number of capital per worker and negatively contributes to economic growth. Therefore, we have modeled population growth rate in this study. Finally, GER is included in the model considering the implications of human capital on economic growth. In other words, human capital is critical for economic growth and for that reason we have measured human capital through GER (Young, 2019).

Table 3.2 Variable Description, Measurement and Data Source

S. No	Description	Variable	Measurement	Data Source
1	PCR	Real GDP Per Capita Growth Rate	Real GDP per capita is a measurement of the total economic output of a country divided by the number of people and adjusted for inflation. It's used to compare the standard of living between countries and over time.	WDI
2	PCI	Growth rate of income per worker	Gross Domestic Product divided by midyear population.	WDI
3	ESR	Economic Support Ratio	ESR=L/N, L is labor force while N is total population	WDI
4	WAP	Growth Rate of Working Age Population	WAP is defined as those aged 15 to 64. We take its growth rate for measurement.	WDI
5	POP	Population Growth Rate	The annual population growth rate.	WDI
6	GER	Gross Enrollment Rate	The number of students who are enrolled in a given educational level regardless of age, sex, expressed in percentage.	WDI

CHAPTER 4

RESEARCH STRATEGY

Research strategy is such that we initially present population pyramids and compare and contrast variant demographic features for each country. We then offer a descriptive analysis of statistics for the selected variables. Hurlin causality test, impulse response function and forecast error variance decomposition results based on panel VAR model for our five selected models will be discussed in the next section.

4.1 Population Pyramids

Population pyramids are important graphs for visualizing how populations are composed when looking at groups divided by age and sex. There are three different trends in population pyramids which are expansive, constrictive, and stationary. First, expansive population pyramids are characterized by higher fertility and lower life expectancy rates, and as a result have a larger percentage of people in younger age groups. Second, constrictive population pyramids are usually indicates lower percentage of people in younger age groups and also shows declining birth rates. And finally, stationary population pyramids shows homogeneous distribution of population in each population group.

In figure 1, we have shown population pyramid for Pakistan. We can see it clearly from the shape of pyramids that majority of the population lies midway above of the pyramids. For instance, almost 62% of the population is between 15- 64, and shows a huge amount of working age population. The total percentage of younger age group 0-40 is 77%, where the percentage of male 39.8 % exceeds the percentage of female 37.2. In contrast, the percentage of dependent-age-group (65 or above) is only

4.3 percent which is consistent with the shape of population pyramids as the base is much narrower and the top section is much wider.

In figure 2 and 3, we have shown population pyramids for both India and Bangladesh respectively. The working age population is relatively high for India which is 66% and higher than Pakistan's 62%. However, the total percentage of younger age group (0-40) for India is 68%, which is relatively lower than 77% of Pakistan's total percentage of younger age group. It shows the fact that India hosts only 2% of population under age 15, while the percentage of under age 15 for Pakistan is 15%. It further implies that, Pakistan compared to India in the near future would find an opportunity of increasing working age-group.

Figure 2 Population Pyramid (Pakistan)

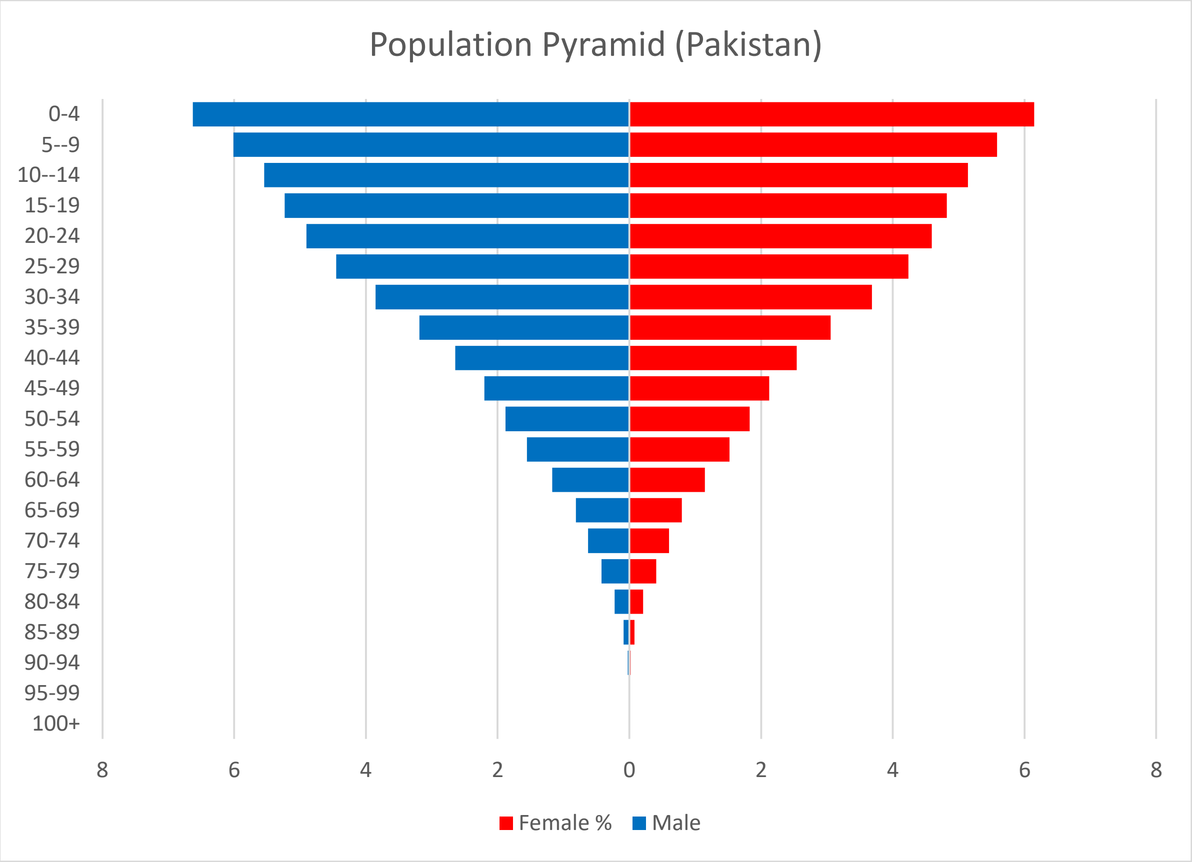


Figure 3 Population Pyramid (India)

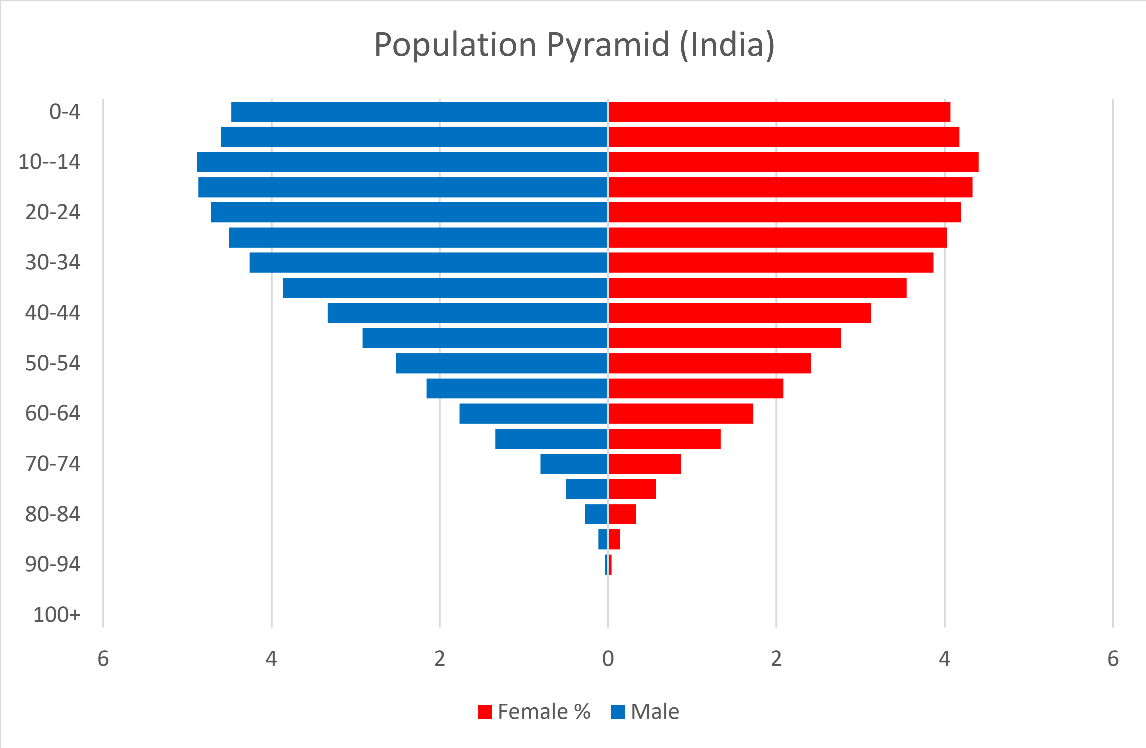
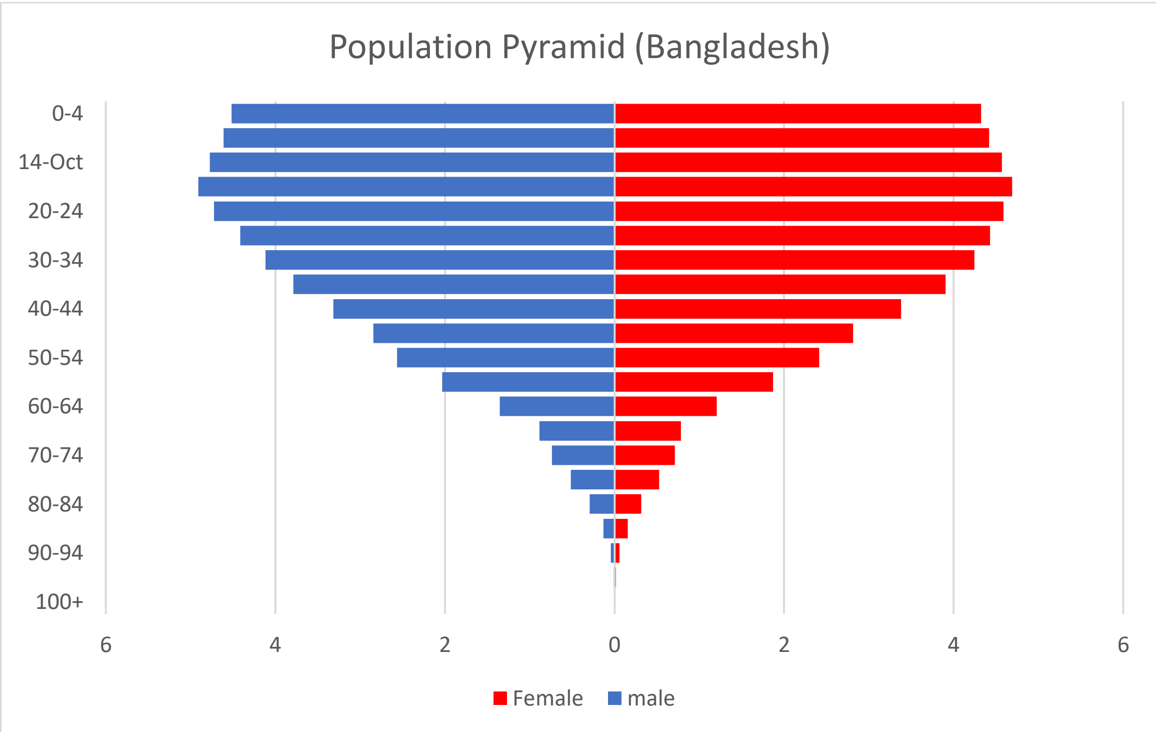


Figure 4 Population Pyramid (Bangladesh)



Globally, between the age group of 10-24, there are more than 1.8 billion children in 2014 and the figure will touch almost two billion in 2050. In this regard, the total number of children between the age group of 10-24 for Pakistan has increased from 59 million to 65 million during 2014-2020. For India, there were 356 million children between the age group of 10-24 in 2014, while it has increased to 374 million in 2020. And for Bangladesh, the total number of children in this age group were 47 million in 2014 and has increased to 46 million in 2020 (Abusaleh, 2017).

4.2 VIF TEST

VIF testing Table 4

Variables	VIF	1/VIF
GWAP	10.00	0.1
POP	9.81	0.101987
GER	4.96	0.201622
LPCI	2.39	0.418891
ESR	1.48	0.677008
Mean	5.72	

Table 4 presents the VIF test for our selected variables if the value of VIF is greater than 10 than there is high multicolliniearity exist between the variables. In table 4 the value of VIF for the variable GWAP is 10.00 for the variable POP is 9.81 for the variable GER 4.96 similarly for LPCI 2.39 for ESR 1.48 there is no variable which value exceeds from 10 so here no any multicolliniarity exist in these variables.

4.3 Unit Root Analysis

In order to check stationarity of the variables, we have employed Levin Lin and Chu (LLC) and present results in table 4.1(a). The null hypothesis of LLC test states that the underlying series has unit root. After getting results we can conclude that ESR, GER, PCR, and GWAP are non-stationary at level. While converting the nonstationary variables into stationary form, we take the first difference and make them stationary. In addition, the remaining two variables such as PCI and POP are stationary at level.

Unit root testing Table 4.1(a)

	At level	At 1st difference	
Variables	Constant	Constant	Conclusion
ESR	0.223	-5.164*	I (1)
GER	1.812	-5.121*	I (1)
PCI	-5.900*	-	I (0)
PCR	14.11	-1.955*	I (1)
POP	-1.469*	-	I (0)
GWAP	2.281	-5.506*	I (1)

* shows significance at 5 percent.

4.4 Descriptive Statistics

Descriptive statistics of the selected variables are given in table 4.1(b). For instance, the mean value of PCR for the data set is 672.32 with standard deviation 476.76. This implies that, on average selected countries have experienced 672.32 PCR for the period 1979-2019 along with 476.76 standard deviation. In similar instance, the average score of GWAP is 58.224 with standard deviation 4.421. Similarly, the mean value of population Growth rate (POP) for the data set is 2.005 along standard deviation 0.640. Similarly, the central tendency of ESR, GER and PCI are 0.311, 41.906 and 3.083 along with standard deviation 0.211, 17.394 and 2.365 respectively.

Table 4.1(b) Descriptive Statistics

	ESR	GER	GWAP	PCI	PCR	POP
Mean	0.311	41.906	58.224	3.083	672.32	2.005
Median	0.340	42.854	58.252	3.118	443.31	2.065
Maximum	0.682	75.091	66.605	7.299	2099.6	3.364
Minimum	0.049	16.850	51.201	-7.388	200.76	1.015
Std. Dev.	0.211	17.394	4.421	2.365	476.76	0.640

4.5 Correlation Matrix

Table 4.2 presents correlation matrix for our selected variables. There are basically three degrees of correlation. The first is week degree of correlation and in this case the value of coefficient will be less than 0.25. The second is moderate degree of correlation and in this case the coefficient is around 0.50. The third and final one is strong correlation, in that case the correlation coefficient is above 0.75.

Table 4.2 Correlation Matrix

Correlation	ESR	GER	GWAP	PCI	PCR	POP
ESR	1					
GER	-0.564	1				
GWAP	-0.565	0.972	1			
PCI	-0.315	0.545	0.547	1		
PCR	-0.347	0.733	0.755	0.322	1	
POP	0.531	-0.927	-0.953	-0.643	-0.643	1

For instance, there is a weak moderate correlation between ESR and GER I.e., -0.56. The correlation coefficient between ESR and PCI is -0.31, which demonstrates the weak degree of correlation. On the other hand, only three correlation coefficient appear to be greater than 0.75. First, the correlation coefficient between GWAP and GER is 0.972, between POP and GER is -0.927, and between POP and GWAP is -0.953.

4.7 Lag Length Criteria for PVAR:

Table 4.3 Lag Determination

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-278.01	NA	0.0007	9.793	10.006	9.876
1	121.67	702.90	2.60e-09	-2.747	1.255*	-2.166
2	190.65	107.03	8.67e-10	-3.884	-1.113	-2.805
3	242.78	70.10*	5.52e-10*	-4.440*	-0.391	-2.863*

For dynamic models, lag(s) selection play a key role, therefore pre-estimation we find the appropriate lags for a model. Table 4.3 describe the lag determination for the PVAR model. The lag is determined on the minimum values of Akaike information criteria (AIC) and Hannan-Quinn information criteria (HQ), Schwarz information criteria (SC). Based on AIC, HQ, FPE and LR, the three lags are sufficient for PVAR model.

4.8 Panel VAR results

Panel VAR model requires the stationary data, hence initially we transform the non-stationary variables which are recommended by LLC test to make stationary by differencing. According to Stock and Watson (2001), due to complex lag structure of VAR model, it is not appropriate to interpret the coefficients and R square. The output of PVAR (table 4.3(A)) is available in appendix. To interpret the coefficients of the estimated PVAR model it is therefore necessary to use some specific tests which are given below instead of describing each coefficient alone.

1. Granger/Hurlin causality test
2. Impulse response function (IRF)
3. forecast error variance decomposition (FEVD)

Table 4.6 Hurlin Panel Causality Test

Null Hypothesis:	W-Stat.	Zbar-Stat.	Prob.
PCI does not homogeneously cause DLPCR	3.83278	1.29934	0.1938
DLPCR does not homogeneously cause PCI	3.81188	1.28341	0.1993
DESR does not homogeneously cause DLPCR	5.40943	2.50177	0.0124
DLPCR does not homogeneously cause DESR	1.33860	-0.60282	0.5466
DGWAP does not homogeneously cause DLPCR	2.28377	0.11425	0.9090
DLPCR does not homogeneously cause DGWAP	0.90686	-0.93146	0.3516
POP does not homogeneously cause DLPCR	7.10533	3.79513	0.0001
DLPCR does not homogeneously cause POP	2.44465	0.24070	0.8098
DGER does not homogeneously cause DLPCR	2.82791	0.45002	0.6527
DLPCR does not homogeneously cause DGER	2.30426	0.07624	0.9392

DESR does not homogeneously cause PCI	10.3885	6.29899	3.E-10
PCI does not homogeneously cause DESR	1.01818	-0.84718	0.3969
DGWAP does not homogeneously cause PCI	3.98062	1.40294	0.1606
PCI does not homogeneously cause DGWAP	1.88678	-0.18725	0.8515
POP does not homogeneously cause PCI	9.00414	5.26692	1.E-07
PCI does not homogeneously cause POP	3.92021	1.37448	0.1693
DGER does not homogeneously cause PCI	1.44955	-0.53385	0.5934
PCI does not homogeneously cause DGER	0.68582	-1.07900	0.2806
DGWAP does not homogeneously cause DESR	6.39136	3.23381	0.0012
DESR does not homogeneously cause DGWAP	2.64887	0.39153	0.6954
POP does not homogeneously cause DESR	5.95601	2.91861	0.0035
DESR does not homogeneously cause POP	4.97024	2.16682	0.0302
DGER does not homogeneously cause DESR	2.16017	-0.02661	0.9788
DESR does not homogeneously cause DGER	0.63744	-1.11353	0.2655
POP does not homogeneously cause DGWAP	1.22597	-0.68910	0.4908
DGWAP does not homogeneously cause POP	3.54146	1.06942	0.2849
DGER does not homogeneously cause DGWAP	3.67342	1.04071	0.2980
DGWAP does not homogeneously cause DGER	0.62573	-1.11905	0.2631
DGER does not homogeneously cause POP	1.43922	-0.54122	0.5884
POP does not homogeneously cause DGER	0.63012	-1.11876	0.2632

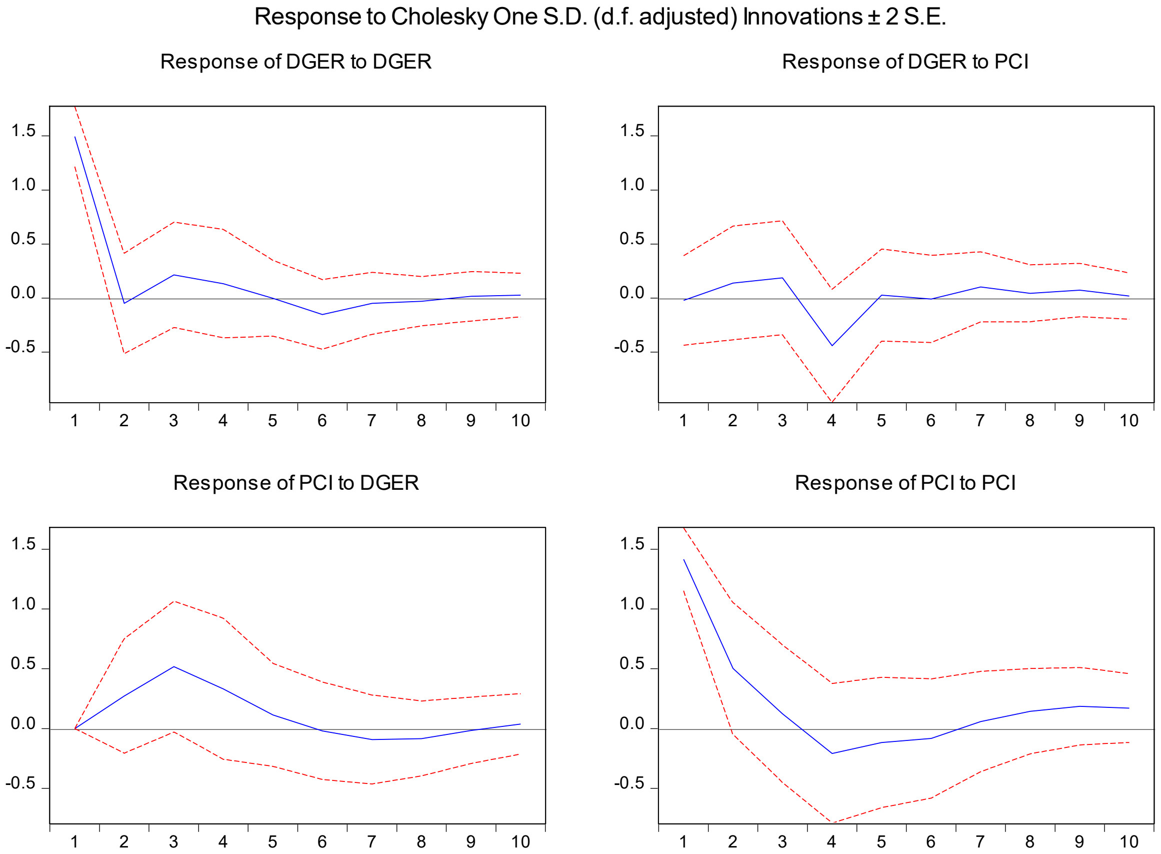
Based on the findings of F statistics and probability values we can sum-up that the null hypothesis that DESR does not cause DLPCR is rejected because probability value is less than 5% level of significance. More specific, we can say that DESR does cause DLPCR significantly. Continuing with the same explanation, POP does cause DLPCR statistically. In the same way, LGWAP can cause DESR significantly.

Based on the results of hurlin panel causality: the following null hypothesis have been accepted because their associated P-values are greater than 5% level of significance.

- *DESR does not cause DGER*
- *DESR does not cause DGWAP*
- *DLPCR does not cause DESR*
- *DGER does not cause DGWAP*
- *PCI does not cause DGER*
- *DGER does not cause PCI*
- *DGWAP does not cause PCR*

- *POP does not cause DGWAP*
- *DLPCR does not cause PCI*
- *PCI does not cause PCR*
- *PCI does not cause POP*
- *DLPCR does not cause POP*

4.9 Impulse Response Function



Response on DGER: If there is one standard deviation shock (innovation) in DGER, at the early stage the DGER declines dramatically, after 2nd period it move up gradually. Beyond the 3rd period it becomes negative and more or less stable means no dramatic increase or decrease. If there is one standard deviation shock (innovation) in PCI, at the early stage the DGER is positive, but after 2nd period it declined steadily. Beyond the 5th period it starts upward movement gradually and then become stable.

Response on PCI: If there is one standard deviation shock (innovation) in DGER, at the initial stage the PCI go up dramatically, approximately the impact of DGER on PCI is decreasing trend from 2nd period to 4th period. Beyond 6th the impact turns out to be negative. If there is one standard deviation shock (innovation) in PCI, at the early stage the PCI itself jumps downward and become negative, and gradually starts travelling upward and beyond 7th period becomes positive again.

4.10 Variance Decomposition

The forecast error decomposition is the percentage of the variance of the error made in forecasting a variable (response variable) due to a specific shock (e.g. the error term in the other equation) at a given horizon (e.g. 10 years). Thus, the forecast error decomposition is like a partial R2 for the forecast error, by forecast horizon. Table 4.4 presents variance decomposition of our selected variables.

Table 4.4 Variance decomposition

DLPCR:

Period	S.E.	DLPCR	PCI	DESR	DGWAP	POP	DGER
1	0.069193	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.070879	96.79258	2.702335	0.191017	0.004083	0.277981	0.032006
3	0.072718	92.20456	2.828283	2.317673	0.319438	0.446384	1.883660
4	0.074623	91.69745	3.049680	2.351574	0.434923	0.664528	1.801846
5	0.075278	90.34147	3.233157	3.138198	0.476438	1.038259	1.772480
6	0.075781	89.15020	3.643214	3.098063	0.483960	1.874806	1.749759
7	0.076408	88.09480	3.646374	3.257021	0.491666	2.592150	1.917993
8	0.076881	87.12215	3.634425	3.499872	0.487103	3.191455	2.064993
9	0.077121	86.58830	3.621893	3.549094	0.497784	3.659187	2.083742
10	0.077299	86.23745	3.605227	3.620163	0.532347	3.895764	2.109048

PCI:

Period	S.E.	DLPCR	PCI	DESR	DGWAP	POP	DGER
1	1.616546	23.25129	76.74871	0.000000	0.000000	0.000000	0.000000
2	1.756810	20.47760	73.14915	2.039801	0.278571	1.670227	2.384649

3	1.892149	18.25178	63.48577	3.696527	0.412439	4.603413	9.550069
4	1.973589	16.81722	59.46047	4.293827	0.447795	7.379882	11.60081
5	2.003401	16.36114	58.04349	4.299938	0.446423	9.268411	11.58060
6	2.032759	15.92658	56.54711	4.926767	0.579807	10.76192	11.25781
7	2.059054	15.52246	55.19222	5.381700	1.000365	11.73345	11.16981
8	2.089249	15.11933	54.08253	5.723015	1.665482	12.40052	11.00911
9	2.121537	14.89000	53.21281	6.050430	2.208928	12.95591	10.68193
10	2.150826	14.81095	52.40631	6.327581	2.552634	13.47781	10.42472

DESR:

Period	S.E.	DLPCR	PCI	DESR	DGWAP	POP	DGER
1	0.000407	0.000925	0.685519	99.31356	0.000000	0.000000	0.000000
2	0.000555	2.426498	8.864100	85.80750	0.653959	2.245762	0.002180
3	0.000657	3.687570	11.84642	78.50016	0.690871	5.273366	0.001614
4	0.000759	4.790106	15.54132	69.97802	0.980732	8.116150	0.593669
5	0.000850	5.256090	16.52098	65.22163	1.258174	10.36994	1.373193
6	0.000927	5.597477	16.57935	61.46398	1.687852	12.38218	2.289163
7	0.000992	5.728138	15.73326	59.45158	1.995840	14.08071	3.010469
8	0.001046	5.740125	14.96150	58.07198	2.210008	15.59831	3.418089
9	0.001090	5.664394	14.35421	57.27851	2.277733	16.88747	3.537691
10	0.001128	5.592438	13.96377	56.74388	2.261710	17.89290	3.545296

DGWAP:

Period	S.E.	DLPCR	PCI	DESR	DGWAP	POP	DGER
1	0.048656	0.498189	1.115630	81.51482	16.87136	0.000000	0.000000
2	0.064379	0.708874	10.47992	69.70714	18.34320	0.742062	0.018800
3	0.077299	1.307637	17.19777	58.54017	21.75834	0.925070	0.271009
4	0.088651	4.194863	19.43291	52.53736	21.89604	0.731202	1.207628
5	0.097841	6.558201	18.75966	50.27878	21.54839	0.610544	2.244429
6	0.104799	8.944514	18.20137	48.25331	20.86554	0.545361	3.189898
7	0.110980	10.85892	16.99578	47.55906	20.36190	0.491487	3.732841
8	0.116559	12.22320	16.16745	47.28899	19.93448	0.457836	3.928042
9	0.121862	13.02598	15.65104	47.22436	19.73758	0.509915	3.851129
10	0.127266	13.59210	15.46168	46.99043	19.55230	0.673625	3.729869

POP:

Period	S.E.	DLPCR	PCI	DESR	DGWAP	POP	DGER
1	0.008856	0.620414	0.216827	7.567800	4.352258	87.24270	0.000000
2	0.025448	0.206644	1.079099	10.65882	3.460024	84.55304	0.042366
3	0.048305	0.067664	2.158185	10.07610	2.646057	84.93813	0.113856
4	0.074585	0.030202	2.764688	9.289524	2.020821	85.66751	0.227253

5	0.101424	0.026943	2.977551	8.719688	1.587405	86.27851	0.409907
6	0.126374	0.032255	2.855896	8.356557	1.282433	86.84056	0.632301
7	0.147859	0.036917	2.566994	8.100462	1.063137	87.38913	0.843356
8	0.165213	0.039131	2.241063	7.922374	0.900480	87.89712	0.999827
9	0.178532	0.038943	1.964879	7.799764	0.781774	88.33176	1.082877
10	0.188404	0.036944	1.768034	7.718481	0.701999	88.67382	1.100718

DGER:

Period	S.E.	DLPCR	PCI	DESR	DGWAP	POP	DGER
1	1.580949	0.266116	0.018660	5.409971	4.858318	0.104457	89.34248
2	1.632883	2.185846	0.747941	5.698221	5.595785	1.931839	83.84037
3	1.692577	2.035124	1.928372	6.115719	7.393799	2.880910	79.64608
4	1.810441	2.872670	7.596181	10.17251	6.628125	2.580428	70.15009
5	1.816570	3.072038	7.566543	10.19550	6.589211	2.899010	69.67770
6	1.835962	3.282503	7.409490	10.26145	7.303937	2.846176	68.89644
7	1.847525	3.241826	7.633300	10.20733	7.893288	2.919404	68.10485
8	1.862692	3.202723	7.566853	10.21551	8.584445	3.403685	67.02679
9	1.876355	3.348042	7.612060	10.07423	8.817442	4.087018	66.06120
10	1.888899	3.548341	7.520309	9.991800	8.934997	4.796475	65.20808

Cholesky Ordering: DLPCR PCI DESR DGWAP POP DGER

Around 14% of the error in the forecast of the DLPCR is attributed to the PCI, DESR, DGWAP, POP and DGER shocks in the PVAR model. While 86% is explained by itself.

Approximately 48% of the error in the forecast of the PCI is attributed to the DLPCR, DESR, DGWAP, POP and DGER shocks in the PVAR model. Rest of the error i.e. 52% is attributed to PCI itself.

Around 43% of the error in the forecast of the DESR is attributed to other variables such as PCI, DLPCR, DGWAP, POP and DGER innovations in the PVAR model. Rest of the error in the forecast that is 57% is due to DESR itself.

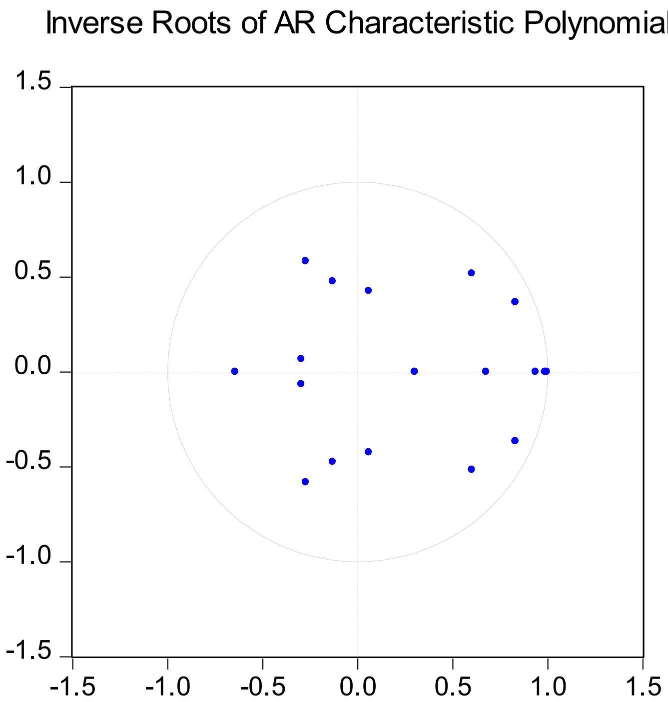
Around the error 80% in the forecast of the DGWAP is due to remaining variables like PCI, DESR, DLPCR, POP and DGER shocks in the model. The remaining 20% is attributed to DGWAP itself.

Around 11% of the error in the forecast of the POP variable is contributed by other variables such as DESR, PCI, DLPCR, DGWAP, and DGER shocks in the PVAR model. Rest of the error in the forecast i.e. 89% is due to POP itself.

Around the error 35% in the forecast of DGER is because of remaining variables like PCI, DESR, DLPCR, POP, DGWAP and DGER shocks in the model. The remaining 65% is attributed to DGER itself.

4. 11 Stability test of PVAR model

Stability of PVAR model shows that the model is almost stable and we can rely the results obtained through PVAR model. Stability of the PVAR model can be seen from the graph as almost each blue dot lies inside the circle. It is assumed that the model is stable no blue dots lies outside the circle.



CHAPTER 5

CONCLUSION

5.1 Conclusion

In this research study, we are interested to relate demographic dividend model with economic growth by choosing three different emerging Asian economies. South Asian countries have indeed entered into the demographic window of opportunity and they should need to invest more energy and resources on the promotion of economic growth, and these opportunities in terms of demographic dividend are mostly credited by changing population age structure or demographic transition in these countries. This study is unique as it would relate demographic dividend model with economic growth by choosing three emerging Asian economies as most of the scholarships available on this relationship between demographic dividend and economic growth have employed time series analysis and constantly ignored the cross-sectional aspects of the phenomenon. Alternatively, literature is full of studies that have employed time series analysis to investigate the relationship between demographic dividend models with economic growth in Asian economies.

In this regard, this research study has two basic objectives which are to examine the relationship b/w demographic dividend & economic growth and to examine the pass-through channel between demographic dividend and economic growth in context of three South Asian Economies, India, Pakistan and Bangladesh for the period 1980-2019. Most of the studies about demographic dividend have come into seen are done on time series data using different models. Therefore, focusing Panel VAR we can be able to check the transmission of demographic dividend pass through different channels. PVAR results for our five selected models have been discussed in chapter 4.

To capture the dynamic relationships between PCR, the GPCI, GWAP, ESR, POP and GER, we specify a panel VAR with three lags based on the Bayesian Schwarz information criterion. It is difficult to interpret the PVAR model coefficients directly by dint of complex lags structure. Therefore, Hurlin granger causality test, impulse response function and forecast error variance decomposition are calculated.

The findings of Hurlin panel causality test are: DESR does cause DLPCR significantly but DLPCR does not contribute to DESR so it is quite obvious that there is unidirectional causality. In addition, POP can statistically cause DLPCR but DLPCR fails to cause POP. It demonstrates that there exists one-way causality. Similarly, LGWAP can cause DESR significantly but reverse causality does not exist.

Impulse response output has shown that if there is one standard deviation shock (innovation) in DGER, at the early stage the DGER declines dramatically, after 2^{nd} period it move up gradually. Beyond the 3rd period it becomes negative and to some extent become stable disclose no dramatic rise or decrease. If there is one standard deviation shock (innovation) in PCI, at the early stage, the DGER is positive, but after 2^{nd} period it declined steadily. Beyond the 5th period it starts upward movement gradually and then become stable. Moreover, if there is one standard deviation shock (innovation) in DGER, at the initial stage the PCI go up dramatically, approximately the impact of DGER on PCI is decreasing trend from 2^{nd} period to 4^{th} period. Beyond 6^{th} the impact turns out to be negative. If there is one standard deviation shock (innovation) in PCI, at the early stage the PCI itself jumps downward and become negative, and gradually starts travelling upward and beyond 7^{th} period becomes positive again.

The results of FEVD are following as: Around 14% of the error in the forecast of the DLPCR is attributed to rest of the included variables shock in the PVAR model. While 86% is explained by itself. Approximately 48% of the error in the forecast of the PCI is due to other variables shock in the PVAR model. Rest of the error i.e. 52% is attributed to PCI itself. Similarly, 43% of the error in the forecast of the DESR is attributed to other variables innovation in the PVAR model. Rest of the error in the forecast that is 57% is due to DESR itself. In the same way, the error 80% in the forecast of the DGWAP is due to remaining variables shock in the model. The remaining 20% is attributed to DGWAP itself. Likewise 11% of the error in the forecast of the POP variable is contributed by other variables shock in the PVAR model. Rest of the error in the forecast i.e. 89% is due to POP itself. The error 35% in the forecast of DGER is because of remaining variables shock in the model. The remaining 65% is attributed to DGER itself. Besides, the model stability has proved by circle graph.

5.2 Policy Recommendations

- Though, population growth rate in Pakistan has declined from 1980-2019, but is still higher than population growth in both India and Bangladesh. In this regard, there is a need to strengthen different programs related to family planning in order to make ensure availability of quality family planning services as well as to control higher population growth rate. This policy recommendation stresses the need for collaborative efforts among four different provinces as the matter of population planning has been devolved to provinces. Proper implementation of this policy allows Pakistan to avoid other socio-economic problems such as Unemployment and inflation.
- There is a genuine need for investment in human capital development as Pakistan is experiencing increasing working age population and without

adequate investment in these sectors Pakistan cannot realize maximum benefits from changing age structure. Only educated and skilled working age population can contribute to avail maximum opportunities in terms of demographic dividend. However, the current investment on human capital development, both at federal and provincial level, is not satisfactory as the greater portion of Federal budget is reserved for non-developmental budget. In this regard, a shift from non-developmental to developmental spending is required in order to realize maximum in terms of demographic dividend.

- New population policies must be broad based, emphasizing an inter-sectoral approach to lower fertility and harnessing the potential of a youthful population.

5.3 Limitations of the Study

The research is limited by the consideration of a relatively small set of mostly economic variables for a limited period of analysis. Besides by dint of unavailability of data we did not take data before 1980 for estimation purpose.

5.4 Future Extension

Future studies can also incorporated other factors like terrorism, internal conflict, external conflict, political instability etc. Furthermore this work can also extend for other developing countries.

REFERENCES

Abusaleh, K. (2017). Demographic dividend in Bangladesh: Quest for initiatives. Society & Change, XI, 3, 37-48.

Aiyar, S. S., & Mody, A. (2011). The demographic dividend: Evidence from the Indian states. IMF Working Papers, 1-31.

Arabi, K. A. M., & Abdalla, S. Z. S. (2013). The impact of human capital on economic growth: Empirical evidence from Sudan. *Research in World Economy*, *4*(2), 43.

Bailey, R. E., & Chambers, M. J. (1998). The impact of real wage and mortality fluctuations on fertility and nuptiality in pretenses England. *Journal of population Economics*, *11*(3), 413-434.

Beveridge, S., & Nelson, C. R. (1981). A new approach to decomposition of economic time series into permanent and transitory components with particular attention to measurement of the business cycle'. *Journal of Monetary economics*, *7*(2), 151-174.

Blanchard, O. J. (1989). A traditional interpretation of macroeconomic fluctuations. *The American Economic Review*, 1146-1164.

Bloom, D. E., and J. D. Sachs (1998) Geography, Demography, and Economic Growth in Africa. *Brookings Papers on Economic Activity* 2, 207–273.

Bloom, D., and J. Williamson (1998) Demographic Transitions and Economic Miracles in Emerging Asia. *World Bank Economic Review* 12: 419–456.

Bloom, D., D. Canning, and P. Malaney (2000) Demographic Change and Economic Growth in Asia. *Population and Development Review* 26 (Supplement): 257–290.

Canova, F., Ciccarelli, M., & Ortega, E. (2007). Similarities and convergence in G-7 cycles. *Journal of Monetary economics*, *54*(3), 850-878.

Canova, F., Ciccarelli, M., & Ortega, E. (2012). Do institutional changes affect business cycles? Evidence from Europe. *Journal of Economic Dynamics and Control*, *36*(10), 1520-1533.

Choudhry, M. T., & Elhorst, J. P. (2010). Demographic transition and economic growth in China, India and Pakistan. *Economic Systems*, *34*(3), 218-236.

Cuaresma, J. C., Lutz, W., & Sanderson, W. (2014). Is the demographic dividend an education dividend? *Demography*, *51*(1), 299-315.

Donehower, G., Fürnkranz-Prskawetz, A., Lee, R. D., Lee, S. H., Mason, A., Miller, T., ... & Soyibo, A. (2014). Human-resource development and demographic change in China.

Drummond, P., Thakoor, V. and Yu, S. (2014). Africa Rising: Harnessing the Demographic Dividend. IMF Working Paper No. WP/14/143.

Entorf, H., & Spengler, H. (2000). Socioeconomic and demographic factors of crime in Germany: Evidence from panel data of the German states. *International review of law and economics*, *20*(1), 75-106.

Feeney, G., and A. Mason (2001) Population East Asia. In A. Mason (ed.) *Population Change and Economic Development in East Asia: Challenges Met, Opportunities Seized*. Stanford: Stanford University Press.

Gabril, L. F. and de Santana Riberio, L. C. (2019). Economic Growth and Manufacturing: An Analysis using Panel VAR and Intersectoral Linkages. Structural Change and Economic Dynamics, 49, 43-61.

Gyimah-Brempong, K., Paddison, O., & Mitiku, W. (2006). Higher education and economic growth in Africa. *The Journal of Development Studies*, *42*(3), 509-529.

Hagnell, M. (1991). A multivariate time series analysis of fertility, adult mortality, nuptiality, and real wages in Sweden 1751-1850: A comparison of two different approaches. *Journal of Official Statistics*, *7*(4), 437.

Hartwig, J. (2010). Is health capital formation good for long-term economic growth? – Panel Granger-causality evidence for OECD countries. *Journal of macroeconomics*, *32*(1), 314-325.

Hovhannisyan, N. and Sedgley, N. (2019). Using Panel VAR to Analyze International Knowledge Spillovers. Review of International Economics, 27(5), 1633-1660.

Hsiao, F. S., & Hsiao, M. C. W. (2006). FDI, exports, and GDP in East and Southeast Asia—Panel data versus time-series causality analyses. *Journal of Asian Economics*, *17*(6), 1082-1106.

Hussain, S., Malik, S., & Hayat, M. K. (2009). Demographic transition and economic growth in Pakistan. *European Journal of Scientific Research*, *31*(3), 491-499.

Iqbal, K., Yasmin, N., & Yaseen, M. R. (2015). Impact of demographic transition on economic growth of Pakistan. *Journal of Finance and Economics*, *3*(2), 44-50.

Issa, H. (2005). Human Capital Demographic Transition and Economic Growth. *Journal of Economic Development*, *30*(2), 49.

Kankal, M., Akpınar, A., Kömürcü, M. İ., & Özşahin, T. Ş. (2011). Modeling and forecasting of Turkey's energy consumption using socio-economic and demographic variables. *Applied Energy*, *88*(5), 1927-1939.

Koga, M. (2006). The decline of Japan's saving rate and demographic effects. *The Japanese Economic Review*, *57*(2), 312-321.

Kónya, L. (2006). Exports and growth: Granger causality analysis on OECD countries with a panel data approach. *Economic Modelling*, *23*(6), 978-992.

Lee, R., & Anderson, M. (2002). Malthus in state space: Macroeconomic-demographic relations in English history, 1540 to 1870. *Journal of Population Economics*, *15*(2), 195-220.

Lewbel, A. (2007). Endogenous selection or treatment model estimation. *Journal of Econometrics*, *141*(2), 777-806.

Love, I. and Zicchino, L. (2006). Financial Development and Dynamic Investment behaviour: Evidence from Panel VAR. The Quarterly Journal of Economics and Finance, 46, 190-210.

Malmberg, B. (1994). Age structure effects on economic growth—Swedish evidence. *Scandinavian Economic History Review*, *42*(3), 279-295.

Mehmood, B., Khan, A., & Khan, A. (2012). Empirical Scrutiny of Demographic Dividend of Economic Growth: Time Series Evidence from Pakistan. *Romanian Review of Social Sciences*, (2).

Munir, K. and Shahid, F. S. U. (2020). Role of Demographic Factors in Economic Growth of South Asian Countries. Journal of Economic Studies, available at https://www.emerald.com/insight/0144-3585.htm

Navaneetham, K., & Dharmalingam, A. (2012). A review of age structural transition and demographic dividend in South Asia: Opportunities and challenges. Journal of Population Ageing, 5(4), 281-298.

Nayab, D. (2007). Demographic dividend or demographic threat in Pakistan. Pakistan Institute of Development Economics Working Paper Series.

Nicolini, E. A. (2007). Was Malthus right? A VAR analysis of economic and demographic interactions in pre-industrial England. *European review of economic history*, *11*(1), 99-121.

Podrecca, E., & Carmeci, G. (2001). Fixed investment and economic growth: new results on causality. *Applied Economics*, *33*(2), 177-182.

Ray, R. (1986). Demographic variables and equivalence scales in a flexible demand system: the case of AIDS. *Applied Economics*, *18*(3), 265-278.

Ray, R. (1996). Demographic variables in demand systems: the case for generality. *Empirical Economics*, *21*(2), 307-315.

Sathar, Z., Royan, R., & Bongaarts, J. (2013). Capturing the demographic dividend in Pakistan.

Stock, J. H., & Watson, M. W. (2001). Vector autoregressions. *Journal of Economic perspectives*, *15*(4), 101-115.

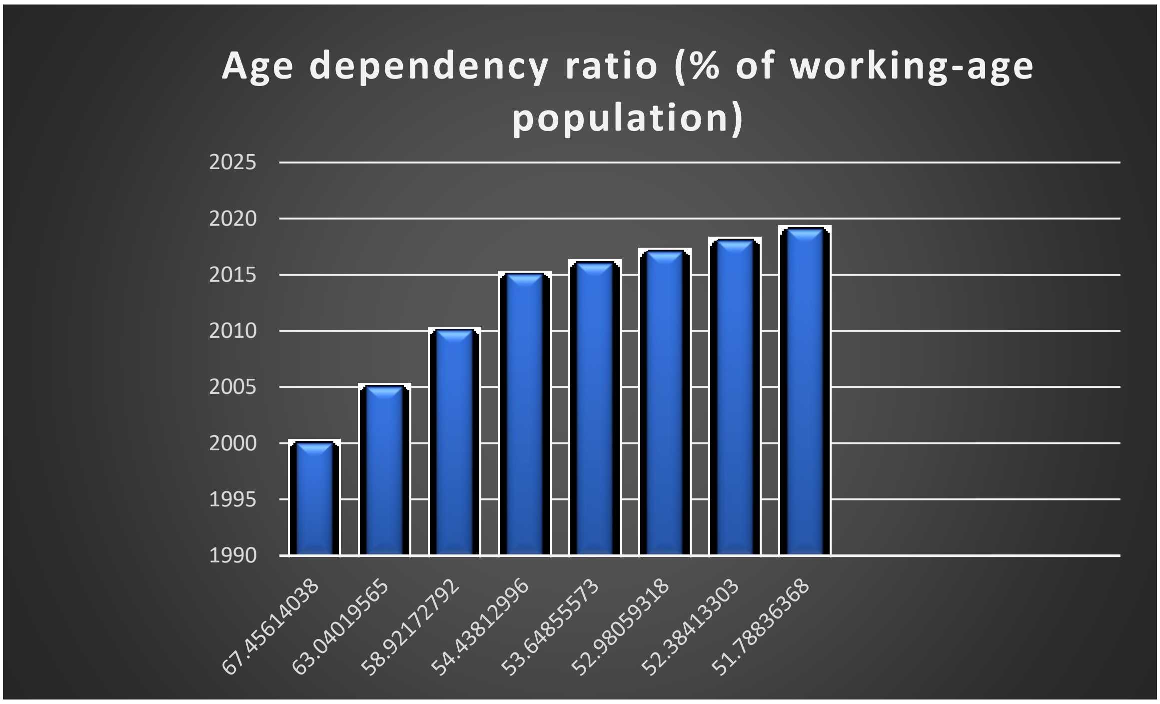
Waverman, L., Meschi, M., & Fuss, M. (2005). The impact of telecoms on economic growth in developing countries. *The Vodafone policy paper series*, *2*(03), 10-24.

Wolfgang Lutz. (2014) Model, D. The Demographic Dividend is an Education-triggered Dividend.

Young, A. O. (2019). Economic growth and demographic dividend nexus in Nigeria: a vector autoregressive (VAR) approach. Asian Social Science, 15(2), 37-59.

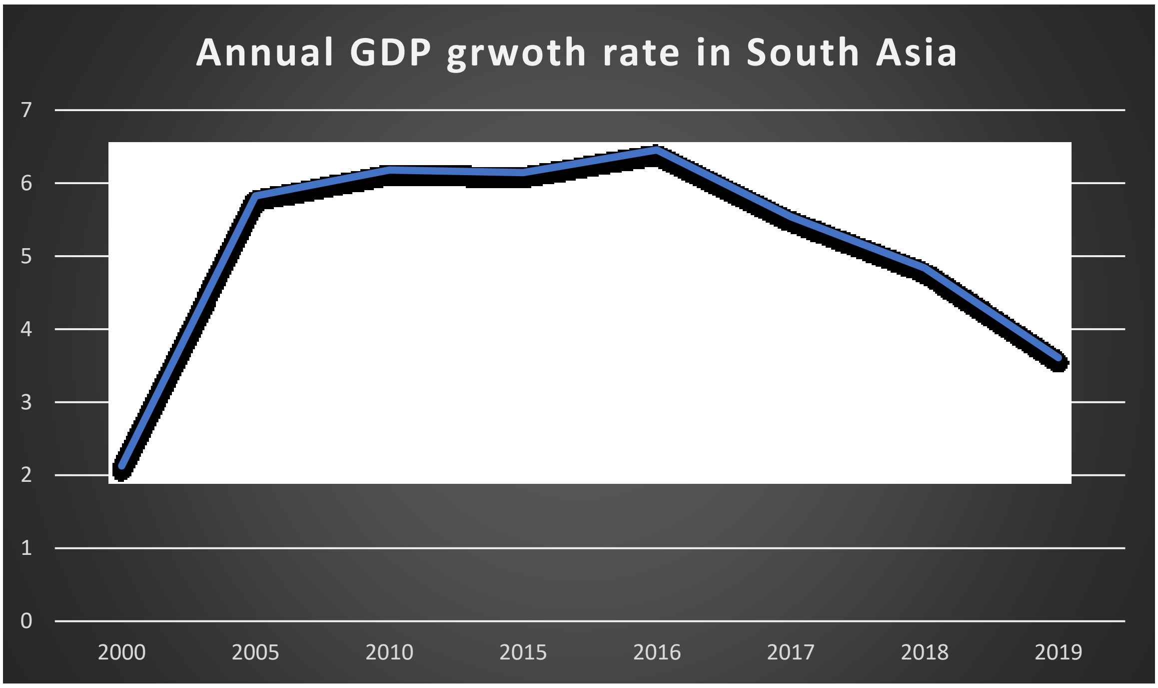
APPENDIX

Figure 1. Age Dependency ratio % of working age population in South Asia



Age dependency ratio % of working-age population shows the proportion of dependents per 100 working-age population, and therefore when it is decreasing meant that working age population is increasing. For obvious reasons, one comes to believe that % of working age population is constantly increasing from low 22.2% in 1980, to 37% in 2000, and then to 49% in 2020. It is visible in the figure that, age dependency ratio which is nothing but ratio of dependents (younger than 15 or older than 64-) to working age population, is successively declining from 77% in 1980 to 51% in 2020. Thus, it can be said that countries in South Asia have a lot of opportunities to take advantage of this demographic transition.

Figure 2. Annual GDP growth rate in South Asia



Average Growth rate in South Asia has remained at 4.6 throughout the selected period. The lowest economic growth rate was recorded in 2000 which is almost 2%, and highest economic growth rate is 6.45 in 2016. It is visible from the figure that since 2000, the annual growth rate has never declined from 3% and the region on average has enjoyed more than 5% growth rate.

Table 4.3 (A) Panel VAR

	DLPCR	PCI	DESR	DGWAP	POPULATION	DGER
DLPCR(-1)	0.0368 (0.1736)	-2.3888 (4.0553)	0.0021* (0.0010)	0.2304 (0.1221)	0.0004 (0.0222)	2.8866 (3.9659)

DLPCR(-2)	-0.0253	-2.1639	0.0003	0.1210	0.0035	-0.6016
	(0.1848)	(4.3196)	(0.0011)	(0.1300)	(0.0236)	(4.2245)
DLPCR(-3)	0.2944	3.7969	0.0010	0.1383	0.0022	4.5303
	(0.1791)	(4.1849)	(0.0011)	(0.1259)	(0.0229)	(4.0927)
PCI(-1)	0.0083	0.3453	-0.0001	-0.0113	0.0009	0.0925
	(0.0080)	(0.1878)	(0.00004)	(0.0056)	(0.0010)	(0.1837)
PCI(-2)	-0.0054	-0.0603	0.00001	-0.0038	-0.0002	0.0617
	(0.0088)	(0.2068)	(0.00005)	(0.0062)	(0.0011)	(0.2023)
PCI(-3)	-0.0031	-0.2129	-0.00004	0.0005	-0.0006	-0.2921
	(0.0091)	(0.2132)	(0.00005)	(0.0064)	(0.0011)	(0.2085)
DESR(-1)	10.1296	-66.3137	0.8644*	-35.7201	0.1334	-882.119
	(62.0196)	(1448.97)	(0.3649)	(43.6125)	(7.9375)	(1417.06)
DESR(-2)	-46.0431	-708.124	-0.2244	-3.3553	9.1035	685.492
	(80.4340)	(1879.18)	(0.4733)	(56.5614)	(10.2943)	(1837.80)
DESR(-3)	32.1612	524.99	0.2653	34.2476	-8.7174	198.49
	(50.6825)	(1184.10)	(0.2982)	(35.6402)	(6.4865)	(1158.02)
DGWAP(-1)	-0.0048	-5.1639	-0.0013	1.0025	-0.0325	6.4221
	(0.5265)	(12.3018)	(0.0031)	(0.3703)	(0.0674)	(12.0309)
DGWAP(-2)	0.2091	6.6104	0.0015	0.0377	-0.0055	2.0777
	(0.6460)	(15.093)	(0.0038)	(0.4542)	(0.0827)	(14.7609)
DGWAP(-3)	-0.1352	-5.3316	-0.0014	-0.0195	0.0384	-13.528
	(0.417)	(9.7427)	(0.0024)	(0.2932)	(0.0534)	(9.5281)
POP(-1)	0.4570	-28.571	-0.0101	-0.6741	2.6442*	26.937
	(0.8162)	(19.069)	(0.0048)	(0.5739)	(0.1044)	(18.649)
POP(-2)	-1.2827	34.636	0.0154	1.0408	-2.4221*	-53.160
	(1.5253)	(35.635)	(0.0089)	(1.0725)	(0.1952)	(34.851)
POP(-3)	0.8035	-10.263	-0.0061	-0.4356	0.7791*	25.876
	(0.7805)	(18.234)	(0.0046)	(0.5488)	(0.0998)	(17.833)
DGER(-1)	-0.0008	0.1815	0.000001	0.0006	0.0004	-0.0329
	(0.0068)	(0.1591)	(0.00004)	(0.0048)	(0.0009)	(0.1556)
DGER(-2)	0.0049	0.3011	0.00002	0.0046	-0.00003	0.1168
	(0.0067)	(0.1559)	(0.00003)	(0.0047)	(0.0008)	(0.1525)
DGER(-3)	-0.0025	0.1391	-0.00001	-0.0050	-0.00005	0.0057
	(0.0071)	(0.1658)	(0.00004)	(0.0049)	(0.0009)	(0.1622)
C	0.0344	9.983*	0.0017*	0.1812	-0.0095	3.6887
	(0.1447)	(3.3808)	(0.0008)	(0.1017)	(0.0185)	(3.3064)

* represents the significance at 5% level