HACETTEPE UNIVERSITY
INSTITUTE OF POPULATION STUDIES
DEMOGRAPHY PROGRAM

THE DEMOGRAPHIC WINDOW OF OPPORTUNITY AND THE FIRST DEMOGRAPHIC DIVIDEND: THE CASE OF TURKEY

Tunca ÜNLÜ

Dissertation Submitted in Partial Fulfillment
of the Requirements for the Degree of Doctor of Philosophy
in Demography

Supervisor
Prof. Dr. A. Sinan TÜRKYILMAZ

Ankara
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ACCEPTANCE AND APPROVAL

This is to certify that we have read and examined this thesis and that in our opinion it is fully adequate, in scope and quality as a thesis for the degree of Doctor of Philosophy in Demography.

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This thesis has been accepted by the above-signed members of the Committee and has been confirmed by the Administrative Board of the Institute of Population Studies, Hacettepe University.

Date: …. / …. / 2017

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Prof. Dr. A. Banu Ergöçmen

Director

This thesis is dedicated to the memory of
my beloved father, Dündar Ünlü.
It is your shining example that
I try to emulate in all that I do...

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My long journey in PhD is coming to an end. It was a privilege for me being a PhD student at Hacettepe University, Institute of Population Studies. When I look back, I realize that I had to give up many things that I enjoyed in my life, especially during the last year of my thesis, but I believe it worth it in the end. I am so glad not only to have earned this degree but also to have met amazing professors and friends, who have been a part of my education life during the last years.

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ABSTRACT

THE DEMOGRAPHIC WINDOW OF OPPORTUNITY AND THE FIRST DEMOGRAPHIC DIVIDEND: THE CASE OF TURKEY

Especially in the recent decades, the importance of demographic analyses is rising rapidly in many fields including education, health and economics. The inclusion of demographic perspective in the researches enriches the quality, accuracy and multidimensionality of the analyses and consequently their findings. In this respect, considering the changes observed in age structure, which is an unavoidable consequence for the societies while they are undergoing demographic transition, has a key role in assessing the economic growth and development of these societies. On the other hand, the level of contribution of these demographic factors on economic growth and development increases considerably in case of being supported by related socio-economic factors according to the previous studies in literature.

In this study, the timings and the magnitudes of the demographic opportunities arising from the shifts in age structures as a result of the demographic transition are calculated by using the concepts of the demographic window of opportunity and the first demographic dividend for Turkey. In addition, it is aimed to find answers to the questions “Could Turkey make use of these demographic opportunities so far?” and “Is it possible for Turkey to benefit from these opportunities in the future?”

The findings suggest that Turkey benefited from these demographic opportunities in the past at various levels. It is estimated that the highest gains were made in the second half of 1980’s and the first half of 2000’s. These demographic opportunities are anticipated to continue in 2030’s according to the calculations. To what extent Turkey will manage to make use of these opportunities before they disappear highly depends on the decisions of the policy makers about critical socio-economic issues, especially including education, health, labor market structure and structural transformations in the economy. The study also provides socio-economic projections and policy suggestions regarding above mentioned issues, which are believed to be guiding for the authorities.

ÖZET

DEMOGRAFİK FIRSAT PENCERESİ VE BİRİNCİ DEMOGRAFİK KAZANIM: TÜRKİYE ÖRNEĞİ

Özellikle son yıllarda, demografik analizlerin önemi eğitim, sağlık ve ekonomi de dahil birçok alanda hızla artmaktadır. Araştırmalara demografik bakış açısının dahil edilmesi, analizlerin ve dolayısıyla elde edilen bulguların kalitesi, geçerliliği ve çok boyutluluğunu zenginleştirmektedir. Bu çerçevede, demografik dönüşümden geçerken toplumlar için kaçınılmaz bir sonuç olan yaş yapısında gözlemlenen değişimlerin dikkate alınması söz konusu toplumların ekonomik büyüme ve kalkınmalarını değerlendirmede önemli bir role sahiptir. Diğer taraftan, literatürdeki geçmiş çalışmalara göre söz konusu demografik unsurların ekonomik büyüme ve kalkınmaya sağladığı katkı seviyesi, ilgili sosyo-ekonomik unsurlarla desteklenmesi durumunda önemli ölçüde artış göstermektedir.

Bu çalışmada, demografik dönüşümün sonucu olarak yaş yapısında meydana gelen değişimlerden kaynaklanan demografik fırsatların süre ve büyüklükleri, demografik fırsat penceresi ve birinci demografik kazanım kavramları kullanılarak Türkiye için hesaplanmıştır. Ek olarak, “Türkiye söz konusu demografik fırsatlardan bugüne kadar yararlanabildi mi?” ve “Türkiye’nin bu fırsatlardan gelecekte faydalanabilmesi mümkün mü?” sorularına cevap bulunması amaçlanmaktadır.

Bulgular, Türkiye’nin geçmişte bu demografik fırsatlardan farklı seviyelerde fayda sağladığına işaret etmektedir. En yüksek kazanımların 1980’li yılların ikinci yarısında ve 2000’li yılların ilk yarısında elde edildiği tahmin edilmektedir. Hesaplamalara göre, söz konusu demografik fırsatların 2030’lu yıllarda da devam edeceği öngörülmektedir. Türkiye’nin söz konusu demografik fırsatlar sona ermeden ne derece fayda sağlayabileceği, politika yapıcıların özellikle eğitim, sağlık, emek piyasası yapısı ve ekonomideki yapısal dönüşümleri de içeren yüksek öneme sahip sosyoekonomik konulardaki kararlarına büyük oranda bağlıdır. Çalışma ayrıca, ülke otoriteleri için rehber niteliğinde olacağı düşünülen sosyoekonomik projeksiyonlar ile bahsi geçen konularda politika önerileri sunmaktadır.

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I. INTRODUCTION

Demographic issues are on the rise among priorities of many governments, especially in developed and developing countries. While population aging is the main demographic subject for the developed countries, demographic advantages arising from shifts in age structures are one of the most important demographic issues for developing countries. These demographic advantages, which are a consequence of demographic transition, can enable developing countries to trigger their economic growth, as it happened in the past decades in Far East in countries such as South Korea, Singapore, Hong Kong and Taiwan or more recently in Ireland which is located in Western Europe.

In case of a significant decrease in fertility, while population increase might continue, there will be a change in the age structure of the population. This change in the age structure will lead the population to a once in a lifetime chance which can be defined by using two major demographic concepts: The demographic window of opportunity or shortly demographic window and the first demographic dividend, both of which are explained in details in the following chapters.

Demographic window has an exact definition as stated in “World Population to 2300”, United Nations Economic and Social Affairs, 2004. According to this definition demographic window is open as long as young age group (0-14) is below 30 percent and old age group (65 and over) is not over 15 percent yet. This definition points out a working age group (15-64), which is at least 55 percent of the total population. Although the timing of demographic window shows variances among populations, it is in general assumed that the window is open for 3 to 4 decades.

However, demographic window is not a self-driven mechanism, which leads to economic growth and development whatever the circumstances are. In other words, demographic window needs to be supported by some complementary factors mentioned as follows.

"Societies who have entered the demographic window have proportionally large working-age populations and relatively light dependency burdens, and therefore the demographic potential for high economic growth. This period (though not defined precisely as it is here) has been characterized as a demographic window of great economic possibilities, because of the bonus of a favorable age structure (e.g., Bloom, Canning, and Sevilla, 2003). Whether the economic potential is realized depends on a variety of complementary considerations, such as the quality of this workforce, the availability of complementary resources, the nature of government policy, and the structure of international competition."[1]

In addition to demographic window, there is also another concept, which brings a similar definition for demographic advantages emerging as a consequence of decreasing fertility in the populations. This concept is called as first demographic dividend, which is examined in details for many regions and countries in various studies of Lee and Mason. In one of these studies, first demographic dividend is described in the following way.

"At an early stage of demographic transition, fertility rates fall, leading to fewer young mouths to feed. During this period, the labor force temporarily grows more rapidly than the population dependent on it, freeing up resources for investment in economic development and family welfare."[2]

First demographic dividend does not include any specific percentage shares of the broad age groups in the population. It is derived by calculating the changes in support ratio, which is the ratio of effective producers to effective consumers. Effective producers and consumers weighted states of population by using economic life-cycle, which is summarized by using two age profiles of labor income and consumption.

[1] "World Population to 2300", United Nations Economic and Social Affairs, 2004.
[2] Lee and Mason, 2006.

Many countries all around the world still have young populations which points out a chance for demographic dividend. In Africa, children under age 15 compose 41 percent of the population for the year 2015, while 15-24 age group composes 19 percent of the population. Latin America and the Caribbean populations include 26 percent of children under age 15 and 17 percent of the 15-24 age group. Similarly Asia has 24 percent of children under age 15 and 16 percent of the 15-24 age group. In both Latin America and the Caribbean and Asia considerably higher fertility declines can be noticed looking at the percentage changes in youth compared to Africa. So in total, populations of these 3 regions have 1.7 billion children and 1.1 billion young persons in the year 2015. In these regions many countries are expected to have smaller proportions of children in the near future. On the other hand the proportions in the prime working age groups for the same countries are expected to grow. Countries with a relatively high ratio of working to dependent populations have the possibility of benefitting from demographic dividend, only if necessary precautions are taken and policies are employed regarding labor market and human capital of children and youth by the countries (United Nations World Population Prospects, 2015 Revision).

From a broad point of view, it can be stated that the origin of this thesis is based on demographic transition theory, which can be accepted as one of the most well-known theories of demography. As explained in this theory, as a result of the falling fertility and mortality rates a shift in age structure begins to be observed leading to demographic advantages, which can be seen only once in a life time of a population.

In this thesis, demographic advantages occurring as a consequence of demographic transition is examined in details for Turkey, with the help of two popular indicators namely the demographic window and the first demographic dividend. While evaluating the demographic advantages for Turkey, the experiences of other countries, which made use of demographic advantages in the past or still making use of these advantages, are studied. In addition, a theoretical analysis about the composition of economic growth is also made in order to develop a background for a further study, which will be focusing on an empirical cross-country analysis including Turkey. In this further econometric analysis, an evaluation about the effects of various socio-economic factors on economic growth in addition to the indicators regarding these demographic advantages is planned to be made. Moreover, this thesis aims to answer the question “Could Turkey make use of these demographic advantages so far and will it be able to take the advantage of these demographic contributions in the following decades?” even though it is not easy to give an exact answer to it.

In order to give an accurate answer to the second part of this question, which is related to the future expectations, following questions need to be answered first;

- How long will these demographic advantages be experienced by Turkey?
- What will be the magnitude of these demographic advantages, annually and totally if possible to measure?
- Will these advantages be supported by socio-economic factors?
- If so, to what extent this support will be and is it possible to make a comparison with other countries, which experienced similar demographic advantages in the past and/or will be experiencing in the near future?

It is noteworthy to underline that some of these questions have direct answers, while the others have not due to their nature. In other words, the timing of demographic advantages can be calculated, even their magnitudes. However, the extent of contribution for each of the socio-economic factors in supporting demographic advantages cannot be measured. To be more precise, for example, it is not possible to decompose the exact magnitude of contribution of increase in tertiary education level on economic growth and development during the times of demographic advantages for a country. In this respect, the thesis aims to give exact answers if possible and if not, to make accurate statements with supporting arguments.

The thesis has a modular structure, in each one of which a different study is carried out in order to contribute to the evaluation of demographic advantages Turkey has been facing and will be facing in the coming decades. In this respect, the thesis is composed of 7 chapters.

Following the introduction chapter, in Chapter 2 past studies in literature regarding different perspectives on the relationship between population growth and economic development, demographic advantages resulting from the shifts in age structure and the socio-economic factors effecting the contribution level of these demographic advantages on economic growth and development are reviewed. The arguments made in these studies are grouped according to their relevance and then summarized underlining their main ideas clearly. Most of these arguments had significant roles in the formation of the following chapters and are considered comprehensively in these chapters.

In Chapter 3, demographic transition theory will be explained in details including all stages, as this theory is the starting point of the thesis. Then, demographic advantages as a consequence of shifts in age structures are examined for Turkey by using demographic window and first demographic dividend, both of which are the well-known two main indicators. The timings of both of these indicators are calculated for Turkey in order to determine for how long Turkey has been experiencing these advantages and for how long more will Turkey continue experience them. Population projection for 2015-2075 period for Turkey is developed to be able to determine the end year of demographic window using DemProj module of Spectrum software. The projection developed is also used for calculating the magnitude of first demographic dividend annually for 1960-2075 period for Turkey.

In Chapter 4, comparative demographic and socio-economic analyses of 6 selected countries with demographic advantages and Turkey is made. These 6 countries are chosen to be from different geographic regions and income levels in order to avoid any misguiding regarding the analyses. These analyses have 2 major goals.

First one is to determine which socio-economic indicators play a noteworthy role in supporting demographic advantages to maintain economic growth and development. Second one is to understand and examine what policy regulations are made by the selected countries in order to trigger their economic growth and development. First goal aims to find out potential inputs for the econometric analysis used in the following chapter, while the second one focuses on developing policy suggestions for Turkey, studying the past success stories of the selected countries. The comparisons made in this chapter have a two stage structure. In the first stage selected countries are compared with their regions and income groups, while in the second stage these selected countries are compared with Turkey in terms of developments in the major socio-economic indicators.

In Chapter 5, a theoretical analysis is carried out about the factors contributing to economic growth, by using well-known growth equations studied in literature, including Cobb-Douglas production function. While making the decomposition of the economic growth, the procedure of including the socio-economic factors used in this thesis is also considered. With the help of the theoretical background prepared in this chapter, the framework of a further cross-sectional country analysis using empirical methods is established. The variables required and the methods that can be used is also determined.

In Chapter 6, the projections of the socio-economic indicators regarding labor market, education and health services, which are crucial for promoting the contribution of demographic advantages on economic growth and development, are developed by using RAPID module of the Spectrum Software. These projections are made in order to serve 2 specific goals. First one is to find out the exact year in which Turkey will be reaching current levels of high income country group under the assumptions made for RAPID module. The first goal is accomplished in addition to identifying the current status of Turkey in terms of these socio-economic indicators by comparing the present values of these indicators with the past values of the high income country group. Second goal of this chapter is to maintain data sets, including the projected values of these socio-economic indicators from present until the year 2075, which is believed to be very useful for the future plans of the policy makers in the country. This chapter is also expected to have a guiding role in answering the question "Is it expected for Turkey to make use of demographic advantages in the following decades?"

Chapter 7, which is the final chapter of this thesis, includes suggestions regarding how to boost Turkey's economic performance and development by making use of socio-economic factors that are considered in various chapters of this thesis. In addition, the findings of the previous chapters are summarized and conclusions are drawn from these findings. Moreover, constructive criticisms are made about the assumptions used and methods applied in different chapters.

Briefly, it can be stated that this thesis has three major contributions:

- Two well-known and important demographic terms (The demographic window and the first demographic dividend) regarding demographic advantages resulting from changes in age structures as a consequence of the demographic transition, are studied for Turkey. The start and end years of both terms are determined. In addition, the magnitude of the first demographic dividend for each single year is calculated.

- Turkey's socio-economic performance so far is evaluated by using cross-country analysis[3]. Comparisons with the selected countries are made both for the last 55 years and for the specific time intervals, during which significant first demographic dividends are gained.

- Turkey's future socio-economic performance is evaluated by using the projections developed in this thesis. In addition, policy suggestions are

[3] The countries from different geographical regions and income levels are selected for the analysis. All of the countries selected had success in making use of demographic advantages and turned these advantages into economic growth as stated in literature.

made for the policy-makers of the country in order to make a better use of the demographic advantages, which are expected to be gained in the following decades in Turkey.

II. APPROACHES IN LITERATURE ON EFFECTS OF DEMOGRAPHIC ADVANTAGES ON ECONOMIC GROWTH AND DEVELOPMENT

Population increase has been evaluated differently in terms of economic growth and development by different schools. According to Malthus and Neo-Mathusians population growth has a negative effect on economic growth (Ehrlich, 1968). Some on the contrary believe that population growth has a positive impact on economic growth (Boserup, 1981; Simon, 1981). There is also a group (revisionists) believing that population growth has only a moderate impact on economic growth (National Research Council, 1986).

However, today it is understood that the age structure of the population is more important than the size of population. As it is the age structure that describes the dynamics of a population, now the eyes are on which age groups are growing and which age groups are shrinking, while the population as a whole is increasing. The share of age groups in a population has a crucial role in determining the magnitude of the demographic advantages or disadvantages. To be more precise, it is the share of broad age groups in a population that is the determining factor for the existence of the demographic window. On the other hand, the value of the first demographic dividend, being positive or negative, is derived by the composition of the single age groups.

In this respect, earlier and recent studies focusing on the changes in age structures rather than the increase or decrease in the size of the populations are presented in this section.

II.1. Demographic Transition, Change in Age Structure and Economic Growth

Although there is abundant research on population growth and economic development, it can be stated that the amount of research done on the relation between population age structure and economic development is limited. The change in population age structure can play an important role in economic development which can be named as demographic dividend. In recent years, the consequences of the change in age structure of a population have become a popular subject (Cutler, Poterba, Sheiner, Summers, and Akerlof, 1990; Bloom, Canning, and Sevilla, 2003; Lee, 2003b). Not only demographers but also economists share the interest of studying the interactions between fertility and mortality declines and population age structure which lead to economic development.

In other words, what is meant by the shift in the age structure is the increase in the proportion of the working age group which might cause a raise in the rate of economic growth and can help gaining demographic dividend. People in the working age group are expected to be more productive compared to other age groups. In addition working age group tends to save more with respect to dependent age groups (1-15, 65+). So an increase in working age group might lead to an increase in the saving rates which will contribute to the productive investment. Moreover, fertility decline, which is the main reason of the shift in age structure, may have a direct positive impact on female labor supply (Bailey, 2006), and may also have an indirect positive impact on primary education and health (Joshi and Schultz, 2006). Although, there is a considerable literature on the shifts of the age groups in favor of the working age and their consequences on economic growth, econometric evidence is relatively limited. In their studies, Bloom and Canning (2004) found out that for a panel of countries for the years 1965 to 1995, there was a sizeable impact of the working age ratio on economic growth but only if it was an open economy. So they concluded that there was always a window of opportunity but whether it could be utilized or not depends on incentives are there to exploit the existing potential (Shekhar Aiyar and Ashoka Mody, 2011).

According to some of the research done in this field it is suggested that there is a strong correlation between demographic structure and national saving rates (Fry and Mason, 1982; Higgins, 1998; Kelley and Schmidt, 1996). On the other hand, there are some researches done about particular regions or countries. In a research, the relationship between demographic structure and output and productivity in the United States is taken into account (Person, 2002). In some other papers, the economic growth and development of East Asia was linked to demographic transition ended up in a remarkable shift in age structure (Bloom, Canning and Malaney, 2000; Mason, 2001). In a similar way, lack of economic growth in African countries was associated with absence of such a shift in age structure of these countries (Bloom, Canning and Sevilla, 2002).

The problems faced by developing countries that are going through demographic window of opportunity are similar. As an example, it is pointed out that bulge in labor supply in India cannot be explained by high growth rates only. Another reason lying behind this phenomenon is the increase in the portion of the working age group (15-59) which occurred as the country was passing through demographic window of opportunity since the 1980s (Mitra and Nagarajan, 2005). In the paper it is emphasized that such shifts in age structure in India which is in favor of the more productive age groups was not enough to trigger economic growth and need to be supported by new employment opportunities and enhanced human capital formation.

In today's world, developing countries are currently going through a demographic transition with a higher speed and a lag with respect to developed countries. During demographic transition while mortality rates especially in children fall, followed by the decrease in fertility rates, age structure starts to shift and leads to a bulge in the working age population consisting of mostly young people. On the contrary to the assumptions of the standard neo-classic growth models, population growth cannot be taken as stable during demographic transition. Leaving the idea of stable or constant population growth opens a new perspective from the demographic point of view on economic growth experienced in developing countries. The effect of the shift in the age structure of the population can theoretically be accepted as positive by means of a potentially more productive population. The increase in the ratio of producers to consumers and the expected increase in savings rate of the working population triggered by the decrease in the youth dependency ratio, contribute to economic growth. In addition to the direct contribution of the increase in the portion of the working age group among the whole population to the labor supply, indirect effects coming from increase of female labor force participation as a result of decrease in fertility leading to a lessened need for time an effort to raise kids, play an important role on economic growth. It is important to note that the condition that the working age group in a population is high and dependency ratios are low last for only a limited period of time once in a life-time of a country. To take the most out of this situation, which is also named as demographic dividend, it is essential to determine under which circumstances the demographic dividend is the biggest. Unfortunately, most of the studies and research done about demographic window of opportunity and demographic dividend are on national levels rather than regional levels. While the effects of the share of working age group has usually a positive correlation with economic growth in different of the geographic region in a country, the correlation between the youth dependency ratio and economic growth might show variations among different regions in a country. Whether the region has a tropical climate or located in North Africa and the Middle East make a big difference. Also it is found out that there might be huge differences in the amount of economic growth in different regions of a country (Van der Ven and Smits, 2011).

As mentioned earlier, the advantages coming from changes in age structure as a result of demographic transition can be defined by demographic window of opportunity and demographic dividend. The demographic dividend is composed of two segments, first and second dividends, regarding the phase of the demographic transition. First dividend occurs at earlier stages of demographic transition compared to second dividend. As fertility rates fall down and consequently labor force starts to have a higher portion in the whole population, resulting in increase in per capita income. This is called the first dividend. The first dividend last quite long such as five decades or more. But eventually this dividend is subject to a pressure reducing its effect and even turning to negative as working age population tends to decrease and elderly population tend to increase. But there is also a possible second dividend, which is related to increased capital accumulation and it occurs when income per effective consumer is growing more rapidly than productivity growth. The amount of success depends on how the elderly is supported in the society and how workers are encouraged to save for their retirements by polices (Lee and Mason, 2006).

Industrialized countries are found to be the ones that had the most advantage not only from the first dividend, but also from the second one. On the other hand, less developed countries, if yet to reach a demographic transition phase for the first dividend, can have the advantage of the first dividend, only if the necessary policies are implemented and economic constraints are well managed. How effectively these less developed countries use the demographic mechanisms play a crucial role. The labor force and human capital are named to be the 2 key factors to be handled wisely. As a brief comparison, it can be stated that on the contrary to the first dividend, second dividend is not transitory in terms of capital accumulation and increase in per capita income may be permanent (Pool, 2007).

Dependency ratio is also said to be one of the critical indicators in evaluating the possibility of a positive economic growth. A high dependency ratio in a country is regarded as a preventive factor against creating boom in both income and output. In a similar way, the opposite is considered as expected too. When the dependency ratio in a country is low, it is believed that economic miracles are more likely to happen. While developing social and economic policies, the proportion of working age group in the whole population plays an important role and need to be considered. A strong health system including primary health care, improved family planning and high quality education including vocational training are essential for creating economic boost facilitated by the demographic dividend. Among all these factors, education and skill building seem to be the most important ones for gaining demographic dividend (Roy and Roy, 2014).

II.2. Factors Enhancing the Contribution of Demographic Advantages on Economic Growth

II.2.1. Education and Economic Growth

Today, there are many theoretical and empirical evidence on the crucial role of the investments made in education and training activities on the economic and social development of the societies. Since 1950's using various models and approaches are developed about contribution of education on economic growth, returns of investments in education, level of education and earnings and etc. In their study about value of investments in education, Psacharopoulos and Patrinos (2004) examined the individual and social benefits of education and provided valuable findings, including the recent studies about the subject. According to these findings, individual and social returns of education can be summarized as;

- In line with the increase in development levels of the countries and educational attainment levels, returns of investment in education exhibit a declining trend. On the other hand, according to the findings of the recent studies the individual returns of higher education is increasing.

- Individual returns of education are higher than the social returns of education.

- In general, returns of investments in education exceed 10 percent. The highest returns are experienced in low and middle income countries.

- Returns of investments in education are higher for females compared to males. Only for the primary education level, the return is higher for males than for females.

However, when a new approach is applied, which other factors such as health, crime rates, and social integration are also included in the returns of education, the results indicate that social returns of investment in education reaches to 30 percent in United States and United Kingdom (Psacharopoulos, 2006). On the other hand, when the data for OECD countries are examined in order to detect the relationship between education and earnings; it is found out that compared with the earnings of high school graduates, which is set to 100, the index value of earnings of individuals with an educational level of less than high school graduates falls to 79, while the index value for university graduates raises to 156, according to OECD averages for the year 2007. More recent studies, that measure the effects of education on economic growth, focused on qualitative measurements regarding education instead of quantitative measurements such as years of education or school enrolment ratios. According to Hanushek and Woessmann (2007), who have been among the pioneers of the approach of analyzing the importance of quality of education on economic growth, efforts of increasing the prevalence of education has been in the center of many development strategies. However, these strategies failed not only to ensure better economic conditions, but also disregarded the quality of education, which truly indicates actual learning and conception of the students. In another study carried out by Hanushek and Kimko (2000), it was found out that the effects of quality of education on economic growth was more than the effects of years of education, considering the results of the international tests including the period between the years 1960 and 1990. According to these findings, a change of one standard deviation on the quality of labor force resulted in around one point change on the annual growth. Moreover, in another research made by Coulombe and et al based on International Adult Literacy Research results, 1 percent improvement in adult literacy is accounted for a 2.5 percent increase in labor productivity (Psacharopoulos, 2006). Nations, who targeted economic growth disregarding investments in human capital, failed to maintain sustainable economic growth in the long run (United Nations, 2004). The benefits of education is not limited to the individuals receiving the education or authorities who decide on the investments in education. The whole society is positively affected by the investments in education. Among various studies supporting this argument, the study made by Haveman and Wolfe points out significant findings, some of which are summarized as follows;

- Educational success of the child is directly affected by the level of education of the family,

- The increase in the level of education of the mother results in a decline in the fertility levels of her daughters,

- Increase in educational level leads to an increase in life expectancy at birth.

In various studies including Grossman's, education is believed to be an exogenous factor for the improvement of health of the society. Moreover, education and health are emphasized as two complementary concepts, which form the basis of human capital. Education level of an individual is not only related to his or her own health but also to his or her children's health. In addition, education is believed to have a diminishing effect on spread of communicable diseases among the society (Woessmann ve Schütz, 2006). Education level of a society is argued to have a significant contribution, which leads to a shift from high fertility levels to low fertility levels. This shift is accepted to be a part changes in basic demographic indicators experienced by societies going through demographic transition. In line with this argument, Caldwell states that a nation with high school enrolment ratios cannot continue with high fertility levels in the long run (United Nations, 2004). The effects of education on population growth occur through the channels of fertility levels and health conditions. While the fertility levels decrease by the increase in education levels, health conditions improve in line with the increase in education levels (McMahon, 2002). The effects of education on health are measured by two factors: the decline in infant mortality rates and life expectancy at birth. In addition, various studies provide evidence which support the argument that increase in education level of the mother results in decrease in total fertility rates and improvements in the health status of the children. Another important issue regarding education and demography raises the question “How are the educational requirements of the societies facing rapid population growth met?” In the second half of the twentieth century, in many developing countries a rapid increase in number of students and school enrolment ratios are observed as a result of the demographic characteristics including high fertility levels. According to Schultz, in the societies, where the share of primary school age population is high compared to total population, school enrolment ratios could be high. However, the effects of rapid increase in the number of school age population on the quality of education is determined to be negative, although there are not many studies measuring this effect clearly (United Nations, 2004). Educational development can be managed via various channels. In many countries, significant improvements on education are made regarding the prevalence of education, school completion ratios and gender inequality in the last decade of the twentieth century. Biggest challenge has been maintaining continuous access for education services for girls and for the children in rural areas. Past experiences express the importance of meeting the educational requirements of females. It is believed that setting these needs as priority, would lead to improved health conditions, better nutrition opportunities, falling fertility levels, enhancements in combating poverty. In other words, increasing education levels of females will have various benefits for the whole society (Kavak, 2010).

II.2.2. Labor Market and Economic Growth

Labor market institutions such as unions, unemployment insurance, regulations regarding firing, hiring and minimum wages, can be employed to the advantage of the entire working population, as it happened for some East Asian countries including Hong Kong, the Republic of Korea, Singapore and Taiwan in 1980’s. In these countries, labor market institutions played an important role in raising employment to almost full employment levels, increasing earnings, creating additional demand for labor in an export-led growth environment. Their success both in economic growth and labor market improvements can set a good example for the other developing countries (Fields, 1994).

The level of income is positively affected by the flexibility of the labor market. On the other hand, steady-state unemployment rate is influenced by the rate of population growth and the rate of technological progress positively, while it is influenced by the saving rates and flexibility of the labor market negatively. Also as the flexibility of the labor market increases, the economy converges more towards its steady-state (Alonso, Echevarria and Tran, 2004).

In a study made on Jamaica, it was found that despite the falling real GDP, total employment rose during 1970’s. This development was generally based on expansionary fiscal policies and the government’s intervention in procuring labor. The real wage rates were also among the factors that affects employment. Overcoming the unemployment problem contributed to economic growth and combating the poverty. In order to both maintain economic growth and enhance the conditions of the working population, issues with labor productivity should be solved, capital formation should be deepened and the overall efficiency of the economic system should be raised (Gafar, 1988).

Labor force mobility is also an important factor to be considered, while taking into account the contributions to economic growth that might be coming from labor market. The level of development and the compositions of the industrial sectors in an economy are the two substantial factors influencing the mobility among the industrial sectors. The mobility resulting from rising productivity in industrial sectors is considerably weak in economies with low stages of development, as a consequence of high proportion of light industries, which display low differentiations of economic growth among sectors. However, industrialized and developed economies, in which significant differentiations in output per worker are experienced, considerably higher mobility among industrial sectors is observed due to the rise in productivity. This outcome can be mainly explained by the rapid growing modern industries, with high ability of utilizing new technologies, in the developed countries (Gordon, 1969).

Another important factor to be considered regarding the possible contributions to economic growth coming from the labor market, is the development level of the country. Labor markets in developing countries exhibit significant differentiations when compared with markets in developed countries. The most noteworthy difference can be denoted as the large share of agricultural sector in the whole economy, which commonly results in seasonal effects on employment. In addition to the economy being dominated by agricultural sector, self-employment and irregular work activities are the two other commonly seen characteristics of the labor market in developing economies. In this respect, general labor market assumptions and rules, which apply for labor markets in developed countries, may not be totally valid for developing countries, especially in terms of employment and unemployment.

According to the economists, who are experienced in developing economies, labor markets in these economies are grouped into three major segments (Rosenzweig, 1988), described as follows;

- **The rural sector:** This sector is commonly composed of self-employed workforce and un-paid family members as workers.

- **The informal urban sector:** This sector is majorly induced by the rapid growth in rural-urban migration and resulted in labor surplus in urban areas. This sector includes not only self-employed but also paid (without any employment contracts) individuals. Job insecurity, underemployment, highly flexible wages, limited effect of labor unions and rarely applied minimum wage laws are among the major characteristics of this type of labor markets.

- **The formal urban sector:** The last segment is composed of medium and large enterprises, which use both skilled and unskilled labor. Employees are selected according to their level of qualifications and are commonly hired by formal employment contracts. The general characteristics of this type of labor markets include job securities, health insurances and pension plans.

In the labor markets in developing countries, which are composed of these three segments, work force with similar qualifications receives different wages depending on the labor market segment they are in. Also, the mobility between the segments is prevented by restrictions and institutional barriers. As a result, even though wage flexibility occurs; in equilibrium, workers from low-wage segments with similar qualifications with workers of high-wage segments cannot move up to these labor segments. If the barriers and restrictions would have been removed, workers of the low-wage segments could move up to high-wage segments and consequently would pull wages down. In the long-run this would result in equalization of the earnings of the segments (Agenor, 1996).

These major characteristics of the labor markets in developing countries are to be considered, while evaluating unemployment problem and creating solutions to it. Unemployment can be argued as one of the major barriers on maintaining economic growth in developing economies. Increasing work force in a developing country, where unemployment is among major issues of the economy, can hardly lead to sustainable economic growth. Therefore, while combating unemployment problem in order to make maximum use of demographic advantages resulting in increase in the share of the workforce, the main characteristics of the labor markets in the developing countries have to be handled with care. These characteristics show considerable differentiations when compared with the characteristics of the developed countries. In this respect, in developing countries the policies created by the authorities should not be direct replicas of the policies applied in developed countries.

II.2.3. Gender and Economic Growth

As stated in development literature, women's empowerment in terms of social and economic equality and substantial representation of their rights by laws and institutions are acknowledged as significant parameters, which contribute to economic growth and development. Equality based gender and social relations in the society are desired in order to support economic development policies. Women, having equal rights with men regarding productive assets, result in a rise in economic activity. In addition, social perception towards women improves and their dependence on men diminishes. These changes lead to contribute women's participation in social and economic activities and consequently enable to enhance their abilities and skills in terms of productivity. However, wage differentiations in favor of men are still a continuing issue in agriculture and related industries. The differences in educational attainment levels and job skills are included in the reasons for explaining the gender wage gap (Gustafsson and Li, 2000). As long as women's schooling and work skills and capabilities continue to stay below the men's, it should be expected that women's labor force participation will intensify in low-paid jobs. Besides, it must be noted that in various studies including Mason et al (2000), Wang and Cai (2000) and MacPhail and Dong (2006), the wage differentiations between men and women to some extent are attributed to gender discrimination (Kelkar, 2011).

The mechanism between fertility and economic growth is also studied in literature. It has been a long time that the changes in fertility are accepted as an important factor which affects the level output and accordingly economic growth. It can be stated that decline in fertility levels lead to both higher capital per worker and higher output per worker. In addition relative wages for women rise too as a result of the decreasing fertility. On the other hand, increase in relative wages for women contributes to the reduction in fertility levels. There are two important findings coming out from the relation between fertility and growth. The first one is the contribution of capital accumulation to relative wages for women. The second one can be explained as the reducing effects of relative wages for women on fertility levels. Models developed point out that the contribution of capital accumulation to relative wages for women is considerably more than for men. Rising relative wages for women also increases the cost of child bearing more than it increase the revenue of the family. This outcome results in a decline in the fertility levels. However, it must be noted that even though increase in capital accumulation has a positive effect on relative wages for women, the improvements in social and legislative issues in favor of women's status in the society have a significant role too. It can be also stated that at least to some extent these improvements regarding women's empowerment are also as a result of economic growth and development (Galor and Weil, 1996).

The bi-directional relation between women empowerment and economic development is also emphasized in other studies too. From these studies it can be inferred that while development has a key role in combating with gender inequality, women's empowerment also contributes to economic growth. It is also highlighted that economic development alone is not sufficient to maintain fundamental improvements in women's empowerment. Women's empowerment has also positive effects on children's well-being, especially on their health and nutrition. It is believed that necessary policy action need to be implied continuously for a long time, while targeting a significant decrease in gender inequality (Duflo, 2012).

For countries facing political instability, population growth is encouraged causing gender discrimination in labor market. Governments focusing on strengthening military forces against political instability, promote population growth considering the need for a young male population for the military services. In this case, governments tend to keep women out of labor force and consequently production, while boosting population growth. The gender discrimination in not only limited to labor force participation. The discrimination also includes limitations to accessibility to education for females. In addition, under the condition of financial resource abundance, where families are less dependent on income coming from women, the discrimination rises (Lehmijoki and Palokangas, 2006).

II.2.4. Health and Economic Growth

The contribution of the health system and the health services to the economic growth can be shown by two major channels. Firstly, a properly working health system, in case it is easily accessed by all groups of population, increases the quality of labor by increasing the health status of both the working population and the dependent population. Secondly, in a well-organized health system, where necessary regulations are made, the cost of the health services can be minimized, leaving an opportunity for reallocating the excess financial resources for other sectors which could boost economic growth and development.

Health is accepted as an indispensable factor for the decisions in labor force participation. The increase in the prevalence of chronic health conditions, including cardiovascular and respiratory problems, negatively affect both the hours worked and the labor force participation rates. It is believed that almost half of the decline in the earnings is associated with the decrease in the labor supply among middle-aged men (Bartel and Taubman, 1979; Yelin and Katz, 1991; Pincus et al., 1989; Burkhauser et al., 1986). The prevalence of chronic diseases increases for older ages and accordingly the effects of health status on labor force participation increases for older ages too. For older men, health problems are stated to be one of the major factors leading to withdrawal from the work force and retirement (Quinn and Burkhauser, 1990). Although increase in health status increases the possibility of participation in the work force, the relationship between the health and labor force participation is not always very straight forward. In addition to physical power being less required at work, as a consequence of development and modernization; work place flexibility or home-office type of jobs enables individuals suffering from chronic diseases to stay in the work force. Also another point to consider is that, decisions regarding leaving labor force also depend on the availability of the financial resources during the years of retirement. In general it can be commented that policymakers have accepted long time ago the necessity of good health conditions for the whole population for economic growth and development. The projections about the relationship between health status and labor force participation, will be very helpful for measuring the effects of improvements achieved in health on national income, which can be done by developing a function for health and labor force participation over the time period of interest (Costa, 1996).

Since 1900's the improvements in health status of the populations have increased human ability and consequently raised economic growth around 30-40 percent in the long run. It should be noted that improvements in the health status has not been maintained as a result of economic growth. On the contrary, improvements in the health status have been contributing to the economic growth. Health status has been improving as a result of investments in public health infrastructure and developments in food production. Today, high prevalence of diseases and mortality rates are among the main causes of weak long-term growth in less developed countries. Improvements in the health status have been positively affecting the output level per unit time, which means an increase in productivity. From this perspective, it can be stated that enhancements in the health status lead to maintain same level of output with less hours worked. Moreover, an increase in the quality of output is expected to result in a rise in the earnings. Another point is that, improvements experienced in health status lead to an increase in survival rates and consequently an increase in the size of the population. As the size of the population increases, so does the size of working age population. A bulge in working force contributes to the division of labor, which leads to improvements in productivity. This means a rise in output per worker possibly with fewer hours of work (Arora, 2001).

In a health care system, both the pre-retirement and the post-retirement periods are need to be handled with care. While reduction of the costs and ease of the accessibility of the health services should be focused for the pre-retirement period, the accumulation and administration of the savings for the retirement and the delivery of these savings during retirement period need to be taken into account for post-retirement period. A comprehensive institutional mechanism should be embracing both of these periods as a whole. The success of this mechanism is expected to lead to allocation of the unused financial resources from health sector to other sectors where economic growth can be supported. Also, efficiently administered health and pension fund systems in the country, should aim to reach all the segments of the population with high quality health services and to lead the society towards a saving-oriented behavior for the retirement. It is also important to underline that public and private health care services should be united under the umbrella of comprehensive reform system and a universal health care fund should be developed, in addition to taking necessary measures in order to make considerable reductions in the health care costs. While making all these arrangements, authorities should make their plans considering several factors, such as regional differences, urban-rural areas and both male and female populations. Regarding the regional differences observed in accession to health services provided, government interventions might be useful and mandatory to diminish the divergences in the patterns of these services among different regions of the country. Adequate governmental policies, including appropriate resource allocations regarding investments and spending, are believed to reduce the inequality gaps among regions in the country. Moreover, inclusion of the private sector as a partner of the government in sharing future goals about the health services such as increasing the accessibility of the services or reducing health related cost, might be helpful in achieving these goals. In addition, increasing the efficiency of the dual-relation between not only the receiver and the supplier of the health services, but also the doctor and the patient can contribute to the overall efficiency of the health system. Also insurance system, which is connected to the health system, is also an important factor that should be taken into account. (Apergis and Padhi, 2013).

Another factor to be considered is the pattern of the disease burden caused by the change in the age structure faced during the period of demographic advantages. Increase in the portion of working age group does not necessarily results in increase in productivity without considering making improvements in the health status of both working and non-working age groups. A rise in disease burden may lead to a deficit in health capital. Increased longevity of life span may not be accompanied by increased savings of the working age group as the disease burden increases and so do the healthcare expenditures. Another point to be taken into account is that different type of diseases show different prevalence for different age groups. So as the distribution of age groups change by time, the prevalence of the diseases in the country change also. This is an important issue to consider for the countries facing demographic window of opportunity (Chandrasekhar, Ghosh and Roychowdhury, 2006).

II.2.5. Structural Transformation and Economic Growth

In addition to education being one of the triggering factors for demographic dividend; structural transformation, facilitating a shift from low value added sectors such as agriculture to high value added sectors such as manufacturing and services, is also crucial for harnessing the demographic dividend. Moreover, policies built to enable this structural shift from primary sectors to secondary and tertiary sectors, could help development of the private sector (Drummond, Thakoor, and Yu, 2014).

However, the mechanism lying behind a successful structural change has to rely on the following findings:

- The structure of factor endowments in an economy differentiates among stages of development. In other words, relative composition of physical capital, human capital, labor and natural resources show variations according to the development level of an economy. In this context, the optimal industrial structure in each economy with different development stages will not be the same. Scale of production, transaction complexity, market structure, optimal firm size, capital intensity and etc. will be different in each different industrial structure.

- The stages of economic development composed of a wide range, in which low-income agrarian economy lies at one side and high-income industrialized economy at the other. The development stages do not have a dichotomous structure. The countries in the world cannot be defined only as poor or rich, developing or industrialized. Each economy has its own industrial structure in line with stage of development it is in. Therefore, infrastructural, industrial and technological improvements targeted is expected to exhibit variety, not to be exactly the same as in a high-income industrialized country.

- In each stage of economic development, the market functions as the fundamental mechanism of the economy for resource allocation. On the other hand, as a result of the dynamic characteristics of the economic development process, industrial upgrading and related both hard and soft infrastructure enhancements are needed. However, industrial upgrading and related enhancements impose a burden on the firms in terms of transaction costs and returns to capital investment. Therefore, the role of the governments in supporting these processes becomes important during economic development, while moving up from one stage to the other (Lin, 2009).

Structural transformation of the economy also creates advantages for compensating the negative effects of deterioration in the health status on economic growth. Decrease in the physical requirements of the jobs, as a result of the expansion in clerical services, improvements in mechanization of the manufacturing sector, the shift from agricultural and manufacturing sectors towards service sectors, decrease in the work hours, increased safety in the work environments, provides an opportunity for the individuals with various chronic health conditions to stay in the workforce (Costa, 1996).

II.3. Life-cycle Approach for Harnessing Demographic Advantages

From a different approach, harnessing demographic dividend can be linked to a life-cycle perspective in which specific individual life stages are connected to related policies. These individual life stages can be summarized as 1- births and early childhood, 2- school children, 3- youth in transition, 4- adults and families, 5- early retirees. For the first stage in the life-cycle, the policy goal is to support a rapid irreversible decline in fertility. In this stage a wide-spread family planning is important. Also increase in investment for the children’s wellbeing by their families is another point that must be taken as essential. In the second stage in the life-cycle, the goal is to provide high quality education that enables children to be ready for life when they graduate and make them good enough for competing internationally. Education has a major role in gaining demographic dividend in three different ways. Firstly, the demand for a quality education leads families to invest more in education of their children which results in having fewer children who are highly educated. This can be evaluated as a simple outcome of quantity/quality trade off. Secondly, the resulting gains from quality education tempt families to have fewer children in the next generation meaning a reduction in fertility. Thirdly, better educated children result in a more productive labor force supply potentially. In order to reach the goals in the second stage, the share of the budget for education must be increased by the governments. Also school curricula have to be strengthened in a way that children can be ready for real life after their graduation besides gaining academic knowledge. Moreover, creating a platform where recent graduates mentor current students can be both profitable not only for creating jobs for the best recent graduates but also for increasing the quality of education in schools. In the third stage in the life-cycle, the main goal is to provide a solid and health transition for the youth into labor market and adulthood. Increasing the quality of education and academic knowledge are useless if they are not applied to business life. How the countries handle the age group 15-29, also named as youth bulge is one of the crucial issues in making the most out of demographic dividend. In case of a long lasting unemployment periods this age group can lose their skills, desire and hope for a decent position in the labor market. Long waiting times can also discourage families to invest in human capital. To abstain from this situation, countries should take necessary precautions to decrease the waiting time for youth before getting a position after graduation. Countries can promote unemployed graduates in involving personal and professional development activities such as internships, additional training in language, computer and etc. The fourth stage in the life-cycle includes family-managing policies for strong and supportive families in terms of human development of children such as survival, education, preparation for labor market and being an adult. In the fifth stage in the life-cycle, harnessing the experiences of new retirees are targeted by early retirement policies so that work experiences and residual energies of this group can be utilized through youth mentoring programs by the countries (Eloundou-Enyegue, United

Nations Department of Economic and Social Affairs Population Division Expert Paper No. 2013/7).

In conclusion, it can be stated that the demographic advantages arising from the shifts in age structures are not utilized by an automatic mechanism in which the excessive working age group is absorbed directly into the labor market. Moreover, the deficit in areas of education and health could negatively affect the transition from a growing poor quality working force into a high quality working force (Chandrasekhar, Ghosh and Roychowdhury, 2006).

II.4. An Evaluation Of Demographic Changes in Turkey in Terms of Education, Labor Force and Health - Recent Developments and Future Prospects

II.4.1. Demographic Changes and the Education in Turkey

Turkey's school age population, which includes 3-22 age group, is believed to exhibit a horizontal trend between the years 2010 and 2020. After following a slightly declining pattern by 2025, this age group is projected to decrease rapidly in size until 2050 according to the medium variant long term population projections (2000-2050) developed in Hoşgör, 2010. In this respect, school age population, which is assumed to be 26.9 million, is expected to drop down to a value of 24.8 million. In other words, taking the value for 2010 as 100, the index value falls to 92 in 2050. From these projection results, it can be inferred that the population related to formal education begins to decrease in size especially after 2020. This expectation, reveals an opportunity to focus on not only increasing the prevalence of formal education, but also improving the quality of it. As the share of school age population in total population projected to decrease to 25 percent in 2050 from 35 percent in 2010, the economic burden of the youth on working population diminishes by time. As a consequence of this development, it becomes possible to raise education expenditures per student, which can lead to improvements in the quality of education. The sex ratio of the school age population, which follows a slightly different pattern compared to the total population, is anticipated to decline from a value of 105 to a value of 103 at first, but then to rise to a value of 104. So in general, it can be stated that male students are expected to form the majority of the school age population for the whole period from 2010 to 2050. The number of primary school age population, which is defined as 6-13 age group, is expected to reduce until 2035, after increasing slightly during last couple of years. During 2035-2040 period, this age group is anticipated to exhibit a horizontal trend, which is believed to be followed by a decreasing trend afterwards. In this respect, the size of primary school age population are projected to fall down to 9.8 million in 2050 from 10.7 million in 2010, leading to a decrease of around 870 thousand primary school age population and consequently results in lowering the index to a value of 92. The share of this age group is projected to drop down to 9.8 percent from 13.8 percent between 2010 and 2050. The sex ratio of primary school age population is expected to follow the general trend of the whole school age population throughout this period. On the other hand, secondary school age population, which is composed of 14-17 age group, is expected to follow a mild volatile pattern over time. Accordingly, this age group is assumed to be increasing during 2015-2023 period, after decreasing slightly between the years 2010 and 2015. Starting from 2025 until 2040, secondary school age population is projected to be decreasing gradually. Afterwards, this age group is predicted to enter a stagnation period, followed by a declining trend. So in general, this age group is expected to decrease to less than 5.1 million in 2050 from more than 5.3 million in 2010. According to the projection, the share of secondary school age population is decreasing to 5.1 percent from 6.9 percent in 2010-2050 period. The sex ratio for this age group will be in favor of males with a value of 103 in general during this period. Similar to secondary school age population, higher education population is also predicted to follow a mild volatile pattern. According to this prediction, this population group is expected to increase 2015-2023 period, after declining in the recent years. Following a horizontal trend for a short time, starting from 2030, the size of this population group is expected to decrease again. In this respect, the size of higher education population is assumed to fall down to less than 6.4 million in 2050 from around 6.8 million in 2010. According to these developments, the size of this age group is anticipated to decrease by 413 thousand and consequently result in a decline in the index value from 100 in 2010 to 94 in 2050. The share of higher education population in the total population is expected to decrease to 6.4 percent in 2050 from 8.7 percent in 2010. The sex ratio of this population group is believed to be in line with the other school age groups. The decrease in the share of this age group leads to an opportunity to emerge, while the total population is still in the rise. Considering all of the school age populations, in general it can be stated that the declining trend in the number of these age groups starting from 2020 can be benefited by increasing the prevalence of the education in all groups and focusing on the modernization of the education system in Turkey (Kavak, 2010).

II.4.2. Demographic Changes and the Labor Force Participation in Turkey

According to the medium variation population projections developed by Hoşgör (2010), population of Turkey is expected to reach 99.8 million in 2050. Working age population is anticipated to increase to 64.4 million in 2050 from 52.3 million in 2010. However, the share of this age group (16-54) is projected to decrease to 64.5 percent in 2050 from 67.5 percent in 2010. Male labor force participation rates in Turkey was 71 percent in 2010. The gradual increases in the years of compulsory education is expected to lower male labor force participation rates for 15-24 age group. As a result of the rise observed in both educational attainment levels and GDP in Turkey, male labor force participation rates for 25-44 age group is expected to increase. In addition, considering the recent regulations stated in social security laws about increasing retirement ages for both males and females (60 for males and 58 for females) and future regulations in line with the recent developments (65 for both sexes in 2048), participation rates for 45-65 age group and consequently the total labor force participation rates are projected to increase over time. According to medium variant scenario developed by Tansel, Hoşgör and Hoşgör (2012), male labor force participation rate is anticipated to increase to 72.5 percent in 2023 and 75.5 percent in 2050, which was 71 percent in 2010. In this respect, it is projected that male labor force participation will be 23.9 million in 2023 and 29.5 million in 2050. During the process of development, female labor force participation patterns are believed to be U-shaped as stated in literature. In line with this statement, decreasing trend in the female labor force participation rate, which had been continuing for a long time, is expected to change and an increasing trend has just been started recently. Female labor force participation rate in Turkey raised to 28.8 percent in 2011 from a value of 24 percent in 2008. In the labor force scenarios developed by Tansel, Hoşgör and Hoşgör (2012), it is forecasted that the female labor force participation rate will be rising with a slow pace in the beginning but then its pace will be increasing. Over the past decades, it has been observed that the fertility level of the women in Turkey is declining, while their educational attainment level is rising. During the 10 year period between 2000 and 2010, the increase in educational attainment levels for girls had been more than it had been for boys in each education category (Kavak, 2010). School enrolment rates and average years of schooling has a key role in the female labor force participation rates. In this respect, in all three scenarios developed by Tansel, Hoşgör and Hoşgör (2012), female labor force participation rates are projected to be increasing. However, it must be noted that the educational attainment level is not the only factor, which effects the female labor force participation rates in Turkey. According to the report prepared by World Bank and the Ministry of Development in 2009, it is underlined that even in a scenario, in which all of the women living in urban areas held a university degree, the female labor force participation rate would rise only up to 47 percent. At this point, it can be commented that female labor force participation is also linked to cultural factors too, besides educational ones. These cultural factors, which are negatively effecting female labor force participation rates, are believed to be changing slowly over time. As a consequence of the increase in the educational attainment levels for 15-24 age group, the labor force participation rate for this age group is expected to fall slightly or remain the same in the future. In addition, considering the recent regulations about the age of retirement for both sexes as mentioned earlier, female labor force participation rate for 45-65 age group is expected to rise over time in line with the developments in male labor force participation rates. According to medium variant scenario developed by Tansel, Hoşgör and Hoşgör (2012), female labor force participation rate is projected to rise to 35.2 percent in 2023 and 50 percent in 2050, which was 28 percent in 2010. So according to these projected participation rates, it is calculated that female labor force participation will be 11.9 million in 2023 and 20.4 million in 2050 in Turkey. Taking into account both male and female labor force, total labor force in Turkey is projected to be 35.8 million in 2023 and 49.9 million in 2050 in the medium variant scenario. Corresponding labor force participation rates are calculated as 53.6 percent and 62.5 percent in 2023 and 2050 respectively. In 2010, labor force participation rates for EU-21 and OECD countries were 71.7 percent and 70.7 percent respectively. When compared with EU-21 and OECD countries, it is seen that the projected labor force participation rate in 2050 for Turkey in medium variant scenario is 8-9 point below the participation rates in 2010 for these two country groups (Tansel, 2012).

II.4.3. Demographic Changes and the Health System in Turkey

According to the population projections, it is expected that Turkey would have population composed of similar sizes of 65-69 and 0-4 age group. Moreover, even though the share of population including children and women of reproductive age will be decreasing in the total population over time, the size of this population group will remain unchanged for several decades. In this respect, the importance of children and women, in terms of protective services regarding prenatal period, childbirth, family planning and prenatal diagnosis, will continue to be on the top priority until 2050’s (Hoşgör and Tansel, 2010). Considering the definition of United Nations, Turkey will be one of the countries with “old population” after 2040 with a population, whose share of old age groups will be higher than 15 percent of the total population. On the other hand, the size of the population is expected to continue to increase despite the decline in the population growth rate until 2050’s. In this respect the concerns of the developed nations regarding their shrinking population will not be an issue for Turkey before the second half of the twenty first century. In this respect population policies for Turkey has to be shaped in line with these expectations. The median age in Turkey is expected to be 40 in 2050, pointing out a size of working age population, who would still have the potential for a significant level of economic activity. Making use of these demographic advantages depends on the health status of the working age population in Turkey, in addition to their level of education. In 2050’s it is expected that the share of 0-14 age group and accordingly the young dependency ratio will have been decreased considerably compared to present day. In order to benefit from this demographic change, Turkey is expected to invest in education and health of this age group. On the other hand, while young dependency ratio will be decreasing, the increasing old dependency ratio points out possible issues regarding this age group. As the shares of the broad age groups will be shifting among themselves, the priorities of the issues related to these age groups also expected to change accordingly in Turkey. Health system in the country has to cope with these mentioned changes. Turkey has an experienced country in terms of the issues regarding young population groups. However, the country is inexperienced about the issues regarding older population groups. In this respect new policies might need to be developed in order to handle the new issues originating from old age groups. While some of the problems can be foreseen, the other are hard to predict. The household size in the future can be taken as one of the unpredictable issues. In case, the share of core family structure continues to rise over time in the following decades, new policies might be needed in order to maintain improved health conditions for the elderly in Turkey in the future. With the help of the right steps taken in terms of development and high-quality economic management, it is possible to live in a country, in which standards of living is rising continuously over time. Social security issues, health service and caretaking requirements of the older population groups in the future, has to be considered in advance as problems related to these age groups will be unavoidably rising in the following decades. Measures not taken step by step in advance, might result in inefficiency in the health services provided for the elderly. As development includes not only children and working age groups, the living standards of elderly has to be considered and improved in order to achieve absolute social and economic progress embracing the whole nation. According to the research carried out in cooperation with Turkish Industry and Business Association (TUSIAD) and United Nations Populations Fund (UNFPA), the share of 0-14 and 15-64 age groups in the total population will be decreasing for both males and females throughout the decades from 2000 to 2050. However, the share of 65 and over age group in the total population is anticipated to raise to 17.32 percent in 2050 from 5.69 percent in 2000. The projected increase in share of old age group is more than three times for both males and females on the contrary to the younger age groups. Even these number are sufficient to highlight the importance that needs to be given to the elderly in the future. Future plans regarding diagnosis and treatment of non-communicable diseases (NCDs) related to old age groups, such as cardiovascular diseases, diabetes, cerebrovascular diseases, and degenerative diseases are to be made in addition to the planning of home-caring services for the elderly. Bidirectional relationship between education and health is important and has to be considered by policy makers. Contemporary education system is required for a healthy society, as the rising general education level leads to growing awareness about health problems and their treatments. Contemporary education is a key factor for inducing habits of searching and reaching health services provided. However, in order to utilize these positive effects, contemporary education has to be provided continuously and for the same period as it is provided in the developed countries. In addition, gender inequalities in accessing the education services have to be diminished for a more comprehensive utilization of these positive effects. Good health conditions are not one of the basic human rights for individuals but also one of the requirements of success in every field including education life. An aging population is a serious factor, which slows down the economic growth of a country regardless of its development or income level. Public spending has to be reorganized in accordance with the potential future problems in social security payments and health expenditures. According to the projections made, the size of the 65 and over age group who was almost 3.9 million in 2012 is expected to rise to 17.2 million in 2050. Both health system and social security system of Turkey has to be ready for these growing old age groups. According to the recent reports of World Health Organization (WHO) chronic diseases are no longer among top health issues for developed countries only. The prevalence of chronic diseases are on the rise even in developing countries currently. Even today, these type of diseases are in significant levels in Turkey and expected to increase in the following decades. Health expenditures and special care services are expected to rise in line with the increase in chronic diseases in Turkey. In this respect, providing support for the needy and associating old age care services with social services are need to be taken among requirements of the system (Ministry of Health, 2011). Researches made state that, while the annual health expenditure of a healthy individual is around 1,000 dollars, the expenditure raises to an amount of between 6,000 and 16,000 dollars for an individual with a chronic disease. 10 percent of the national health expenditures are used for the individuals with chronic diseases, who are in the final year of their lives (Akalın, 2010). The burden of chronic diseases on the society are considerably high including direct or indirect costs, which are medical expenditures and negative effects of these diseases on production. In order to handle the problems resulting from chronic diseases and health issues related to old age groups of the population, new and suitable health policies are need to be developed and implemented. These new health policies should include the cooperation between public health institutions, non-governmental organizations (NGOs) and private sector. Also, additional financial resources are required besides the resources spent previously for health issues related to communicable diseases and child and mother health. A good management of chronic diseases will result in not only an increase in the quality of health services but also an improvement in the optimization of health expenditures. Successive management of the health system is essential for protecting and improving the health status of the society. In order to administer the health system properly, good planning of the financial resources and human resources is a must, considering the continuously growing and becoming more complicated health system. Currently it can be stated that Turkey is experiencing some problems in terms of basic health services provided and administration of hospital systems. It must be kept in mind that, the term “health” is not only related to a process that starts with the status of being ill. In fact, “health” is related to a process which starts earlier and includes preservation of the status of being healthy. Especially for the developing countries, in which scarcity of financial resources are commonly seen, preservation of well-being for each age group of the society has to be targeted as a priority. According to the contemporary approaches, health systems focusing on individuals, who are already ill, are not acceptable. In today’s world, health sector requires knowledge and technology more than most of the other sectors. Improvements and inventions in computer technologies had a very important role for the development of the data systems. Efficient utilization of the data systems against combating with the diseases, chronic diseases being at the top of the list, and for the improvement of the performance of the health system are among the requirements for a better health system (Akalın, Tanrıöver, Sayran, 2012). In accordance with the demographic changes, new regulations and planning are required in order to receive sufficient contribution from the health system. In this respect, management of the coordination between not only different health services but also between health services and social services is believed to be beneficial. Health system and consequently regulations and changes made in the health services have to be evaluated periodically by using accurate and solid mechanisms (Akın, Ersoy, 2012).

III. DEMOGRAPHIC ADVANTAGES ARISING FROM CHANGE IN AGE STRUCTURE

The demographic advantages occurring as a consequence of changes in age structures form the core part of this thesis. These demographic advantages can be considered by two main definitions as mentioned in the introduction chapter:

- The demographic window,
- The first demographic dividend.

Before proceeding with the definitions and the calculations regarding these two major indicators of demographic advantages, it might be very useful to explain the demographic transition theory, which is the main reason of the changes in age structures in the populations. Also it is believed that following the definitions and calculations regarding the demographic window and the first demographic dividend, describing population pyramids and illustrating them by using five-year age group data for Turkey derived from population projections developed for demographic window and first demographic dividend calculations might be very informative.

III.1. Demographic Transition Theory

Demographic Transition Theory, which can be named as one of the most important theoretical contributions of the demography, explains the process of changing fertility and mortality patterns of the societies throughout their history, including the changes in their population growth rates. The theory was first introduced in the 1940's by Frank W. Notestein, who was a famous American demographer and the Director of the Office of Population Research at Princeton University (Woods 1982b). Since then, the theory has been studied and elaborated by other demographers.

The origin of the demographic transition theory was based on the observations of the birth and death rates of the European countries, in which similar patterns of population growth had been experienced. The changes in the patterns of birth and death rates are described as irreversible, from high birth and death rates to low birth and death rates over time. The start, the end and the durations of the demographic transition show differentiation from society to society. It can be generalized that the industrial countries had entered the demographic transition around a century earlier than the developing or less developed countries. Moreover, the duration of the transition was shorter in industrialized countries compared to developing or less developed countries.

In general the demographic transition has four main stages, although the transition has been divided into five stages by some of the later versions. The commonly accepted four staged demographic transition theory can be explained as follows;

Stage 1 – Pre-transition Stage:

Even though both birth rates and death rates were high, the difference between the patterns of birth rates and death rates were noticeable. While the birth rates exhibited a stable pattern, death rates displayed a more volatile and less predictable pattern. In this stage, birth rates and death rates were around 30 or more per thousand people and accordingly the growth rate of the population was low, considering high but similar birth and death rates.

Total fertility rate was considerably high with a value of around 6 children per woman. However one fourth of the children would have died in their first year. In the past, despite the evidence of population growth for continuous periods; wars, epidemics and famines in Europe in the Middle Ages resulted in the suppression of the population growth. In this first stage of demographic transition there were only a few countries left before the middle of twentieth century.

Stage 2 – Early Transition Stage:

Early transition stage began with the decrease in death rates, especially among the young population, while the birth rates continued to stay in high levels. In Europe, the decrease in death rates were the consequences of the developments in living standards of the society, including better nutrition and the decrease in the prevalence of infectious diseases. As a result of decreasing death rates not followed by the birth rates resulted in a high population increase period in this stage. In addition, the gap between the birth rates and death rates widened during this stage.

Stage 3 – Late Transition Stage:

In the late transition stage, birth rates started to decline as a result of the trend towards smaller families, changes in social trends, increasing cost of child-bearing and lower infant mortality rates. As a consequence of rapid decrease in birth rates in addition to the slow-down period in the decrease in death rates, the gap between the birth rates and death rates started to narrow throughout this stage. Population growth rate demonstrated a slowing down trend because of the diminishing difference in birth and death rates.

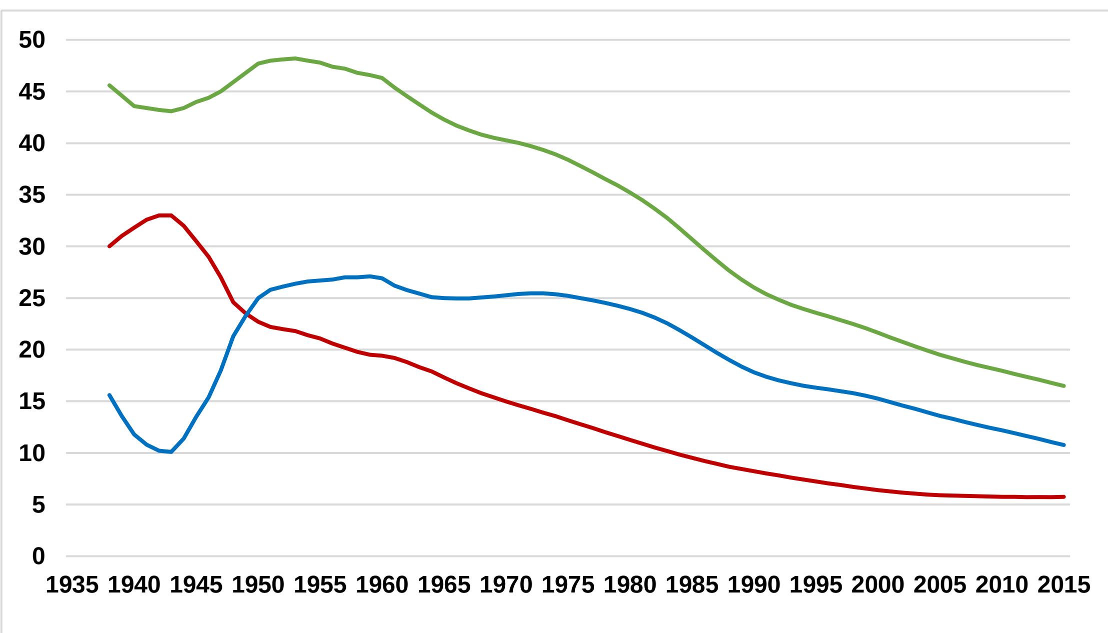
Stage 4 – Post-transition Stage:

Post-transition stage started with converging birth and death rates, which was similar to stage 1. However, in this stage both of the rates were in the low levels on the contrary to pre-transition stage. Slightly higher birth rates compared to death rates resulted in a mild natural increase in this stage. In this stage, while population continued to grow with moderate levels, fertility was still declining. In line with the low fertility levels, the two-child families became very common in this stage.

Today for the societies experiencing post-transition stage, which are the developed countries, a considerable proportion of larger families are needed to overcome unmarried people or families with no children or with just one child. Otherwise, a decrease in the population size is unavoidable, as well as the population aging (Rowland, Demographic Methods and Concepts).

Considering the recent developments in both birth rates and death rates, it can be stated that Turkey is in the post-transition stage, which is the last stage of demographic transition. Figure III.1.1. demonstrates the changes visualized in both birth and death rates in Turkey since 1935.

Figure III.1.1. Crude Birth Rates and Crude Death Rates for Turkey (1935-2015)



Source: Shorter and Macura, 1982; World Bank Data

III.2. Demographic Window for Turkey

The definition of demographic window includes the conditions that the share of 0-14 age group falls below 30 percent, while the share of old age population (65 and over) is still below 15 percent in the total population, as it was mentioned in “World Population to 2300” prepared by UN Department of Economic and Social Affairs, Population Division in 2004.

In order to determine the beginning and end years of the demographic window for Turkey annual data for the broad age groups (0-14, 15-64 and 65+) are required. The data for the previous years for these broad age groups are taken from World Bank datasets. However, for the future data detailed population projections are need to be made. The population projections for Turkey made in this study is explained in details as follows including data, methodology and software used.

III.2.1. Population Projection for Turkey

DemProj module of Spectrum Software is used for the population projections for Turkey for 2015 -2075 period.

III.2.1.1. DemProj Input and Methodology regarding Population Projections for Turkey

The projection period is chosen to be starting from the year 2015 and ending at the year 2075 which is exactly the same end year of the projection of TURKSTAT. Data from TDHS’s, TURKSTAT and United Nations Population Division are used as inputs for the demographic projections.

Required input data of this module for demographic projections are listed as below:

- Base year total population for both sexes,
- Total fertility rates (TFR),
- Age specific fertility rates (ASFR),
- Sex ratio at birth,
- Life expectancies at birth for both sexes,
- Total migrants for both sexes,
- Migrant age distribution for both sexes.

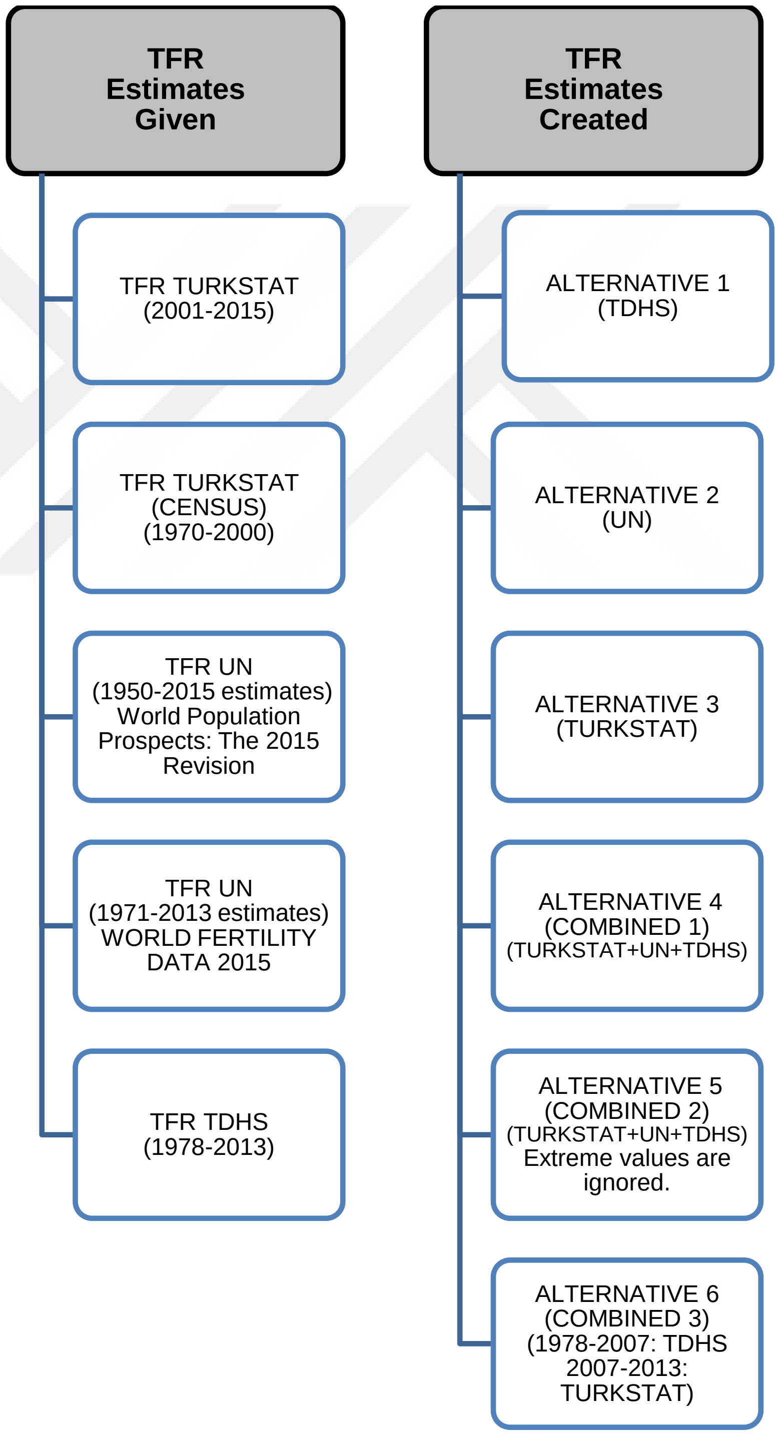
III.2.1.1.1. Base year total population for both sexes

Regarding the base year population by sex, the results of Address Based Population Registration System (ABPRS) for the year 2015 is used.

III.2.1.1.2. Total fertility rates (TFR)

However, TFR's are not taken only from one source; instead data from different sources are used. As one of the sources, ASFR's taken from General Directorate of Civil Registration and Nationality, Ministry of the Interior for the years 2001-2015 to calculate TFR's for these years. Also TFR's obtained from censuses for the years 1970 to 2000 conducted by TURKSTAT are also included for the projections. In addition, TFR data from World Fertility Data 2015 and World Population Prospects: The 2015 Revision by United Nations (UN), Department of Economic and Social Affairs, Population Division is also used. And finally TDHS's TFR data for the years 1978-2013 obtained from various TDHS reports prepared by Institute of Population Studies, Hacettepe University are used in the study. Moreover new TFR estimates are created, considering that they will be better estimates to be used to create trendlines for developing TFR projections for the years 2015-2075. First created TFR estimate, Alternative 1 consists of TDHS data only. Alternative 2 is composed of UN data. In case there is more than one data value for a given year, the average of the values are taken and used. For Alternative 3 a combination of TURKSTAT census data for the years 1970-2000 and TURKSTAT TFR values calculated from ASFR values for the years 2001-2015 are used. Data from all above mentioned sources are combinedly used in Alternative 4. Average values are taken, when there is more than one data value for a given year. In Alternative 5 differently from Alternative 4, extreme values or in other words outlier are not taken into account. To be more specific, in case there is more than one data value and there is an outlier, the outlier is ignored. Similarly, if there is only one data value for a year and if that data value is an outlier, simply the data value for that year is ignored. And finally for Alternative 6, TDHS data are used for the years 1978-2006 and TURKSTAT data are used for the years 2007-2015. Briefly, TFR estimates used in the study are summarized in Figure III.2.1.1.2.1.

Figure III.2.1.1.2.1. TFR Estimates Used



As a next step, TFR projections for the years 2015-2075 are calculated using given and created TFR values for the years 1978-2015. While creating trendlines different trend types are tested considering R squared values and how logical the projection results especially after the year 2050. Exponential, linear, logarithmic and power type of trendlines are all tested. During the tests, it is found out that exponential and power trends were very significantly similar. Correspondingly, logarithmic and linear trends were appeared to be remarkably similar. Considering the projection values for the following decades, logarithmic and linear trends are found to be illogical. When exponential and power type trendlines are compared the R squared values for the power type trendlines were found to be higher. In the light of all these observations, power type trendlines are accepted as the best fit so this type of trendlines are used during the whole study. As an illustration a comparison of linear and power type trend lines are presented in Figure III.2.1.1.2.2. - Figure III.2.1.1.2.6.

Figure III.2.1.1.2.2. Comparison of Linear and Power Type Trendlines for TFR values of TURKSTAT (2001-2015)

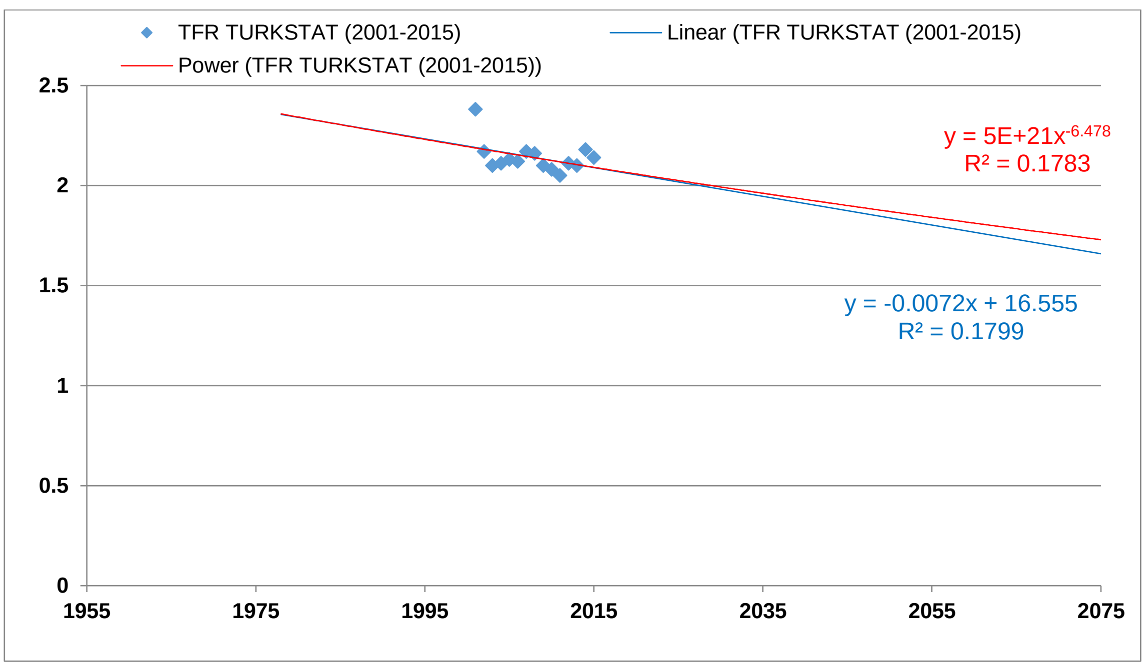


Figure III.2.1.1.2.3. Comparison of Linear and Power Type Trendlines for TFR values of TURKSTAT (CENSUS) (1970-2000)

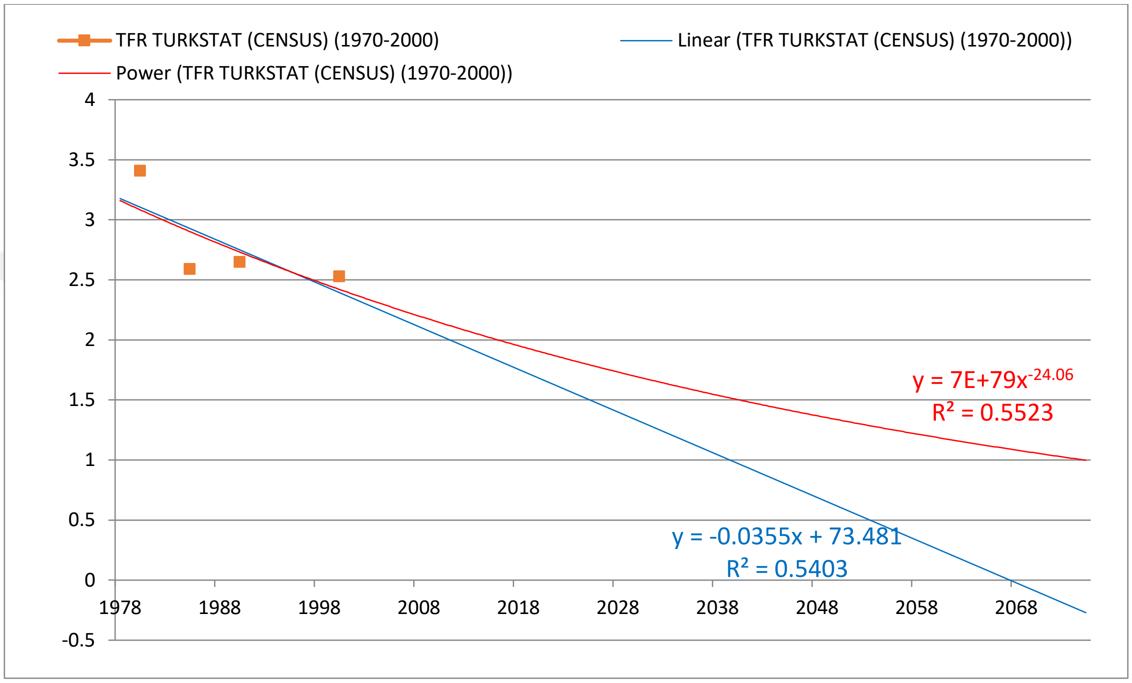


Figure III.2.1.1.2.4. Comparison of Linear and Power Type Trendlines for TFR values of TDHS (1978-2013)

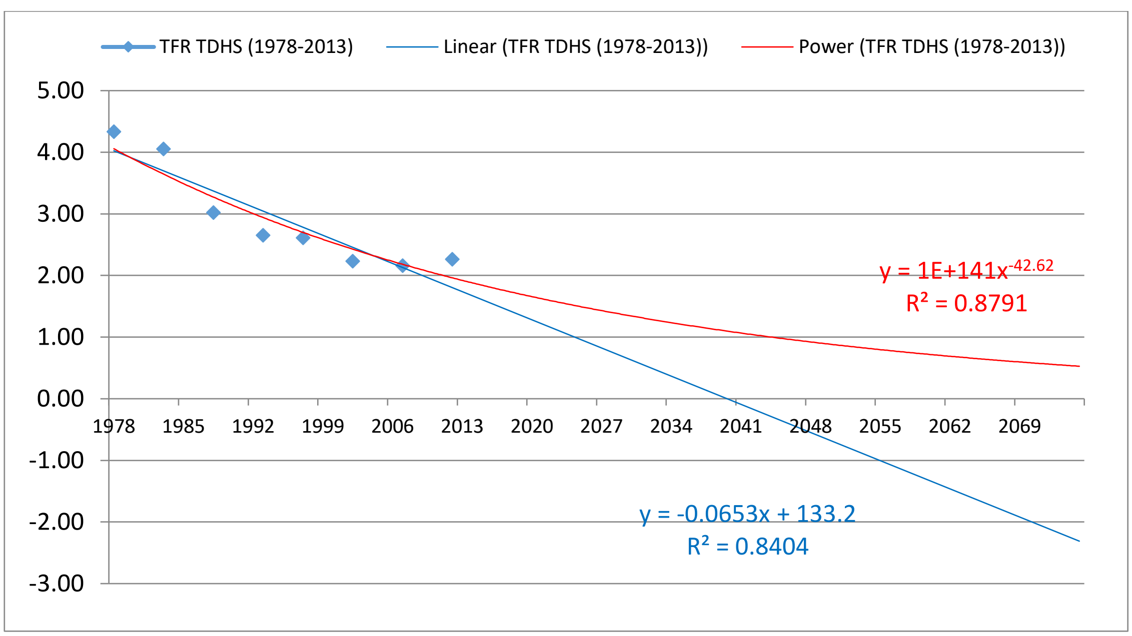


Figure III.2.1.1.2.5. Comparison of Linear and Power Type Trendlines for TFR values of UN (1950-2015 Estimates)

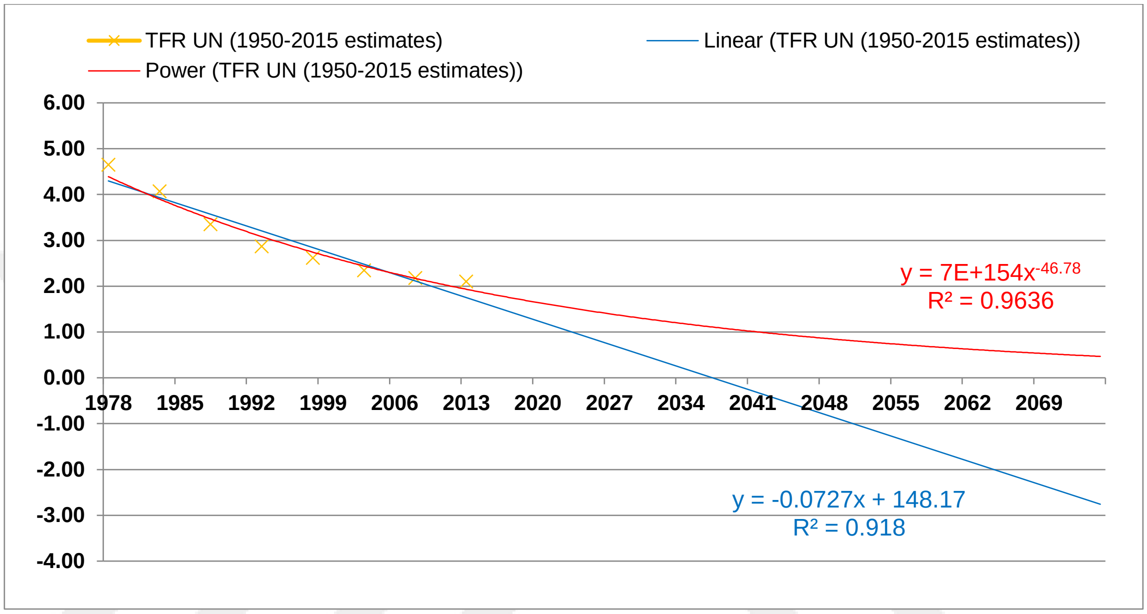
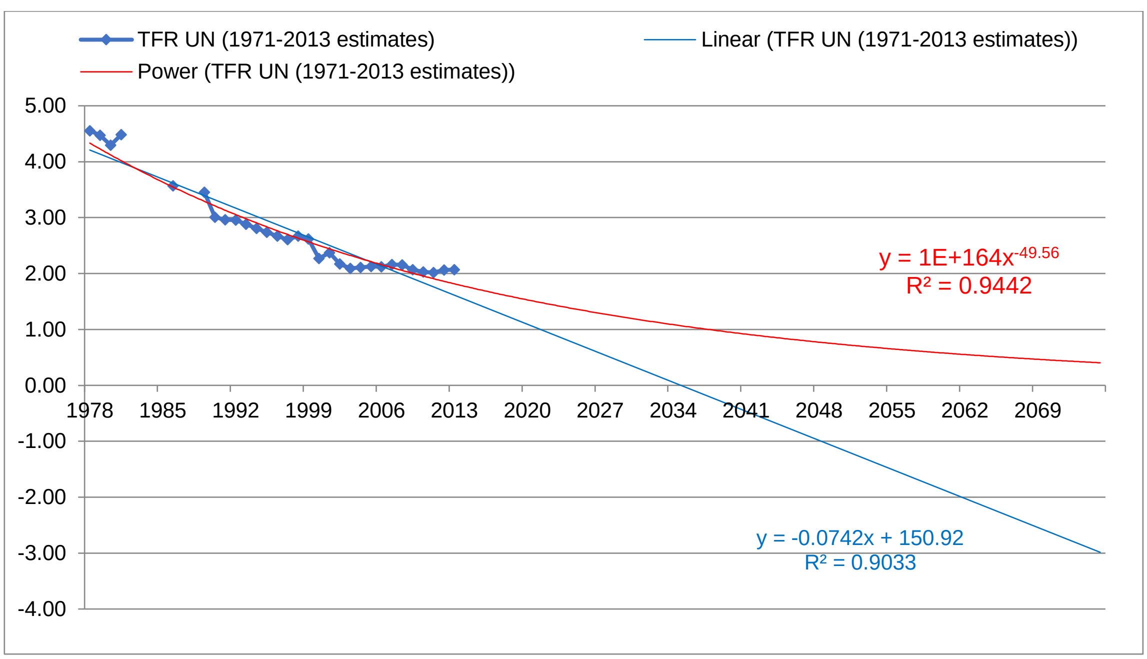


Figure III.2.1.1.2.6. Comparison of Linear and Power Type Trendlines for TFR values of UN (1971-2013 Estimates)

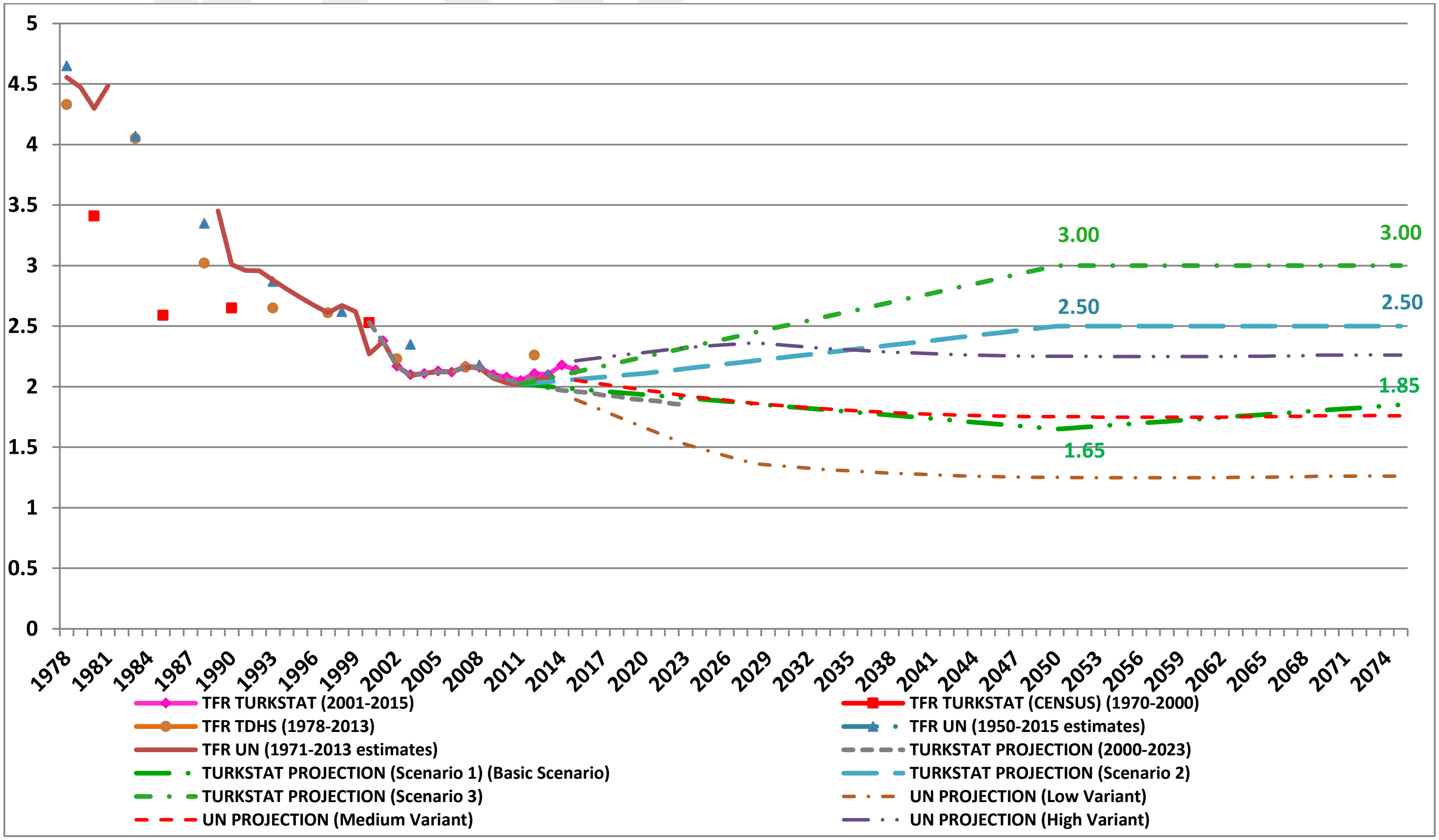


In this study all of the created TFR projections are developed using only the created TFR estimates presented in Figure III.2.1.1.2.1. As a brief demonstration, in Figure III.2.1.1.2.7., TFR estimates taken from TURKSTAT, UN and TDHS and TFR projections made by TURKSTAT and UN are presented. On the other hand, in Figure III.2.1.1.2.8., TFR estimates created in this study and corresponding TFR projections are shown.

As it is clearly observed in Figure III.2.1.1.2.7., TURKSTAT basic scenario projection, which is Scenario 1, and UN medium variant projection show significant similarities especially until the year 2040. In Figure III.2.1.1.2.8., it is pointed out that TDHS's TFR projections slightly differentiate from the other projections made according to the other created TFR estimates. TFR projection values of all of the projections expect TDHS are close to each other especially for the period 2015 – 2040. After 2040 these projections start to differentiate from each other, but all of their TFR values stay below the values of the projection made according to TDHS estimates.

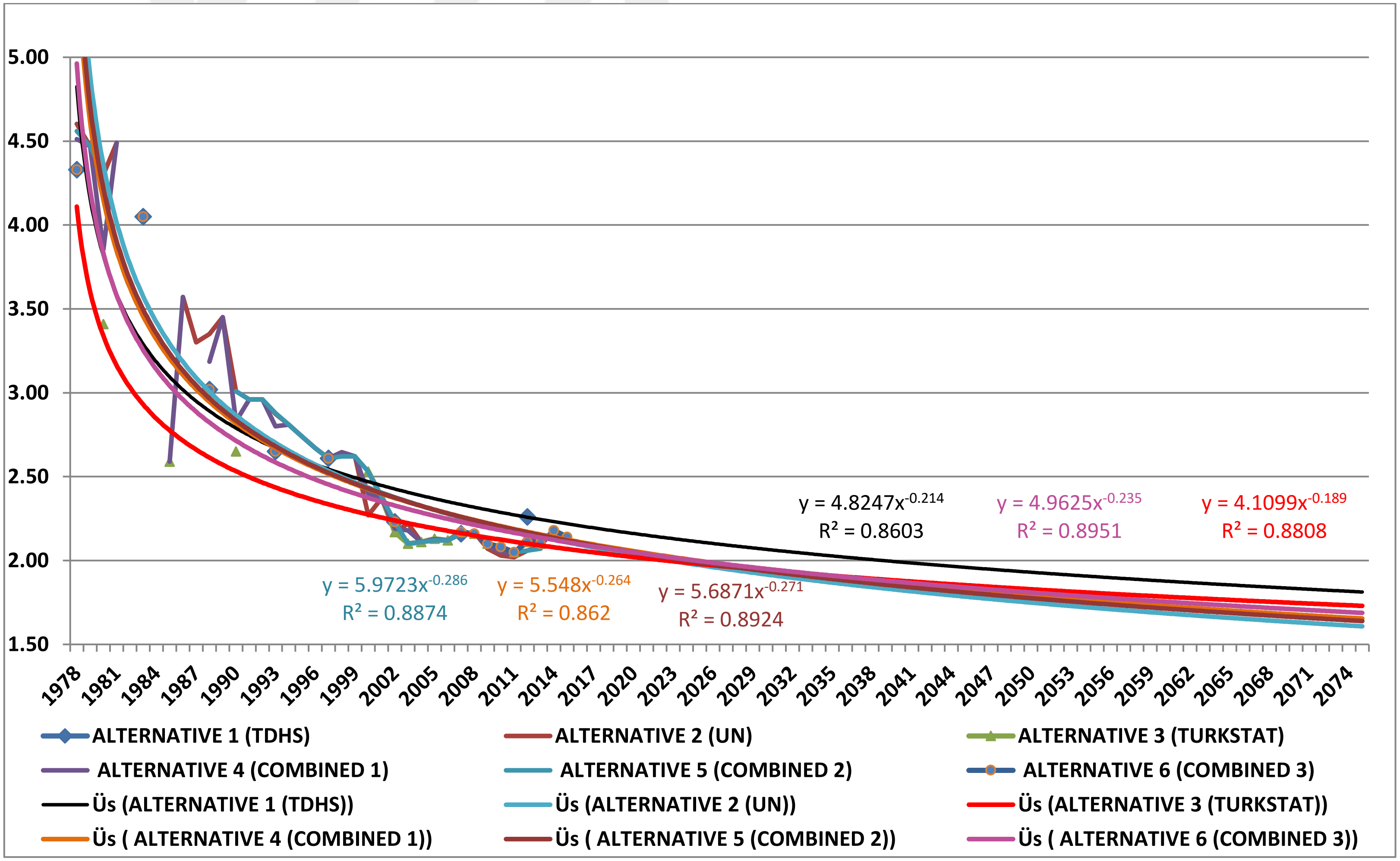
In Table III.2.1.1.2.1, TFR projection values are presented to make a comparison between the projections created and most likely scenarios of TURKSTAT and UN. The similarities and differentiations between the TFR values of the projections can be better observed in Table 1. It can also be noted that TFR projection values obtained using TDHS estimates (Alternative 1) start to converge TURKSTAT and UN's most likely scenarios after year 2050. Starting from the year 2071, TFR projection values of Alternative 1 lie in between the projection values of TURKSTAT and UN.

Figure III.2.1.1.2.7. TFR Estimates and Projections by TURKSTAT, UN and TDHS



Source: Hacettepe Üniversity, Institude of Population Studies,TurkStat, United Nations

Figure III.2.1.1.2.8. TFR Estimates and Projections Created



Source: Hacettepe Üniversity, Institude of Population Studies,TurkStat, United Nations, author’s calculations

Table III.2.1.1.2.1. Comparison of TFR Projection Values by Source (2015-2075)

Years	PROJECTIONS GIVEN		PROJECTIONS CREATED					
	TURKSTAT PROJECTION (Scenario 1) (Basic Scenario)	UN PROJECTION (Medium Variant)	PROJECTION ALTERNATIVE 1 (TDHS)	PROJECTION ALTERNATIVE 2 (UN)	PROJECTION ALTERNATIVE 3 (TURKSTAT)	PROJECTION ALTERNATIVE 4 (COMBINED 1)	PROJECTION ALTERNATIVE 5 (COMBINED 2)	PROJECTION ALTERNATIVE 6 (COMBINED 3)
2015	1,98	2,05	2,22	2,11	2,07	2,12	2,12	2,11
2020	1,93	1,97	2,16	2,04	2,02	2,06	2,05	2,05
2025	1,89	1,90	2,11	1,97	1,98	2,00	1,99	2,00
2030	1,84	1,84	2,06	1,92	1,94	1,95	1,94	1,95
2035	1,79	1,80	2,02	1,87	1,91	1,90	1,89	1,91
2040	1,74	1,78	1,99	1,83	1,88	1,86	1,85	1,87
2045	1,70	1,76	1,96	1,79	1,85	1,82	1,81	1,84
2050	1,65	1,75	1,93	1,75	1,83	1,79	1,78	1,81
2055	1,69	1,75	1,90	1,72	1,80	1,76	1,75	1,78
2060	1,73	1,75	1,87	1,69	1,78	1,73	1,72	1,76
2065	1,77	1,75	1,85	1,66	1,76	1,70	1,69	1,73
2070	1,81	1,76	1,83	1,63	1,74	1,68	1,67	1,71
2075	1,85	1,76	1,81	1,61	1,73	1,65	1,64	1,69

Source: Hacettepe Üniversity, Institude of Population Studies,TurkStat, United Nations, author’s calculations

III.2.1.1.3. Age specific fertility rates (ASFR)

Regarding ASFR's, three different data sources are used: TURKSTAT, UN and TDHS. The time period of the ASFR's varies among sources, as shown in Table III.2.1.1.2.2, III.2.1.1.2.3 and III.2.1.1.2.4. It is important to mention that the values in the tables show percent distributions of each age group for a given year. In other words, percent cumulation for each year gives the value 100 percent. The past ASFR percent distribution values are used to estimate the future trends for the years 2015-2075.

Table III.2.1.1.2.2. Age Specific Fertility Rates – TUIK (2001-2015) (Percentage)

Year	15-19	20-24	25-29	30-34	35-39	40-44	45-49
2001	10,29%	30,25%	28,15%	16,60%	10,50%	3,15%	1,05%
2002	9,91%	30,41%	28,11%	17,51%	9,91%	3,23%	0,92%
2003	9,55%	29,83%	28,64%	18,62%	9,31%	3,10%	0,95%
2004	9,48%	29,62%	28,20%	19,91%	9,00%	3,08%	0,71%
2005	9,65%	28,94%	28,94%	19,76%	8,71%	3,29%	0,71%
2006	9,46%	28,37%	30,50%	19,39%	8,51%	3,31%	0,47%
2007	9,24%	27,94%	30,95%	19,63%	8,78%	3,00%	0,46%
2008	9,05%	28,31%	30,39%	19,95%	9,28%	2,55%	0,46%
2009	8,80%	27,97%	29,94%	20,24%	10,07%	2,55%	0,42%
2010	8,12%	27,12%	30,19%	21,20%	10,32%	2,62%	0,44%
2011	7,76%	26,77%	30,44%	21,90%	10,23%	2,48%	0,42%
2012	7,25%	25,97%	30,62%	22,60%	10,64%	2,57%	0,35%
2013	6,84%	25,36%	30,88%	22,81%	11,12%	2,69%	0,30%
2014	6,28%	24,62%	31,02%	23,37%	11,51%	2,93%	0,26%
2015	5,81%	23,95%	31,43%	23,65%	11,92%	2,99%	0,26%

Source: TurkStat

Table III.2.1.1.2.3. Age Specific Fertility Rates – UN World Population Prospects: The 2015 Revision (1950-2015) (Percentage)

Period	15-19	20-24	25-29	30-34	35-39	40-44	45-49
1950-1955	10,60%	33,80%	28,40%	17,70%	7,20%	2,30%	0,00%
1955-1960	10,60%	33,80%	28,40%	17,70%	7,20%	2,30%	0,00%
1960-1965	10,60%	33,80%	28,40%	17,70%	7,20%	2,30%	0,00%
1965-1970	10,60%	33,80%	28,40%	17,70%	7,20%	2,30%	0,00%
1970-1975	10,60%	33,80%	28,40%	17,70%	7,20%	2,30%	0,00%
1975-1980	10,60%	33,80%	28,40%	17,70%	7,20%	2,30%	0,00%
1980-1985	10,60%	33,80%	28,40%	17,70%	7,20%	2,30%	0,00%
1985-1990	10,60%	33,80%	28,40%	17,70%	7,20%	2,30%	0,00%
1990-1995	10,60%	33,80%	28,40%	17,70%	7,20%	2,30%	0,00%
1995-2000	10,10%	32,47%	29,36%	17,57%	7,80%	2,50%	0,20%
2000-2005	9,60%	31,13%	30,34%	17,43%	8,40%	2,70%	0,40%
2005-2010	9,10%	29,80%	31,30%	17,30%	9,00%	2,90%	0,60%
2010-2015	7,53%	27,20%	32,54%	20,33%	9,45%	2,50%	0,45%

Source: United Nations

Table III.2.1.1.2.4. Age Specific Fertility Rates – TDHS (1978-2013) (Percentage)

Period	15-19	20-24	25-29	30-34	35-39	40-44	45-49
1978	10,75%	29,94%	25,20%	17,80%	11,68%	4,39%	0,23%
1988	7,45%	31,95%	30,30%	16,89%	9,11%	3,15%	1,16%
1993	10,57%	33,77%	28,49%	17,74%	7,17%	2,26%	0,00%
1997	11,49%	31,23%	28,74%	17,82%	8,05%	2,49%	0,19%
2002	10,31%	30,49%	30,04%	17,49%	8,52%	2,69%	0,45%
2007	8,10%	29,17%	30,79%	21,06%	8,33%	2,31%	0,23%
2012	6,86%	27,43%	30,09%	23,01%	10,62%	1,55%	0,44%

Source: Hacettepe Üniversity, Institude of Population Studies

Regarding the calculations of ASFR percent distributions, as the first step, current ASFR percent distributions for the year 2015 from different sources, which are TURKSTAT, UN and TDHS are compared. A narrow range for the current ASFR percent distribution is determined. The most similar ASFR percent distribution to this percent distribution range is searched in the table named “Model Age Patterns of Fertility Used for the Countries with Economies in Transition” in “World Population Prospects – The 2012 Revision” document of UN. It is found out that Turkey’s current ASFR percent distribution is most similar to Model 2 in this table which is also presented as Table III.2.1.1.2.5.

Table III.2.1.1.2.5. Model Age Patterns of Fertility Used for the Countries with Economies in Transition

	Percentage of total fertility by age group								
Model	**15-19**	**20-24**	**25-29**	**30-34**	**30-39**	**40-45**	**45-49**	**Total**	**Mean age at childbirth**
1	7,9	35,3	38,4	15,9	2,4	0,1	0,0	100	26.0
2	5,6	29,5	39,3	21,0	4,4	0,2	0,0	100	27.0
3	4,0	24,1	38,4	25,6	7,3	0,6	0,0	100	28.0
4	2,8	19,4	36,2	29,5	10,8	1,3	0,0	100	29.0
5	2,0	15,4	33,1	32,1	14,8	2,5	0,1	100	30.0

Source: United Nations

As the next step, in order to determine future ASFR percent trends, all past trends are examined looking at the data obtained from TURKSTAT, UN and TDHS. However, a clearly visible trend could not be discovered. Because of this reason, the future trends developed by UN are used. For each age group, percent distribution changes over the decades are calculated. These changes are searched in the Table III.2.1.1.2.4 to project the future ASFR percent distribution values. As a result, it is accepted that ASFR percent distribution of Turkey will be like model 3 in 15 years, in the year 2030, and like model 4 in the year 2050 and finally like model 5 in the year 2065. A criticism to this approach can be directly using the future ASFR percent distribution trends of UN. Also it is important to point out that UN uses same trends for all of its three scenarios which include low, medium and high variants.

III.2.1.1.4. Sex ratio at birth

Sex ratio at birth is taken as constant, which has a value of 105 for each single year throughout the whole period (2015-2075).

III.2.1.1.5. Life expectancies at birth for both sexes

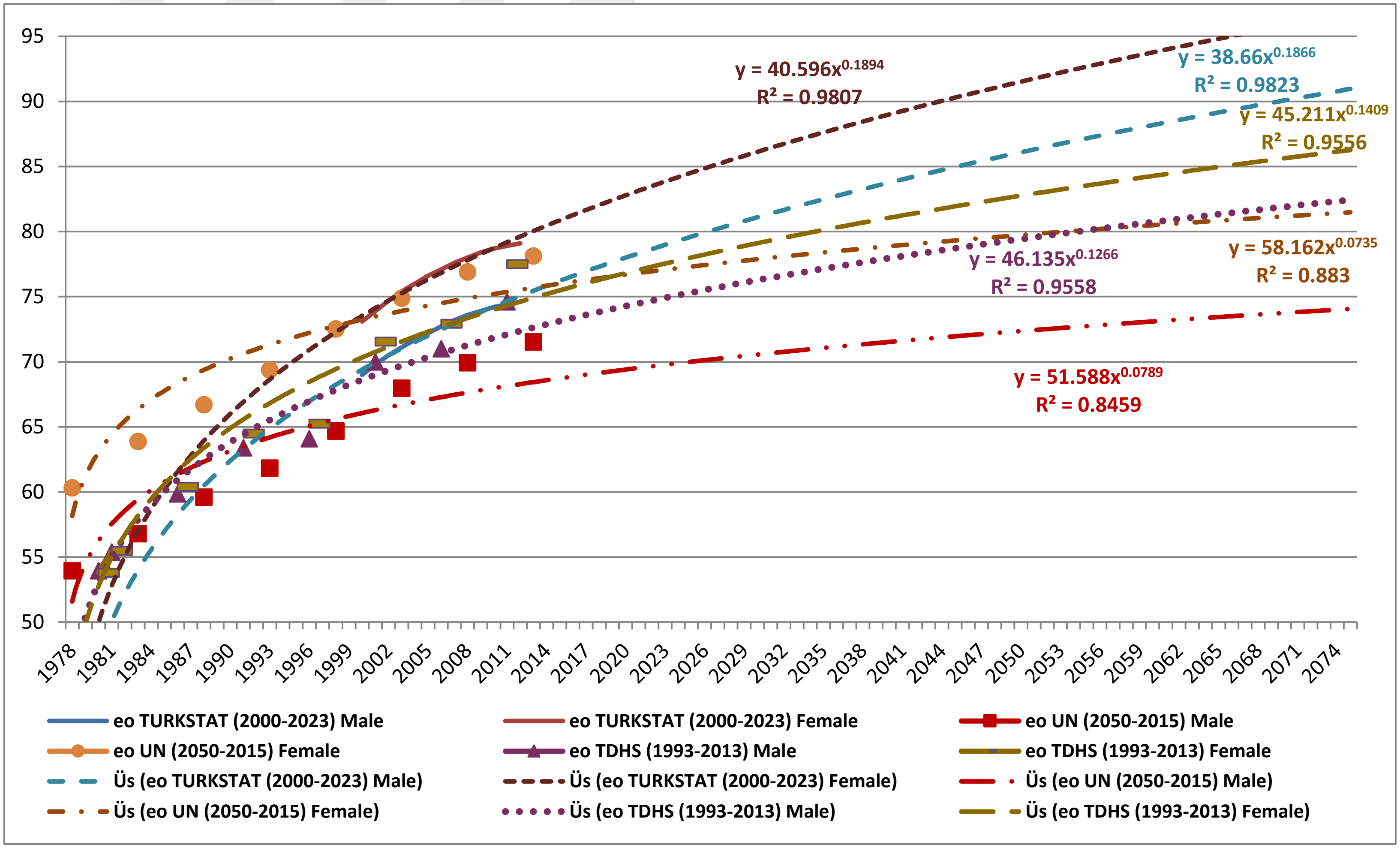
As the first step in calculation of life expectancy at birth projections, estimates of life expectancy at birth data from TURKSTAT and UN are directly taken. On the other hand, life expectancy at birth values are also calculated by using infant mortality rate (IMR) data from TDHS and CD West model life tables of UN. Next, life expectancy at birth projection values are calculated using power type trendlines, which are the same type of trendlines used in TFR projection calculations. Life expectancy at birth projection values which are calculated by using power trendlines from TURKSTAT (2000-2023) and UN (2050-2015) data are also compared by the projections done by TURKSTAT and UN using the same data by their own methods. While the projection values created in the thesis using TURKSTAT data are higher than the values created by TURKSTAT, the projection values created in the thesis using UN data lower than the values created by UN as shown in Table III.2.1.1.5.1. Also life expectancy at birth estimate values and projection values created by sex and source are presented in Figure III.2.1.1.5.1 including trendline formulas and R square values. Projections created for females by using TURKSTAT data is the highest, while projections created for males by using UN data is the lowest among the trends shown. Moreover, created and given projections for life expectancy at birth for each sex is presented separately in Figure III.2.1.1.5.2 and Figure III.2.1.1.5.3 by using area type chart to give a better illustration of projection differentiations. It is worthy to mention that, TDHS projections created lie between UN projection given and UN projections calculated starting from the year 2032 for male and from the year 2020 for female.

Table III.2.1.1.5.1. Comparison of Life Expectancy at Birth Projection Values by Source and Sex

Years	PROJECTIONS GIVEN				PROJECTIONS CREATED					
	eo TURKSTAT PROJECTION (2000-2023)		eo UN (2015-2100)		eo TURKSTAT (2000-2023) PROJECTION		eo UN (2050-2015) PROJECTION		eo TDHS (1993-2013) PROJECTION	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
2015	74,9	79,4			76,22	80,85	68,74	75,99	73,12	75,48
2020	75,4	79,9	73,53	79,75	78,00	82,77	69,41	76,68	74,27	76,81
2025			74,87	80,75	79,61	84,51	70,02	77,31	75,31	78,01
2030			76,17	81,64	81,10	86,11	70,57	77,87	76,26	79,10
2035			77,43	82,46	82,47	87,59	71,07	78,39	77,14	80,11
2040			78,67	83,22	83,76	88,98	71,53	78,87	77,95	81,05
2045			79,88	83,93	84,96	90,27	71,97	79,31	78,71	81,93
2050			80,98	84,57	86,09	91,49	72,37	79,72	79,42	82,75
2055			81,99	85,19	87,16	92,65	72,75	80,11	80,09	83,53
2060			82,82	85,79	88,18	93,75	73,11	80,48	80,72	84,26
2065			83,56	86,36	89,15	94,79	73,45	80,83	81,32	84,96
2070			84,24	86,92	90,07	95,79	73,77	81,16	81,89	85,63
2075			84,88	87,47	90,95	96,74	74,07	81,47	82,44	86,26

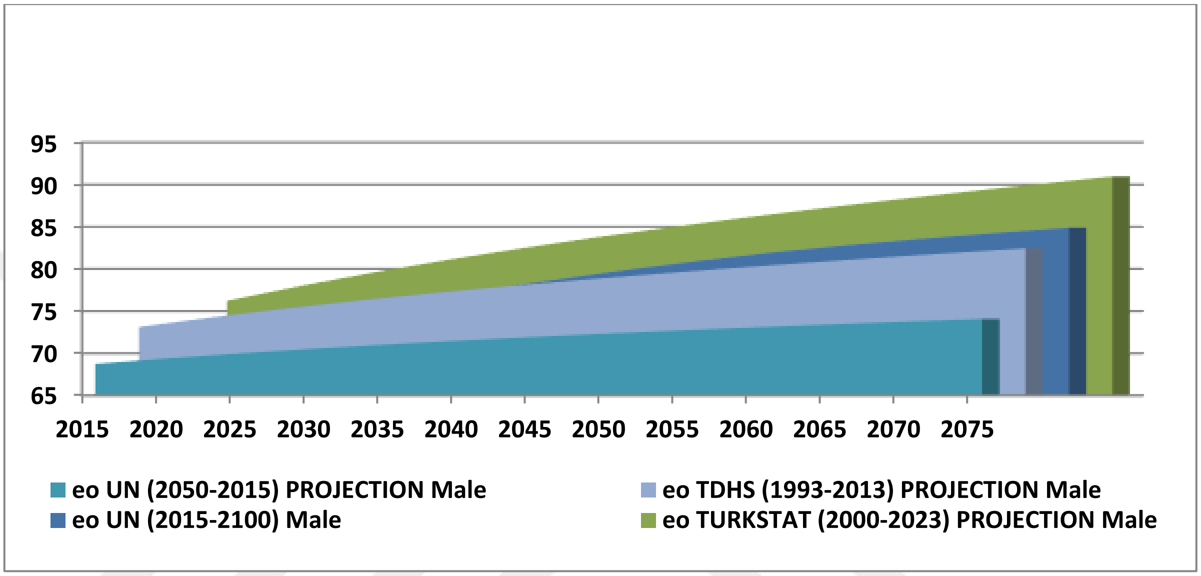
Source: Hacettepe Üniversity, Institude of Population Studies,TurkStat, United Nations, author's calculations

Figure III.2.1.1.5.1. Life Expectancy at Birth Estimates and Projections Created by Source and Sex



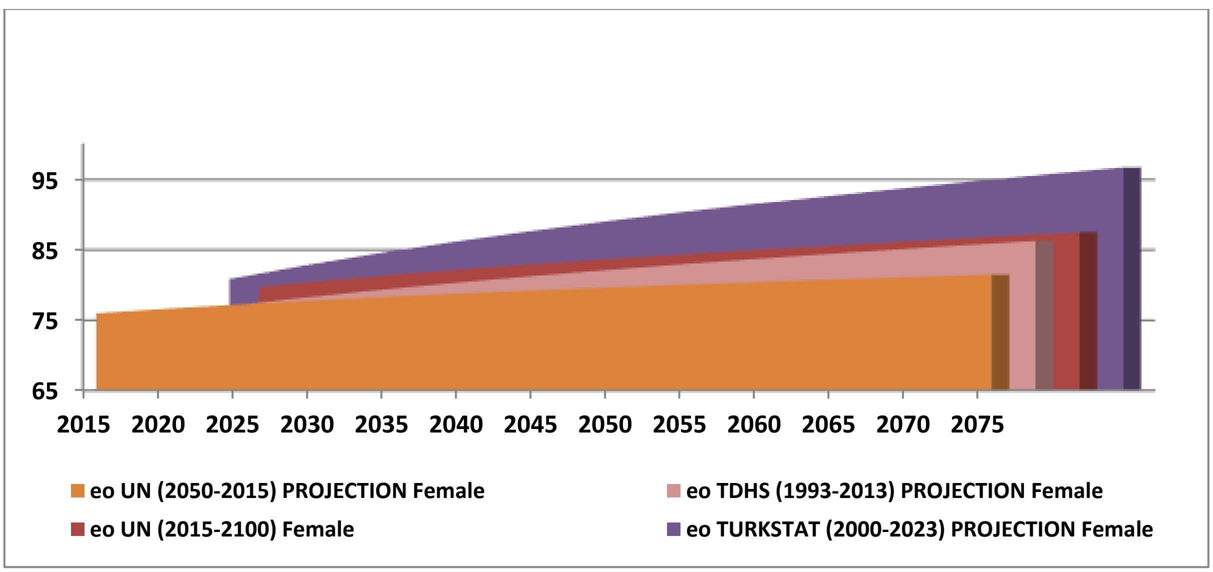
Source: Hacettepe Üniversity, Institute of Population Studies,TurkStat, United Nations, author's calculations

Figure III.2.1.1.5.2. Life Expectancy at Birth Projections Given and Created for Male (2015-2075)



Source: Hacettepe Üniversity, Institude of Population Studies,TurkStat, United Nations

Figure III.2.1.1.5.3. Life Expectancy at Birth Projections Given and Created for Female (2015-2075)



Source: Hacettepe Üniversity, Institude of Population Studies,TurkStat, United Nations

III.2.1.1.6. Total Migrants for Both Sexes, Migrant Age Distribution for Both Sexes

Regarding the last step of data entry for DemProj module, several migration data sets from UN Department of Economic and Social Affairs (UN DESA), Population Division and The United Nations Refugee Agency (UNHCR) and especially Ministry of Interior, Directorate General of Migration Management are examined.

At this point, it is crucial to underline that the main reason of making the population projections is to derive the population size and structure, which is or will be included in Turkish education system and already entered or subsequently will enter the labor market of the country in the future. In other words, the permanent population, which contributes or will contribute to the economic development and growth of Turkey is to be considered in this study. From this point of view, only the population groups which satisfying these conditions (if any) should be included in the migration section of DemProj module.

The population groups that should be examined whether they could be included in international migration section of DemProj Software can be listed as;

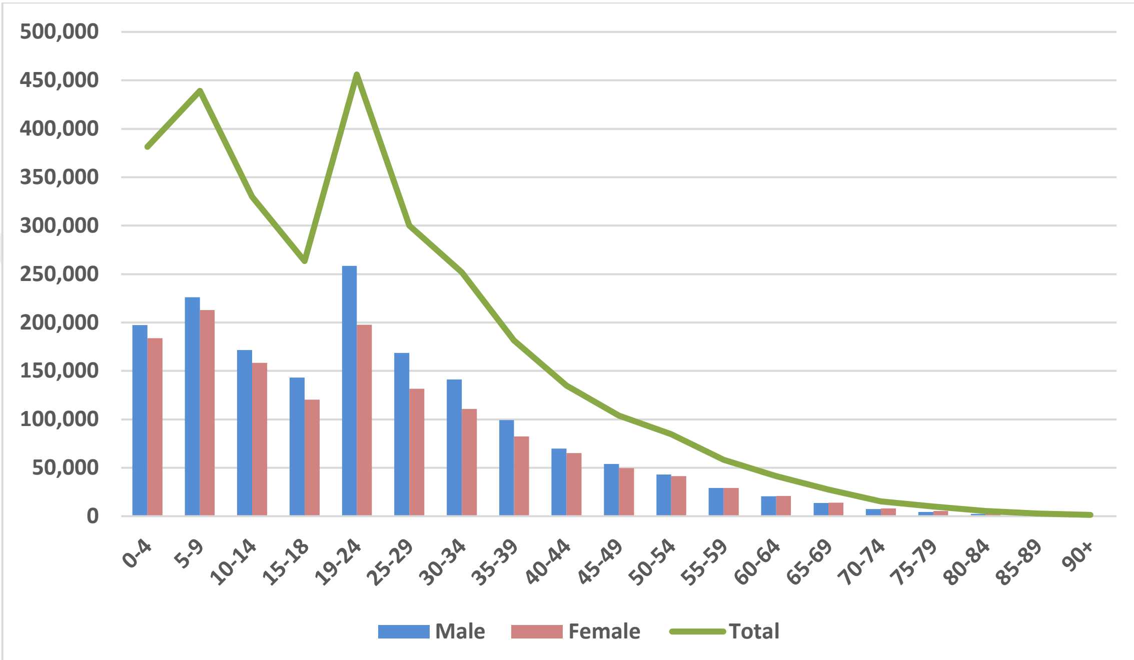
- Syrian population in Turkey under temporary protection,
- Foreigners in Turkey with residence permits,
    - Short term residence permit,
    - Family residence permit,
    - Student residence permit,
    - Study residence permit,
    - Other residence permit.

- Approved international protection applicants.
- Irregular migrants,

With the start of the civil war within Syria, more than 2.8 million Syrian people left their country and entered Turkey in order to receive temporary protection status between the years 2011 and 2016. According to recent data announced by Ministry of Interior, Directorate General of Migration Management, this number is raised to almost 3.1 million people as of 13 July 2017, pointing out an increase of around 300 thousand people within the last 6 months.

The age group distribution of registered Syrian population in Turkey by gender is presented in Figure III.2.1.1.6.1. The majority of the Syrian population in the country is composed of 0-9 and 19-24 age groups and makes up 41.3 percent of the total Syrian population in the country. Starting from 25-29 age group the size of the Syrian population in Turkey diminishes as the age groups get older. Population of school age and younger age groups of the working age population are significantly higher compared to other age groups except 0-4 age group.

Figure III.2.1.1.6.1. Age and Gender Distribution of Registered Syrians under Temporary Protection (*)



Source: Ministry of Interior, Directorate General of Migration Management

(*) As of 13.07.2017

However, there are no publicly announced formal data regarding the school attendance and labor force participation rates for the Syrian population temporarily living in Turkey. Moreover, it is assumed that they will not permanently reside in Turkey. Even though in case they are given the right to stay permanently in the country, there is no guarantee that a significant percent of this population will not go back to their country or move to other countries as immigrants or refugees in the following decades. Taking into account all these reasons, it may not be accurate and realistic including Syrian population in Turkey in the population projections used in this study.

Although, it were to be believed that the Syrian population in Turkey with temporary protection would be permanent in the country and were supposed to be included in the population projections, which is used as inputs in various chapters of this study for the necessary calculations for measuring and assessing the economic development and growth; there are still many questions rising and data missing about the Syrian population in Turkey. These issues can be summarized as follows:

- What is the actual number of Syrian population in Turkey including the unregistered ones?
- How do the fertility and mortality rates and related age structure of Syrian population in Turkey differ from the rates of Turkish population? How can these indicators be measured?
- What portion of Syrian school age population in Turkey is willing to enroll in schools that follow Turkish education system?
- What portion of Syrian people are seeking for jobs and willing to attend labor market?
- Do the official records about Syrian people in Turkey reflect the reality?

Most of these questions require specific surveys that should be conducted in order to acquire related data that needs to be entered in the DemProj module of Spectrum Software for the projection results.

Regarding the foreigners in Turkey with residence permits, none of the sub-groups is need to be included in the population projections either. Population group with short term residence permit makes up the highest portion of this group, which is almost 4 times the size of second largest sub-group. However, the profile of this group is subject to change with short time intervals, as their permission in staying in Turkey is considerably limited compared to other population groups with residence permits. The population groups, that should be included in the population projections developed by

DemProj module, should be composed of people staying in the country in the long run, in order to be able to measure their contribution to the economic development and growth of the country. As the people with short term residence permit in Turkey change, their age, educational and labor profiles change too. This situation makes it difficult to make accurate calculations regarding their past, present and future contributions to the economic activity in the country.

On the other hand, the size of population with family residence permit and approved international protection in Turkey is around 87 thousand according to current data given by Ministry of Interior, Directorate General of Migration Management. This number is a small amount considering the size of the population in Turkey, which is 79.8 million as of 31 December 2016 according to Address Based Population Registration System (ABPRS) managed by TurkStat. In other words, the population group with family residence permit composes only 0.11 percent of the total population in Turkey in 2016. In this respect, population group with family residence permit and approved international protection in Turkey are neglected and not included in the overall population of the country, which will be considered in this study.

Population with student residence permit and study residence permit are expected to be in Turkey only for the educational reasons and assumed to be leaving the country after their graduation. So it can be stated that these population group will not be entering the labor market in Turkey and consequently will not be making any contribution to the economic development and growth in the country. Also population group with other residence permit makes up a small share of the total population group with residence permit according to the recent data announced by Ministry of Interior, Directorate General of Migration Management.

Lastly, irregular migrants is the population group which is illegally in the country and supposed to be deported as soon as they are arrested by security forces. So, this population sub-group should not be included in the population projections either.

Taking into account all these factors; the mention population groups are disregarded and the net international migration for Turkey is assumed to be zero in migration section of the DemProj module.

III.2.1.2. DemProj Output, Methodology and Findings Regarding Population Projections for Turkey

Using the input projections explained previously, DemProj provides future values of various demographic indicators, which can be classified as follows:

- Population
    - Total population size,
    - Population by age for both sexes,
    - Total net international migration.
- Fertility
    - Total fertility rate,
    - Gross reproduction rate,
    - Net reproduction rate,
    - Mean age of childbearing,
    - Child-woman ratio,

- Mortality
  - Life expectancy at birth,
  - Infant mortality rate,
  - Under-five mortality rate,
- Vital events
  - Births,
  - Deaths,
  - Deaths by age,
  - Crude birth rate (CBR),
  - Crude death rate (CDR),
  - Rate of natural increase (RNI),
  - Annual growth rate (GR),
  - Doubling time.
- Ratios
  - Sex ratio,
  - Dependency ratio.
- Age groups
  - All age groups,
  - Defined age group,
  - Median age.

These projected demographic indicators can be very useful and informative in guiding public policies for various fields such as education, health, retirement programs and etc. However, in this chapter of the thesis only the share of broad age groups, which are 0-14, 15-64 and 65 and over in percentages, which are shown in Table 7, are used to build up necessary projections in order to detect future development of the demographic window for Turkey.

On the other hand, some of the other projected values of the demographic indicators derived by DemProj module will be used in different chapters of the thesis. While, projections of dependency ratio, median age, mean age of child bearing, infant mortality rate and the percentage share of special age groups, such as 15-24 age group will be utilized in serving as a basis for the public policy suggestions in the following chapters; the projections of the crude birth rate and crude death rate are already used in demonstrating the future of the demographic transition of Turkey in the introduction chapter.

All of the demographic indicators as outputs of DemProj module are summarized in Table III.2.1.2.2, excluding the ones presented in Table III.2.1.2.1. The future values of these indicators are presented starting from 2020 until 2075 for each 10 year period with an exception of the last one, which is only a 5 year period.

Table III.2.1.2.1. Population Indicators - The Base Year and the Projections (2015 – 2075)

Population Indicators	2015	2020	2030	2040	2050	2060	2070	2075
Total	78,741,056	82,353,936	88,721,832	93,354,224	96,153,576	96,947,000	95,924,856	94,999,648
Male	39,511,192	41,416,224	44,690,348	46,988,540	48,344,168	48,680,276	48,080,992	47,578,696
Female	39,229,860	40,937,716	44,031,484	46,365,688	47,809,408	48,266,724	47,843,864	47,420,948
Percent 0-4	8.1	7.71	6.75	6.12	5.69	5.25	4.95	4.84
Percent 5-14	15.88	15.41	14.08	12.64	11.77	11.08	10.4	10.15
Percent 15-24	16.38	15.45	14.27	13.35	12.24	11.65	11.18	10.89
Percent 15-49	53.26	52.58	49.65	46.93	44.47	42.96	41.45	40.74
Percent 15-64	67.77	67.76	67.11	66.05	63.37	61.72	60.49	59.85
Percent 65 and over	8.25	9.12	12.06	15.19	19.17	21.95	24.16	25.16
Percent females	52.61	52	48.91	46.06	43.59	42.08	40.54	39.82
Sex ratio	100.72	101.17	101.50	101.34	101.12	100.86	100.50	100.33
Dependency	0.48	0.48	0.49	0.51	0.58	0.62	0.65	0.67
Median age	31	33	35	38	41	43	45	45

Source: Author's calculations

Table III.2.1.2.2. Summary of Demographic Indicators - The Projections (2020 – 2075)

Demographic Indicators	2020	2030	2040	2050	2060	2070	2075
Fertility							
Input TFR	2.05	1.95	1.87	1.81	1.76	1.71	1.69
Calculated TFR	2.05	1.95	1.87	1.81	1.76	1.71	1.69
GRR	1	0.95	0.91	0.88	0.86	0.83	0.82
NRR	0.97	0.93	0.9	0.87	0.85	0.83	0.82
Mean age of childbearing	27.3	28	28.5	29	29.7	30.4	30.7
Child-woman ratio	0.3	0.28	0.27	0.26	0.25	0.24	0.24
Mortality							
Male LE	74.2	76.1	77.7	79.3	80.6	81.7	82.2
Female LE	76.6	79	80.9	82.5	84.1	85.5	86.1
Total LE	75.4	77.5	79.3	80.9	82.4	83.6	84.1
IMR	14.4	11.1	9.1	7.6	6.4	5.6	5.3
U5MR	16.8	12.9	10.6	8.8	7.5	6.5	6.1
Total 45q15	0.0373	0.0291	0.0237	0.0195	0.0162	0.0139	0.013
Vital Rates							
CBR per 1000	15.5	13.5	12.3	11.3	10.4	9.8	9.6
CDR per 1000	6.9	7.2	8.2	9.2	10.6	11.5	11.7
RNI percent	0.86	0.63	0.41	0.21	-0.02	-0.16	-0.21
GR percent	0.86	0.63	0.41	0.21	-0.02	-0.16	-0.21
Doubling time	80.9	109.9	168.5	334	0	0	0
Annual births and deaths							
Births	1,275,720	1,197,276	1,147,29	1,088,996	1,008,877	942,468	911,435
Deaths	566,992	636,147	762,466	889,258	1,027,335	1,098,752	1,115,623

Source: Author’s calculations

Especially the population projection values of this thesis for the benchmark years 2025, 2050 and 2075 are compared with the population projection values of TurkStat and UN DESA. It can be easily observed that the population projection values derived in the thesis for the benchmark years are very close to the values of UN DESA and after the year 2065 the values of the study are in between the values of scenario 1 (basic scenario) of TurkStat and the values of UN DESA as shown in Table III.2.1.2.3. The differentiations of the patterns of these projections are clearly visible in Figure III.2.1.2.1.

It is noteworthy to mention that different projections could be derived using different alternative sets of inputs, as there are sufficient numbers of different given and created estimates to develop the input projections using trend-lines. However, only one demographic projection is developed and presented here to avoid any confusions and to be clear; as for each new demographic projection that would be developed by using different alternative of input data, the thesis would provide differentiating findings.

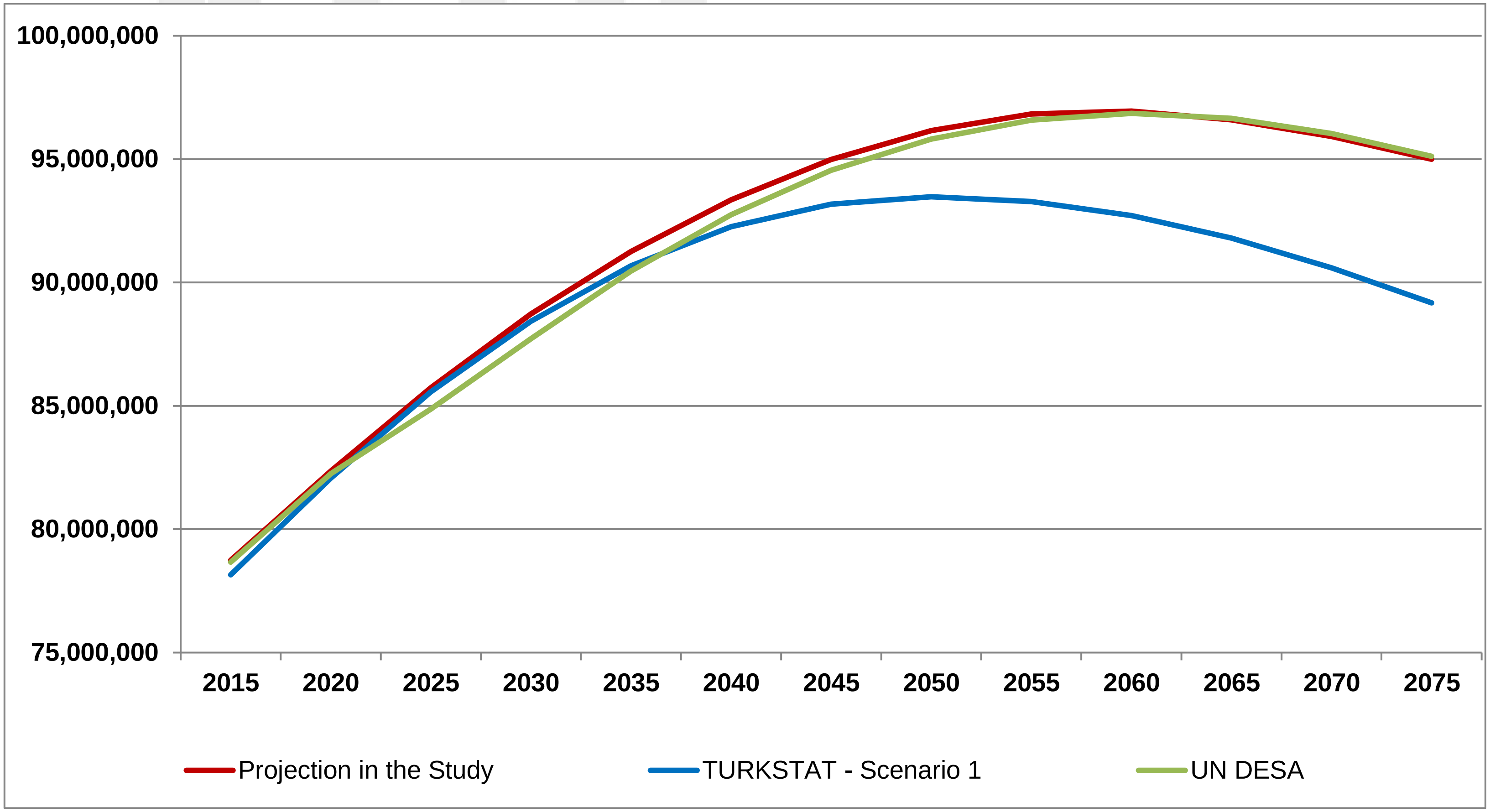
Regarding the population projections developed in this thesis, as TFR values TDHS data for the 1978 -2006 period and Address Based Population Registration System data for 2007-2015 period is taken. Also as life expectancy at birth values TDHS data for 1993-2013 period is used.

Table III.2.1.2.3. The Comparison of Population Projections

Years	Projection of the Thesis			TURKSTAT			UN DESA		
	Male	Female	Total	Scenario 1	Scenario 2	Scenario 3	Male	Female	Total
2015	39.511.192	39.229.860	78.741.056	78.151.750	78.200.638	78.224.595	38.675.000	39.991.000	78.666.000
2020	41.416.224	40.937.716	82.353.936	82.076.788	82.535.851	82.761.284	40.428.000	41.828.000	82.256.000
2025	43.167.444	42.565.872	85.733.312	85.569.125	86.854.339	87.487.390	41.698.000	43.163.000	84.862.000
2030	44.690.348	44.031.484	88.721.832	88.427.604	90.874.077	92.115.182	43.117.000	44.600.000	87.717.000
2035	45.956.828	45.299.800	91.256.624	90.680.302	94.586.203	96.629.322	44.508.000	45.953.000	90.461.000
2040	46.988.540	46.365.688	93.354.224	92.257.821	97.964.644	101.037.927	45.688.000	47.056.000	92.744.000
2045	47.782.584	47.200.220	94.982.808	93.175.281	101.149.183	105.580.208	46.660.000	47.884.000	94.544.000
2050	48.344.168	47.809.408	96.153.576	93.475.575	104.309.596	110.546.401	47.392.000	48.427.000	95.819.000
2055	48.656.356	48.174.932	96.831.288	93.277.765	107.452.196	115.934.065	47.889.000	48.700.000	96.588.000
2060	48.680.276	48.266.724	96.947.000	92.716.895	110.458.050	121.511.659	48.129.000	48.727.000	96.856.000
2065	48.462.352	48.137.728	96.600.080	91.800.361	113.346.937	127.333.312	48.128.000	48.522.000	96.650.000
2070	48.080.992	47.843.864	95.924.856	90.589.432	116.251.718	133.623.970	47.918.000	48.125.000	96.043.000
2075	47.578.696	47.420.948	94.999.648	89.172.088	119.344.690	140.672.782	47.542.000	47.579.000	95.121.000

Source: TurkStat, United Nations, author's calculations

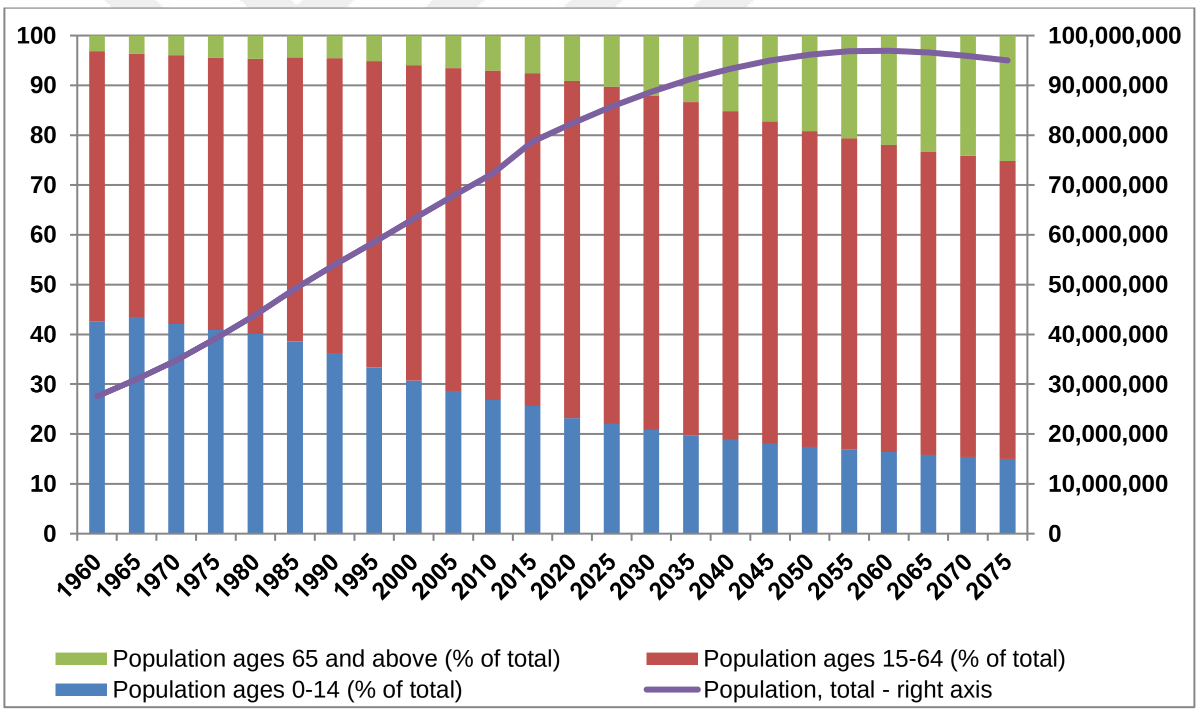
Figure III.2.1.2.1. The Patterns of Population Projections



Source: TurkStat, United Nations, author’s calculations

Taking World Bank data regarding the share of broad age groups (0-14, 15-64 and 65+) for Turkey for 1960-2015 period and taking the values of the population projections for 2016-2075 period developed by using DemProj module in this thesis, the broad age distribution of Turkey from 1960 until 2075 is derived in order to determine the beginning and end years of demographic window for Turkey. Figure III.2.1.2.2 demonstrates the change in the share of broad age groups, so the beginning, the end and the timing of demographic window for Turkey.

Figure III.2.1.2.2. The distribution of Broad Age Groups and the Total Population



Source: World Bank

According the change in share of 0-14 and 65+ age groups, it can be stated that Turkey enters demographic window in 2002 and exits the window in 2040. So the demographic window for Turkey is open for a total of 38 years and 15 years of the window is already over.

III.3. The Demographic Dividends

As an undeniable consequence of the demographic transition, every country on the world regardless of its development level has experienced or still experiencing and will continue to experience a shift in its age structure with different timings and durations. The shift in age structure begins with the decrease in fertility, causing a reduction in the young age population and as the young age population, especially before the fertility decline started, enters the working age group, an appreciable growth in the share of working age population occurs. Following this period, as the working age group with a high share in the population starts to enter 65+ age group, the composition of the population changes in favor of the old age group resulting in population aging with the noticeable contribution of increase in life expectancy. Increase in life expectancy is an autonomous result of the improvements in the health care system and developments made in the well-being of the society and life status. In literature, the economic outcomes of these demographic changes have taken attention of many researchers in the recent decades.

Analyses made on impacts of age structure on the economy can be grouped into three in terms of methods used and results obtained. The first group of analyses includes, empirical researches which used aggregate level panel data and reached the findings stating that the impacts of demographic factors on economic growth (Bloom and Canning, 2001; Bloom and Williamson, 1998; Kelley and Schmidt, 1995) and aggregate saving rates (Bloom et al., 2003; Deaton and Paxson, 2000; Kinugasa, 2004; Williamson and Higgins, 2001) are noteworthy and statistically significant. However, according to previous studies which used shorter time series, solid impacts of demographic factors on economic growth could not receive much statistical proof (Kelley, 1988). In the second group of analyses, it was found out that demographic factors had a key role in the economic growth in some of the East Asian countries, which were named as “East Asian Tigers” (Bloom and Williamson, 1998; Mason, 2001b; Mason et al., 1999). However, there were some differentiations in the techniques used and the results of the case studies made. In one of the studies according to the results of the econometric analysis it was stated that one third of the income per capita growth was relied on the demographic dividend (Bloom and Williamson, 1998). On the other hand, in another study, in which used growth accounting methods were used, the results indicated that a quarter of the economic growth in the region was due to the demographic dividend (Mason, 2001). Even though the results of the studies varied regarding the contribution level of the demographic factors on economic growth in the East Asia region, it can be concluded that the studies made point out the importance of the demographic factors on the economy of the region. In the third group of studies, effects of age structure considering age specific consumption and income levels are taken into account in calculating the first demographic dividend (Mason and Lee, forthcoming; Mason, 2005). Third group of analyses focuses on macroeconomic models which examines the impacts of shifting age structure on the economies (Cutler et al., 1990; Lee et al., 2003; Lee et al., 2001; Mason 2005). In the more recent studies, the conditions under which first and second demographic dividends can occur are set (Mason and Lee, forthcoming) and the demographic dividends are calculated for many countries from different regions of the world for the second half of the 20th century (Mason, 2005).

According to these recent studies, while going through the demographic transition, countries experience a growth in the share of working age population. This shift in the age structure is believe to create an advantage for the growth in income per capita and this opportunity can be turned into economic growth, in other words first demographic dividend can be gained. The magnitude of the dividend is accepted to be influenced by the impact of the shift in age structure in favor of the working age group on labor force participation rates, unemployment levels and wages. On the other hand, the second demographic dividend arouses in accordance with the population aging. For the countries facing population aging, the main demographic issue is the consumption needs of the elderly whose income is considerably limited compared to working population. In other words, older people are consuming more than they are producing. Aging countries have two major solutions to this problem, first one of which includes strengthening of transfer systems by means of public programs or family support systems. Second solution mainly advices the increase in saving rates in order to accumulate more wealth and capital. Capital accumulation during the working life of the individuals can be used as the source for financing the needs in older ages following their retirements. Also, capital accumulation is considered to be more effective on economic growth in terms of productivity, compared to the first solution for the population aging. In other words, the pro-growth effect coming from capital accumulation is the key factor in the formation of the second demographic dividend. If capital accumulation is invested in the country, output per worker might be improved in addition to capital deepening. On the other hand if capital accumulation is invested outside the country, not only an increase in national income, but also an improvement in the balance of current account will be experienced. In both situations, capital accumulation will have a contribution on the increase of income per capita, which is namely second demographic dividend. It is noteworthy to mention that, in case the adverse effects of population aging are overcome by capital accumulation, second demographic dividend is tend to be permanent rather than temporary, making a continuous positive contribution to income per capita increase (Mason, 2005).

In this study the third group of analyses which was developed by Mason and Lee is taken into account in the first demographic dividend calculations of this chapter in order to answer the thesis question whether or not can Turkey make use of the growing share of the working age population and gain first dividend before the demographic window closes for the country. Second demographic dividend is not considered here as the study focuses on possible gains from first demographic dividend which the potential for it is believed to continue for a couple of decades more for Turkey. After the closure of the potential for the first demographic dividend, second demographic dividend is believed to follow, which is very unlikely in the near future for Turkey.

III.3.1. The First Demographic Dividend

As a result of the decrease in fertility, the share of the working age group in the populations grows, leading to a potential first demographic dividend. More specifically, it can be stated that an increase in the share of 15-64 age group can be concluded to induce an increase in output per capita, which is defined as the first demographic dividend under the assumptions, where labor force participation rates, unemployment rates and productivity which is the output per worker are kept constant. Also, as the working age population grows faster than the dependent population in the following decades of the rapid fertility decline, an opportunity to shift the resources for investing in socio-economic development arouses. It is worth noting that the duration of the first demographic dividend lasts for a couple of decades and the dividend is temporary according to its nature. As the bulge in the working age group starts to enter 65+ age group continuously as time passes and considerably small number of young people enters the working age group as a result of the decreased fertility levels, the advantage coming from the high share of working age groups diminishes by time. This process is followed by population aging meaning a significant increase in the share of 65+ age group in the population. At the first stages of population aging, the first demographic dividend will start to be negative as a consequence of the population growing faster than the labor force. As the population aging proceeds, the share of the working age group in the population will be lower than it was before the first demographic started to be positive (Mason, 2005; Lee and Mason, 2006).

In terms of first dividend, the period and duration of the dividend varies from region to region and income level is also a major factor in the differentiation of the timing of the first dividend. The first dividend was observed first in the industrial countries in the beginning of 1970’s and followed by Latin America, Pacific Islands, Middle East and Northern Africa, Eastern and South Eastern Asia, Transitional Economies, South Asia and Sub-Saharan Africa respectively. The duration of the first dividend was slightly less than 30 years for the industrial countries, which was the shortest compared to all other regions. It was followed by transitional economies with duration of around 34 years for the first dividend. Longest duration was expected to be for South Asia with a value of almost 61 years. However, it was also mentioned that the durations of the first dividend had a downward bias for some of the regions, considering the countries gaining first dividend before and after the time period of the study, which was limited to 1950-2050 time period. In terms of the magnitude of the first dividend, developing countries had bigger gains compared to developed countries, based on the reason that developing countries entered the time period of interest with an age structure with a higher dependency ratios. In general it can be summarized that there was a significant difference between the developed and developing countries regarding the duration and the magnitude of first dividend.

Moreover, the distinction among developing countries about the first dividend is noteworthy to mention. For East and South East Asia and Latin America countries the duration of the first dividend was short and its magnitude was substantial. However, for South Asia the duration of the first dividend was comparably longer but its magnitude was smaller. On the other hand, the Sub-Saharan Africa region has just entered the first dividend period in the last decade. Also another point to highlight is that, making use of favorable demographic shifts to gain economic growth is to some extent complicated. While East and South East Asia region is proved to utilize the demographic factors in economic development, Latin America region seems to fail to make a similar gain (Mason, 2005).

Lifecycle of production and consumption with respect to age has a key role in the process of calculating first demographic dividend. Young and old age populations consume more than they produce as expected. On the other hand, working age population in general produce more than they consume. These age specific characteristics of production and consumption are projected in the lifecycle, with a consumption line having a slightly upward trend and a production line having an upside down U shape. Production line intersects with the consumption line on two points, which are called the crossing points. Between these two points production line is above the consumption line, meaning between these two ages population produce more than they consume. The population lying between these two ages, also marked by the crossing points, are usually close to the beginning and end ages of the working age population. So, as a result of these characteristics of the economic life cycle, populations with high shares of working age groups have superiority in terms of per capita income compared to populations with low shares. It should also be emphasized that young and old dependency ratios and conventional support ratios all of which are determined by commonly set age groups (0-14 age group is accepted as young age, 15-64 age group is accepted as working age and 65+ age group is accepted as old age) are still used as demographic indicators of economic dependency. However, using economic lifecycle while calculating support ratios and consequently first demographic dividend, gives more realistic results, considering the real life incidences about the ages for entering and leaving working life. To put in another way, while calculating conventional support ratio by using commonly set age groups, it is assumed that young and old age groups have no contribution to production and similarly 15-64 age group, which is called as the working age group definitely contributes to the production, which is not always the case. Entering and leaving ages for working age group varies from country to country and from time to time. In this respect, holding entering and leaving ages for working age group constant has a high potential of misleading the calculations. Moreover, the contribution to the production of the each age group which is included in the working age group is not the same. Age groups with higher experience and skills tend to contribute more to the production with respect to the new entrees with no working experience. In a parallel way, the consumption level of each age group is not the same either. Briefly, it can be stated that calculations using economic lifecycle tend to give more accurate results compared to the calculations using conventional young and old age dependency ratios and support ratios.

It is also important to emphasize that age specific economic outcomes, which are production and consumption levels, show variance from country to country mostly as a consequence of cultural, sociological differences and public policy regulations. Because of this, impacts of changing age structure on economic outputs will be different to some extent for each country (UNPD, Technical Paper No.2017/1). So it can be inferred that totally same single age structure might offer distinct opportunities or challenges for different countries.

III.3.1.1. Formulization and Calculation of The First Demographic Dividend

The formulization of the first dividend is taken from Mason and Lee's calculations. Instead of using conventional methods in calculating number of consumers and producers as mentioned previously, effective number of consumers and producers are computed, considering age specific consumption and production patterns with the help of economic lifecycle.

The effective number of consumers and producers are calculated as follows:

$$N(t) = \sum_a \alpha(a)\, P(a,t) \qquad \text{[Equation 1]}$$

$$L(t) = \sum_a \Upsilon(a)\, P(a,t) \qquad \text{[Equation 2]}$$

where;

N(t): The effective number of consumers at time t,

L(t): The effective number of producers at time t,

P(a,t): The population with age a at time t,

$\alpha(a)$: The age specific coefficient indicating relative level of consumption,

$\Upsilon(a)$: The age specific coefficient indicating relative level of labor income.

The age specific coefficients for relative levels of consumption and income ($\alpha(a)$ and $\Upsilon(a)$) in Equation 1 and Equation 2 can also be demonstrated by;

$$\alpha\ (a) = \frac{c(\mathrm{a})}{\bar{c}\ (30-49)} \qquad \text{[Equation 3]}$$

$$\Upsilon\ (a) = \frac{yl(\mathrm{a})}{\bar{y}\ l\ (30-49)} \qquad \text{[Equation 4]}$$

where;

c (a): The consumption per capita for age a,

$yl(\mathrm{a})$: The labor income per capita for age a,

$\bar{c}\ (30-49)$: The average consumption per capita for the 30-49 age group,

$\bar{y}\ l\ (30-49)$: The average labor income per capita for the 30-49 age group.

In other words, consumption and labor income per capita values for each age group are normalized by dividing these values with the average consumption and income per capita values for 30-49 age group. To give an example, a value of 0.70 for α (a) indicates that a person at age a consumes 70 percent of the average consumption of the 30-49 age group on average. Similarly, a value of 0.70 for ϒ (a) indicates that a person at age a is 70 percent as productive as the 30-49 age group on average.

For a more specific notation of effective consumers and producers, Equation 1 and Equation 2 can be rewritten by using Equation 3 and Equation 4 as;

$$\mathrm{N(t)} = \sum\nolimits_{\mathrm{a}} \frac{c(\mathrm{a})}{\bar{c}\ (30-49)}\ \mathrm{P(a,t)} \qquad \text{[Equation 5]}$$

$$\mathrm{L(t)} = \sum\nolimits_{\mathrm{a}} \frac{yl(\mathrm{a})}{\bar{y}\ l\ (30-49)}\ \mathrm{P(a,t)} \qquad \text{[Equation 6]}$$

Output per effective consumer which is Y(t)/N(t) can be written as;

$$\frac{Y(t)}{N(t)} = \frac{L(t)}{N(t)} * \frac{Y(t)}{L(t)} \qquad \text{[Equation 7]}$$

where;

Y(t): The aggregate income at time t,

N(t): The effective number of consumers at time t,

L(t): The effective number of producers at time t.

It should be noticed that Equation 7 indicates growth rates. By taking natural logarithm and then the derivative with respect to time of both sides, the equation is converted into;

$$\dot{y}^n(t) = [\dot{L}(t) - \dot{N}(t)] + \dot{y}(t) \qquad \text{[Equation 8]}$$

where;

$\dot{y}^n(t)$: The rate of growth in output per effective consumer with respect to time t,

$\dot{L}(t) - \dot{N}(t)$: The rate of growth of the support ratio with respect to time t,

$\dot{y}(t)$: The rate of growth in output per worker.

So according to Equation 8, rate of growth in output per effective consumer is equal to the sum of rate of growth of support ratio and the rate of growth in output per worker. In other words, economic growth per capita is divided into two components: First one is the demographic factor, which is the first dividend and second one is the productivity factor, through which the second dividend contributes to output per capita growth in case of capital accumulation. To be more precise, the first dividend can be directly derived by calculating the rate of growth of the support ratio, which is defined as the ratio of normalized effective producers to normalized effective consumers. The first dividend points out the impact of shifting age structure on economic output. Keeping productivity and wealth accumulation constant, when the support ratio has a positive slope, the first dividend is positive. This situation can be interpreted as; the first dividend contributes to economic growth as long as support ratio is increasing for the related time period.

In a similar way to the formulation of Equation 7, consumption identity, which is the consumption per effective consumer, can be shown as;

$$\frac{C(t)}{N(t)} = \underbrace{\left[(1-s(t))\frac{Y(t)}{L(t)}\right]}_{\textbf{I}} \underbrace{\left[\frac{L(t)}{N(t)}\right]}_{\textbf{II}} \qquad \text{[Equation 9]}$$

where;

C(t): The aggregate consumption at time t,

N(t): The effective number of consumers at time t,

s(t): The saving rate at time t (S/Y),

Y(t): The aggregate income at time t,

L(t): The effective number of producers at time t.

In Equation 9, the first part of the right hand-side depicts the second dividend, while the second part indicates the first demographic dividend. For the first part, decrease in the saving rates and/or increase in income per effective producers increase the aggregate consumption per effective consumer, holding other factors including support ratio constant. For the second part, increase in the support ratio increases the aggregate consumption per effective consumer, assuming other factors including saving rate and income per effective worker constant.

The characteristics of the first dividend which are emphasized in the past studies mentioned previously can be summarized as;

- Fertility decline, especially when the decrease in fertility is rapid, causes a shift in the age structure in favor of the working age population, resulting in a rise in the support ratio which is defined as the ratio of number of workers per number of consumers.
- The support ratio has two major determinants:
  - Shifts in age structure of dependent population and working age population,
  - The relative levels of consumption and production with respect to age.
- The changes in duration and magnitude of the first dividend can be shaped implementing policies regarding;
  - Developments in maternal and child health and fertility reduction,
  - Regulations affecting consumption and labor income levels for the age groups.

- One percent increase in the support ratio causes one percent increase in consumption per effective consumer, holding saving rate and production per effective worker constant.

- Countries starting with more significant demographic disadvantages, such as higher fertility levels and young dependency ratios are likely to gain more from the first dividend.

- Not only annual but also total gain from the first capital is noteworthy to consider.

III.3.1.2. First Demographic Dividend Calculations for Turkey

While calculating first demographic dividend, two main data groups are needed for the calculations. First data group is the number of people in each age group for each year in the time period under consideration. In this study the period under consideration for Turkey starts with 1960 and ends with 2075, which is 115 years. Second data group is composed of normalized labor income and consumption values for each age group for Turkey.

For the first data group, which is the number of people in each age group, data values for;

- 1960-1969 period are taken from TurkStat,

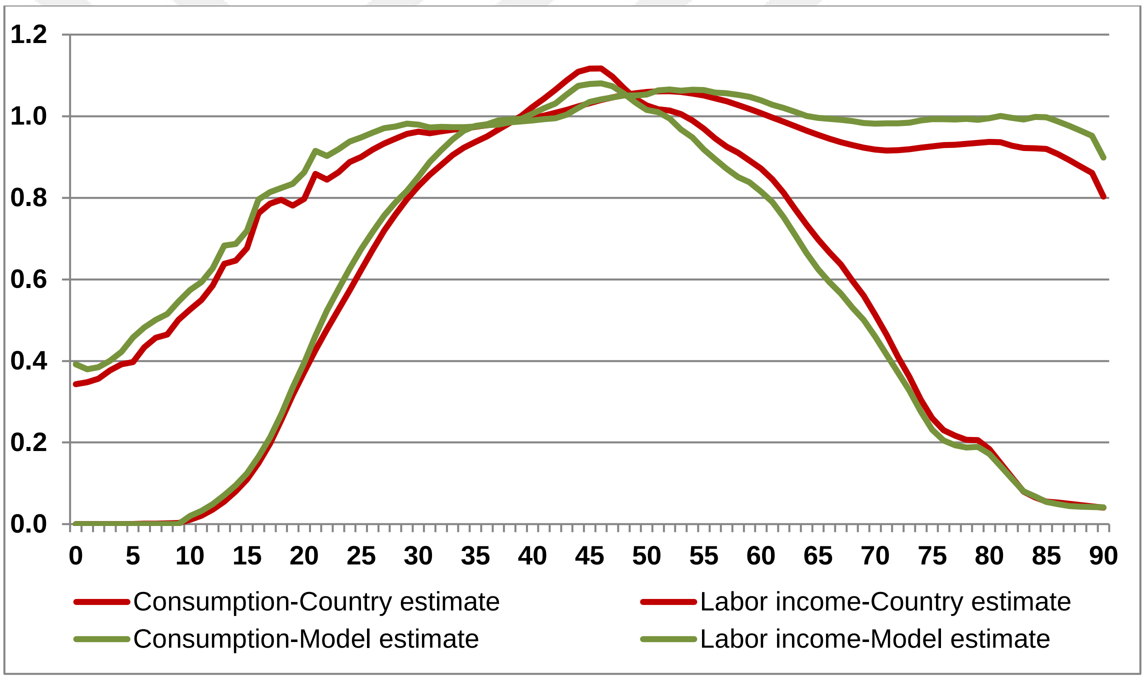
- 1970-2014 period are taken from data set of DemProj module of Spectrum Software,

- 2015-2075 period are derived from own projection calculations of this study by using DemProj module of Spectrum Software.

For the second data group, which is normalized labor income and consumption profiles, data values are taken from NTA datasets.

The normalized labor income and consumption profiles for both country estimate and model estimate are presented in Figure III.3.1.2.1.

Figure III.3.1.2.1. Labor Income and Consumption Profiles for Turkey for the year 2006



Source: NTA

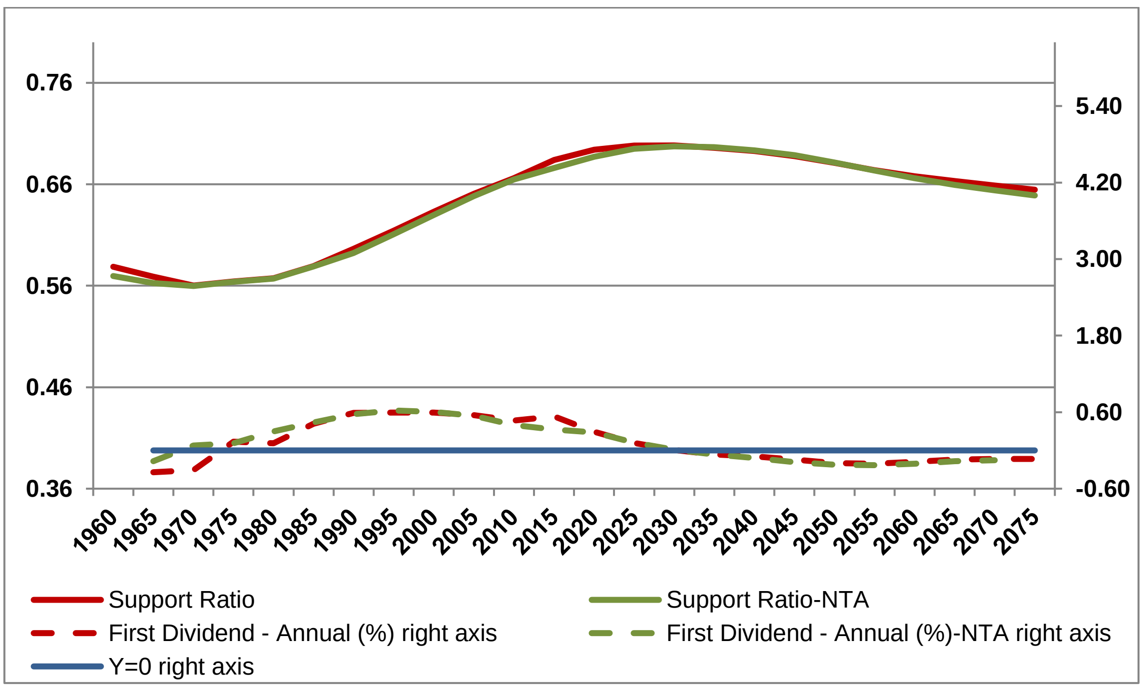
As it can be seen from the figure country estimate and model estimate profiles are very close to each other. In this thesis country estimates for the calculations of first demographic dividend for Turkey are used[4].

[4] In United Nations Population Division, Technical Paper No.2017/1, it is stated that model estimate profiles were less reliable compared to country estimates.

Using the country estimate profiles and multiplying number of people for each age group with these profiles effective labor income and effective consumption values are calculated for each age group. For each year, by summing up age group values, cumulative effective labor income and cumulative effective consumption values are calculated. Support ratios for each year are equal to the ratio of cumulative effective labor income to cumulative effective consumption values. Doing these calculations for each age group and each year, support ratios for each year are determined for Turkey. First dividend values for each year are derived by calculating the growth rates of the support ratios for that specific year.

Similar results are found with respect to the calculations of the NTA. The results of this study and of NTA are presented in Figure III.3.1.2.2 for comparison.

Figure III.3.1.2.2. Support Ratio and First Demographic Dividend for Turkey



Source: NTA, author’s calculations

However, while determining the start and end year of first demographic dividend, the annual values of first demographic dividend calculated by NTA is taken into account to be more precise. It is essential to underline that even very small differences in the values of first demographic dividend can make considerable variances in the start and end year of the first demographic dividend for Turkey.

According to NTA results, positive first demographic dividend values for Turkey starts in 1969 and ends in 2031, indicating a 62-year period with first demographic dividend for the country.

III.3.1.3. A Global Comparison of the First Demographic Dividends (1960-2015)

Comparing Turkey's first demographic dividend with the other countries' might give a better idea about the magnitude of the first dividend in Turkey. Even though different countries from different geographical regions have different timings of first demographic dividend, instead of shifting the time period for each country a specific interval (1960-2015) is taken for all of the countries for several reasons.

First of all, some of the countries have not started gaining their first demographic dividend yet, while some others have already stopped gaining their first demographic dividend. If only the countries whose first demographic dividend timings similar to Turkey's would have taken into consideration then there would be a significant decrease in number of countries included in the comparison.

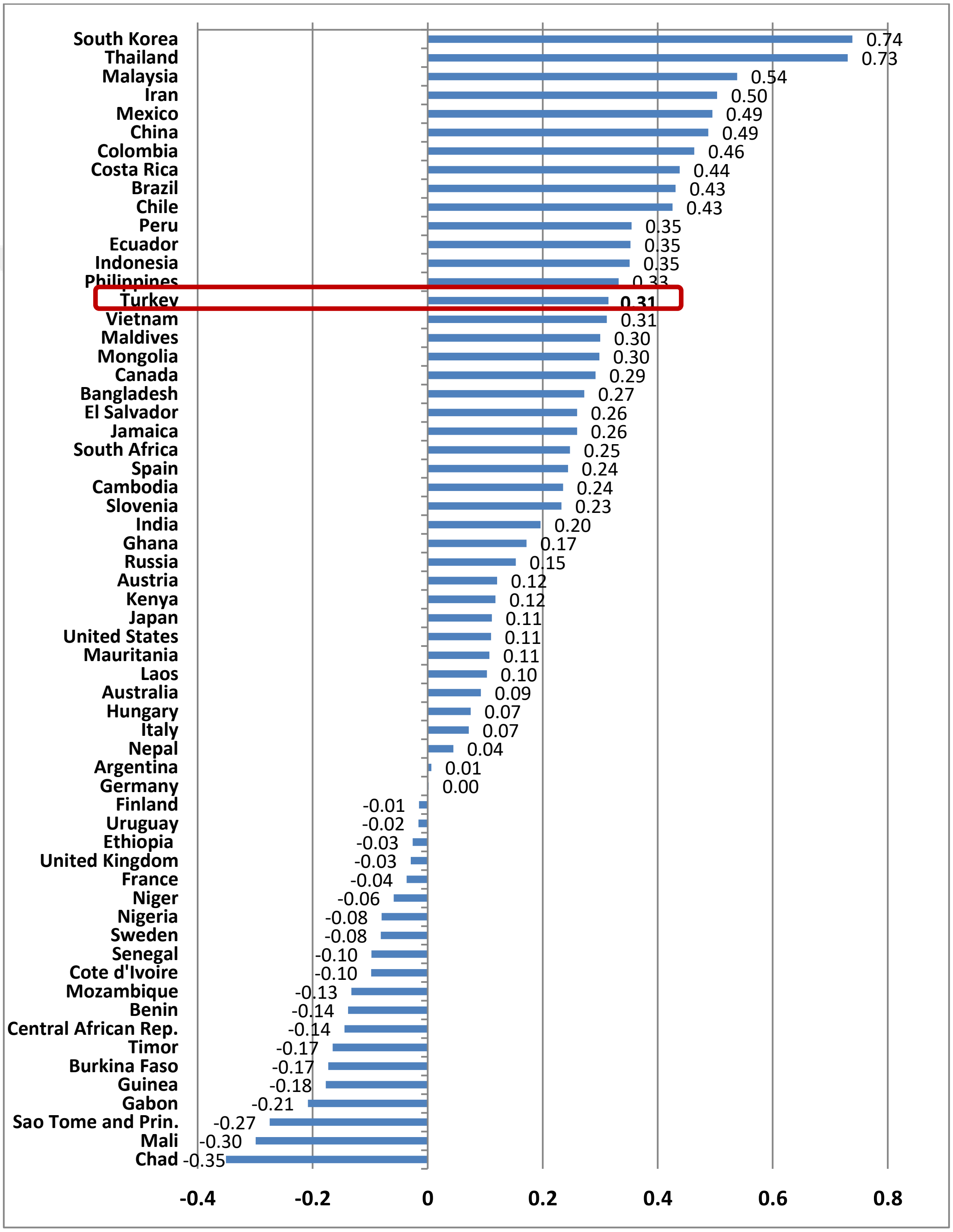
Secondly, as the timings of first demographic dividend vary from country to country, the duration of the period under consideration would vary too. This would result in a huge difference in the periods taken. For example, as start and end years of first demographic dividend for France, which is located in Western Europe, is 1970 and 2002 respectively, the timing of first demographic dividend for France is only 32 years. On the other hand, Ghana, which is located in Western Africa, started to gain first demographic dividend in 1983 and expected to continue gaining first demographic dividend until 2111 according to the extrapolations made by using NTA data-sets. So the timing of first demographic dividend for Ghana is expected to be 128 years. This is 4 times the timing of first demographic dividend for France. Also the variations in the timings of first demographic dividends for the countries might have an effect on the average values of the dividends. In this case it might not be reasonable directly comparing average values of first demographic dividends without taking into consideration the length of their timings.

Thirdly, after comparing average first demographic dividends, the difference of GDP per capita values and the sum of first and second demographic dividends will be compared for each country. The GDP per capita values are limited in World Bank data-sets with a period of 1960 and 2015.

Considering all these reasons, the period for average values of the first demographic dividend for each country is taken between the years 1960 and 2015 as shown in Figure III.3.1.3.1. In the figure, 61 countries from different geographical regions and with different income levels are used in the comparison. For all of these 61 countries, the first demographic dividend is calculated by using country estimates, which are more reliable than the model estimates as stated in Technical Paper No. 2017/1 prepared by United Nations Department of Economic and Social Affairs. Because of this reason other countries are not included in the comparison.

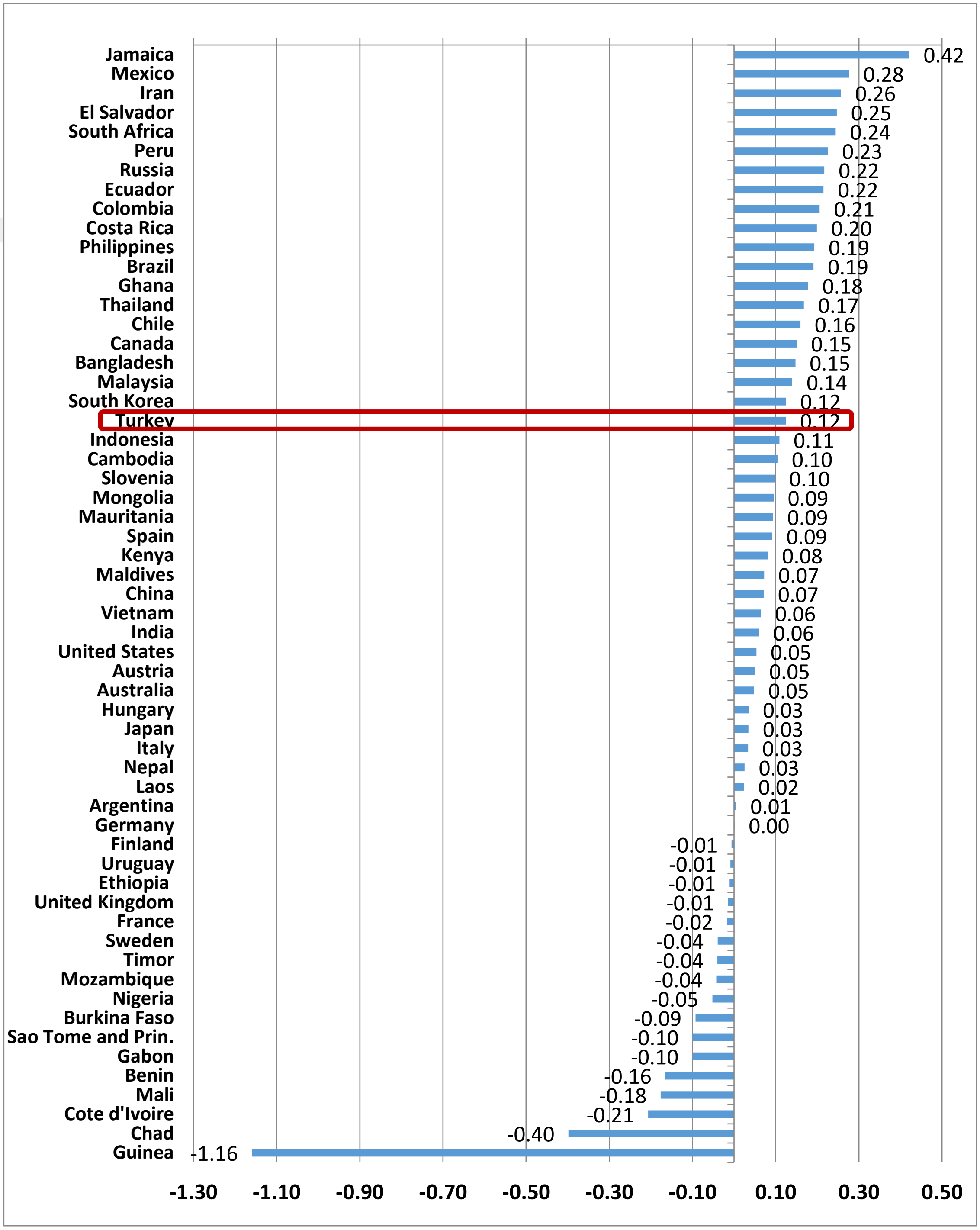
Among these 61 countries, Turkey is the 15th country in terms of the magnitude of the average value for the first demographic dividend for the period 1960-2015. On the other hand, when the ratios of annual values of the first demographic dividend to annual values of GDP per capita growth is accounted, Turkey becomes 20th in the list of 58 countries as presented in Figure III.3.1.3.2. Countries with negative GDP per capita growth are removed from the list, as their first demographic dividend values are also negative. When both the first demographic dividend and GPD per capita values are negative, the ratio of these two variables turn into a positive value, which might misguide the comparison of this ratio among countries.

Figure III.3.1.3.1. Average Values of the First Demographic Dividend (1960-2015)



Source: NTA, World Bank

Figure III.3.1.3.2. The Ratio of the First Demographic Dividend to GDP per Capita Growth (Average Values) (1960-2015)



Source: NTA, World Bank

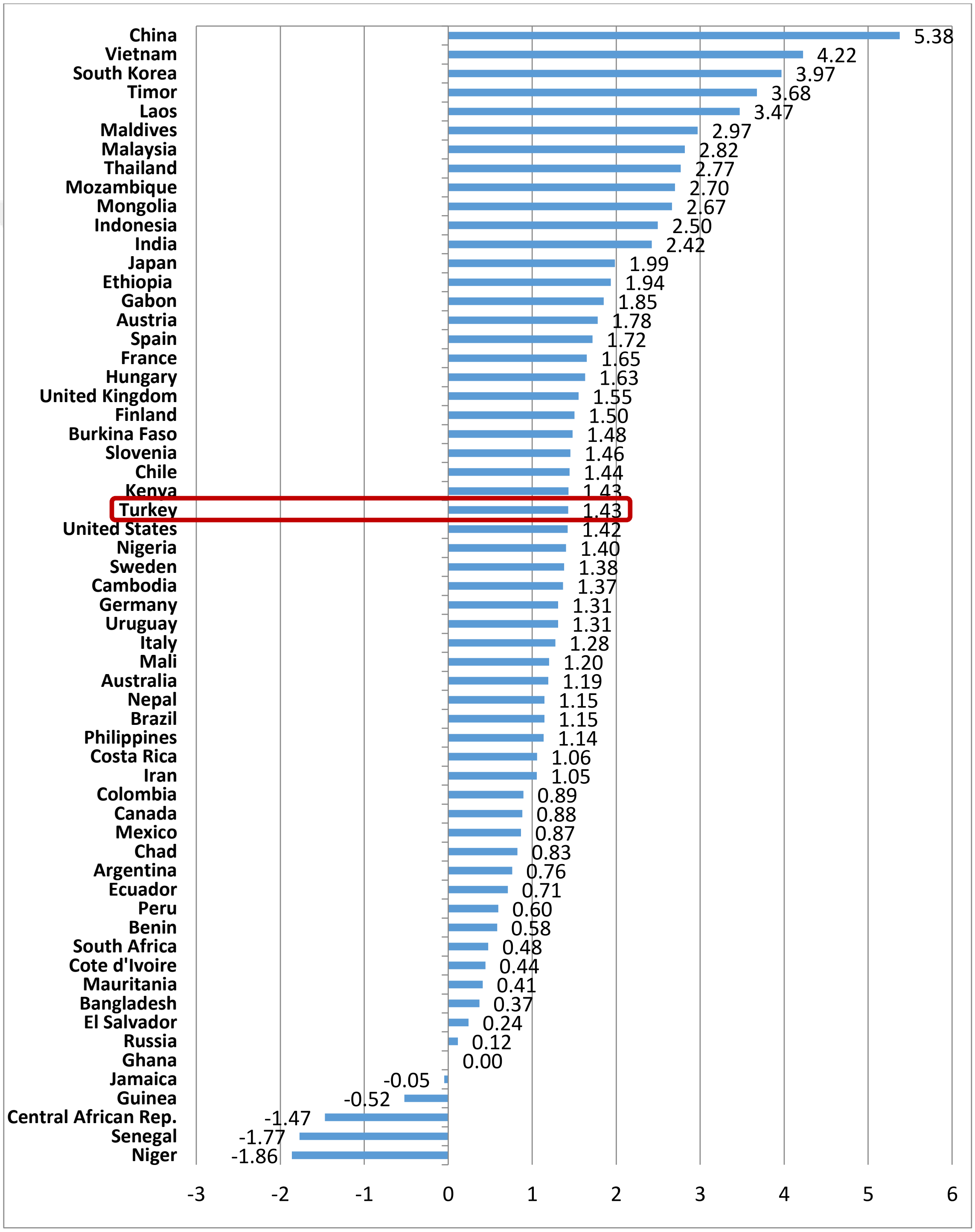
Looking at these rankings, it can be inferred that Turkey's position in the list of countries decreases as GDP per capita values are also included in the comparison. However, this decrease in the rankings should not be commented as Turkey's limited ability in making use of first demographic dividend for economic growth. A wider comparison including the second demographic dividend also, might lead to a more accurate conclusion.

In this respect, a more general comparison is made using the sum of both first and second demographic dividends and GDP per capita values for each country. The difference of GDP per capita growth and the sum of first and second demographic dividends are taken and illustrated in Figure III.3.1.3.3. A similar comparison for different regions was made by Mason in one of his researches named "Demographic Transition and Demographic Dividends in Developed and Developing Countries". According to this research the negative values of the difference between GDP per capita growth and the total value of demographic dividends were accepted as the failure of the regions to make use of demographic dividend. In addition, it was underlined that the GDP per capita growth values which were similar to the total demographic dividend values should not be regarded as the economic growths were maintained only by demographic dividends in these regions.

Turkey is the 26th country among 60 countries in the list, in which they are ordered according to the difference between their GDP per capita growth rates and total demographic dividend values. Countries with negative total demographic dividends are eliminated, as the difference of their GDP per capita growth rates and demographic dividend values would give positive values that are higher than their GDP per capita growth rates. The positive difference value for Turkey, which is 1.43 percent points, indicates that Turkey has been making use of demographic dividends to some extent. If the difference value were to be negative for Turkey, it could be commented that Turkey has been failed to exploit its demographic potential. However, it is just the opposite in real life. Also, if the GDP per capita growth rate for Turkey for this period were very close to the sum of demographic dividend values or in other words their difference were close to zero, it would not be possible say that Turkey would have been making use of its demographic dividends. Nevertheless, it must be kept in mind that, this comparison is a straight-forward one and making explicit judgments is not possible. But still, considering the complex relationship between economic growth and demographic dividends, deductions made in this section can be expressed as valuable information.

In these comparisons the difference between average values of GDP per capita growth and first and second demographic dividend for 1960-2015 period were used. In other words, the values used, were the averages of a 55-year period. Taking averages for such a long period might be misleading, especially for detecting the difference between the economic growth rates and demographic dividends. From this point of view, it might be useful to make a similar comparison but this time just for Turkey for each 10 year period from 1960 to 2015.

Figure III.3.1.3.3. The Difference of GDP per Capita Growth and Total Demographic Dividends (1960-2015)

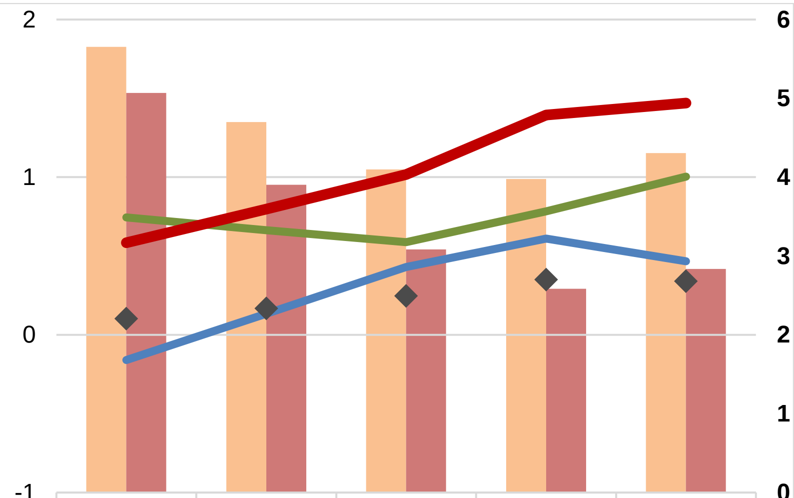


Source: NTA, World Bank

Figure III.3.1.3.4 presents average total demographic dividends and their difference from average GDP per capita growth rates in addition to first and second demographic dividends, which are shown also separately. Moreover, in the figure the ratio of total demographic dividends to GDP per capita growth rates are included for each period. From 1960 to 1990, for 3 decades GDP per capita growth rates exhibit a gradual decrease over time. On the other hand, average values of the first demographic dividend increases, while the second demographic dividend decreases slightly over the years. The average value of the total demographic dividend increases over time for these three decades, as the increase in the first demographic dividend outstrips the decrease in the second demographic dividend. Considering all these, it can be assumed that while going through 1960’s to 1980’s there might be a reduction in exploiting the advantages coming from the demographic dividends in Turkey. However, from 1990 to 2015 the increase in GDP per capita growth during the rise in the total demographic dividends can be explained as Turkey has been making use of the demographic dividends at almost a constant level throughout this period. However, it is noteworthy to underline that these inference made here are more likely to be valid if all other factors have not been changing significantly over time. To be more precise any internal or external shocks, political and international developments, global or domestic financial crisis might affect the accuracy of the arguments made here.

Nevertheless, looking at the big picture it can be stated that for all of the periods mentioned in Figure III.3.1.3.3, Turkey has been making use of demographic dividends, as the difference between GDP per capita growth rate and the total demographic dividend values are always positive and significantly greater than zero. It might be useful to mention that the effects of the first and the second demographic dividends cannot be separated and evaluated individually due to the reason that all inferences are to be made just looking at the difference between GDP per capita and total demographic dividend value.

Figure III.3.1.3.4. GDP per Capita Growth Rate and Demographic Dividends



	1960-1969	1970-1979	1980-1989	1990-1999	2000-2015
Ave Growth GDP (%)-Right Axis	5.65	4.70	4.10	3.98	4.31
GDP- Total Demographic Dividend (%)-Right Axis	5.07	3.90	3.08	2.58	2.84
Ave 1st Demographic Dividend (%)	-0.16	0.13	0.43	0.61	0.47
Ave 2nd Demographic Dividend (%)	0.74	0.66	0.59	0.78	1.00
Ave Total Demographic Dividend (%)	0.58	0.80	1.02	1.39	1.47
Demographic Dividend / GDP Growth	0.10	0.17	0.25	0.35	0.34

Source: NTA, World Bank and author’s calculations

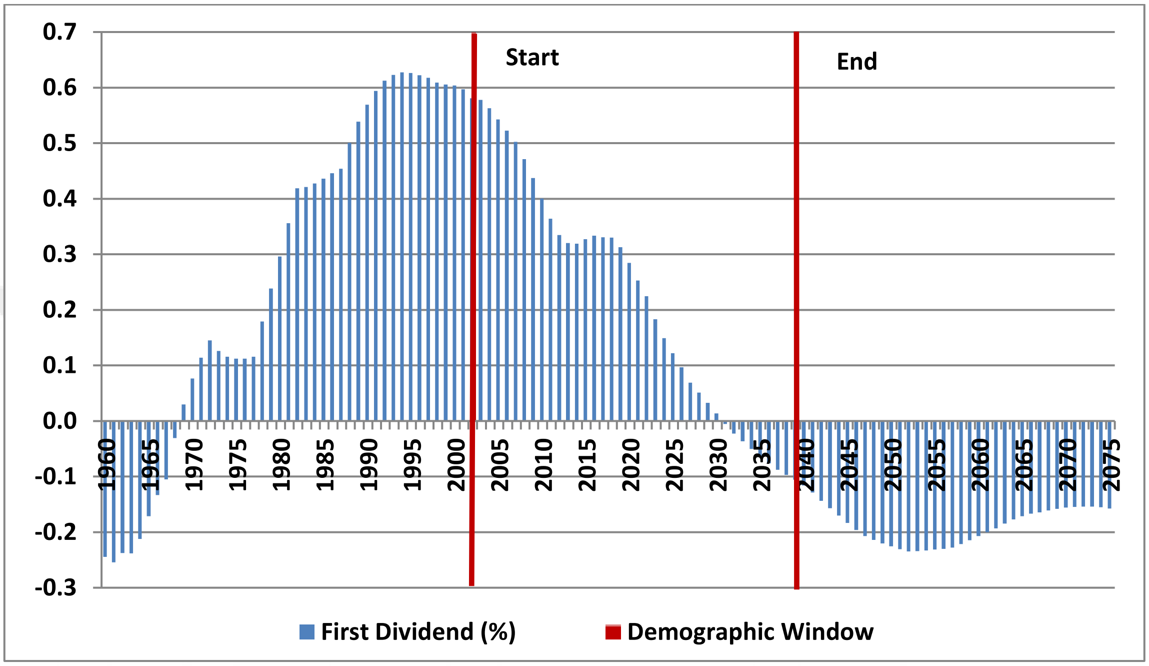
III.4. A Brief Evaluation and Comparison of Demographic Window and the First Demographic Dividend for Turkey

Considering the methods used for the calculations of both of these indicators regarding demographic advantages and the type of information they convey following statements can be made:

- Demographic window indicates a status rather than expressing values. On the other hand, First demographic dividend provides specific values for each point in time.
- Even though both indicators are based on working age group, demographic window does not point out the change in working age group, it only indicates whether the demographic window is open or not. On the other hand, first demographic dividend reveals annual percentage values of support ratio derived by effective producers and effective consumers.
- For Turkey the timing of first demographic dividend is longer than the timing of demographic window.
- First demographic dividend started in 1969 and will end in 2031 lasting for 62 years, while demographic window starts in 2002 and ends in 2040 lasting for 38 years.

Figure III.4.1 illustrates the timings of both demographic window and first demographic dividend, in addition to annual percentage values of first demographic dividend from 1960 until 2075.

Figure III.4.1. First Dividend vs. Demographic Window for Turkey



Source: NTA and author's calculations

III.5. Population Pyramids

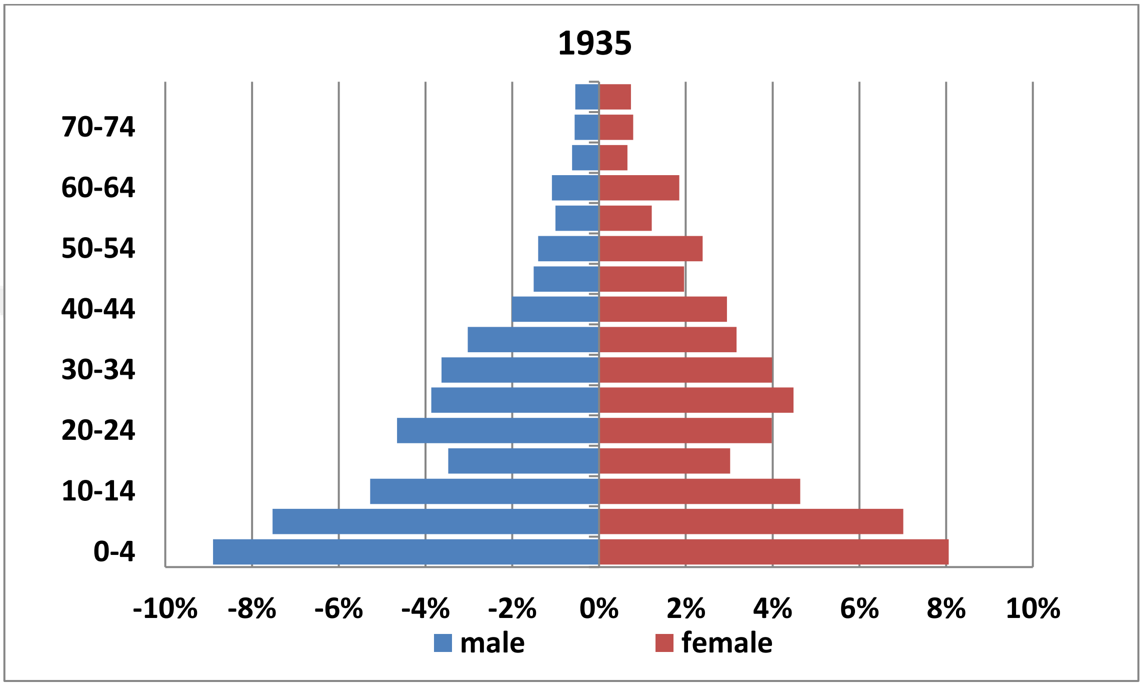
Population pyramids, which are the most distinctive and most popular graphs in demography, commonly used to express age and sex composition of a population. In general, age groups are shown for each five-year age group except the last one. The last age group can be shown as 75 years and over or 80 years and over or 85 years and over and so on. The common notations used to express these final age groups are 75+, 80+ and 85+ respectively.

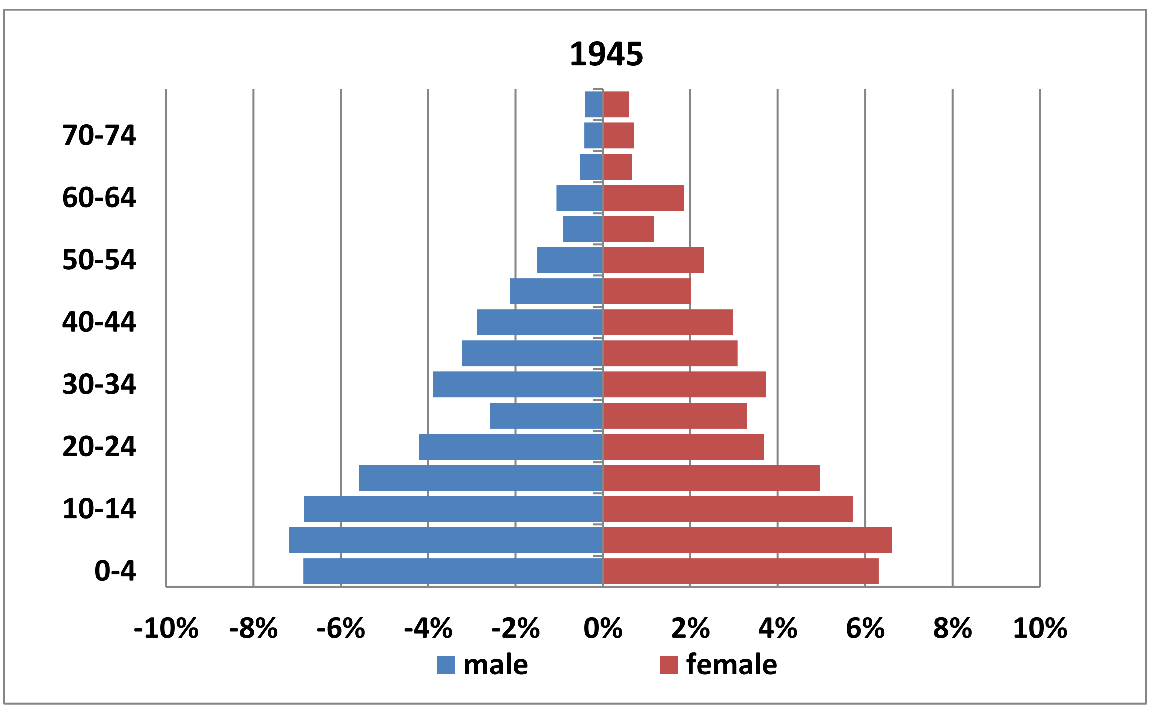
When population pyramids for a population are shown with a time interval over a long time-span, they tell us a lot about the shifts in age structure in that population. Population pyramids show considerable variation for populations, which are going through from stage 1 to stage 4 of the demographic transition. In this respect, the population pyramids are very helpful to demonstrate the effects of the demographic transition on a population.

Population pyramids are composed of two bar graphs, one representing the males and the other one the females, which are placed back-to-back. The youngest age group, which is the 0-4 age group, forms the base of the pyramid. As going up through the vertical line of the population pyramid the bars show an older age group. Finally the oldest age group, which is the only open-ended one, is shown at the apex of the pyramid. In the usual display, males are shown on the left hand side, while females are shown on the right. The bars representing each age group for both sexes can be in numbers or in percentages. Population pyramids represented in percentages are more effective in comparing different populations. It is important to emphasize that the percentages should be presented as the proportion of each age group of each sex to the total population including both males and females. By doing so, variations between males and females can be observed, especially for the older age groups, where females clearly exceed males.

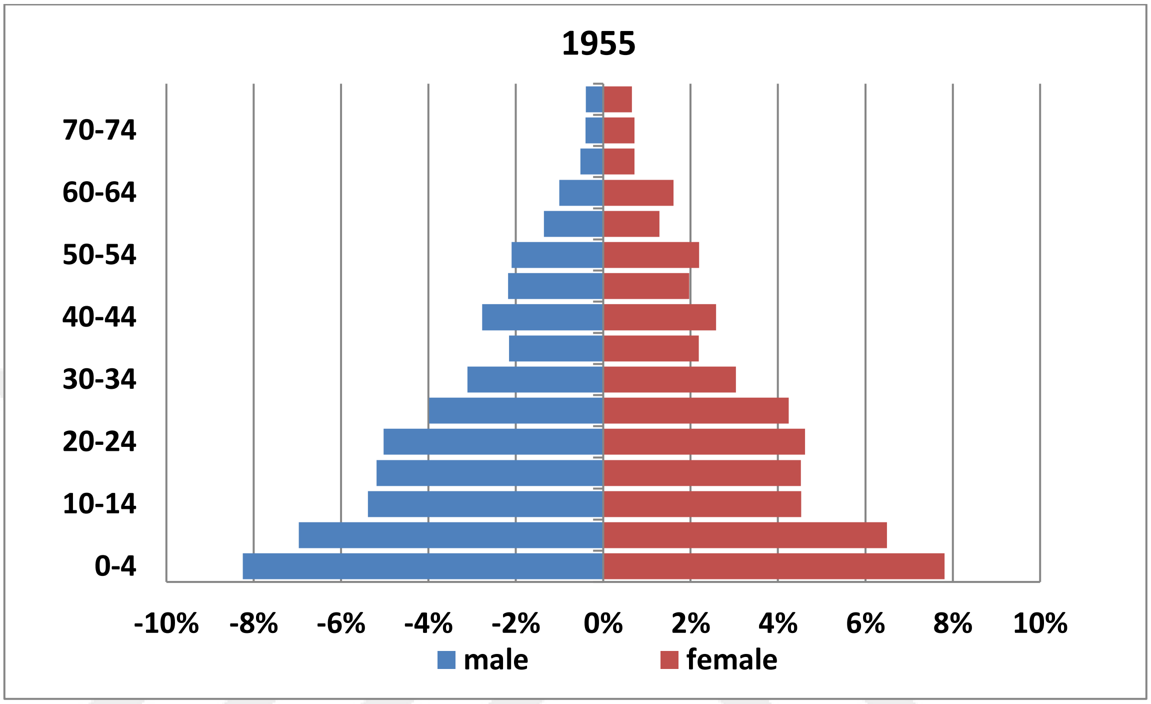
Using the past data and the projected data derived by population projections developed in this chapter for Turkey, the shifts in age structure considering both sexes over time are illustrated in Figure III.5.1 via population pyramids as follows for a 140-year period, which is from the year 1935 to the year 2075. For the period between the years 1935 and 1975 necessary data is taken from Shorter and Macura, 1982. For the years 1985, 1990 and 2000, five-year age groups for both males and females are taken from TurkStat General Population Census Database. For the rest of the years, required data are derived from the results of population projections developed in this thesis via DemProj module.

Figure III.5.1. Population Pyramids for Turkey (1935 - 2075)[5]





[5] **Source:** Shorter and Macura, TurkStat and author's calculations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70-74
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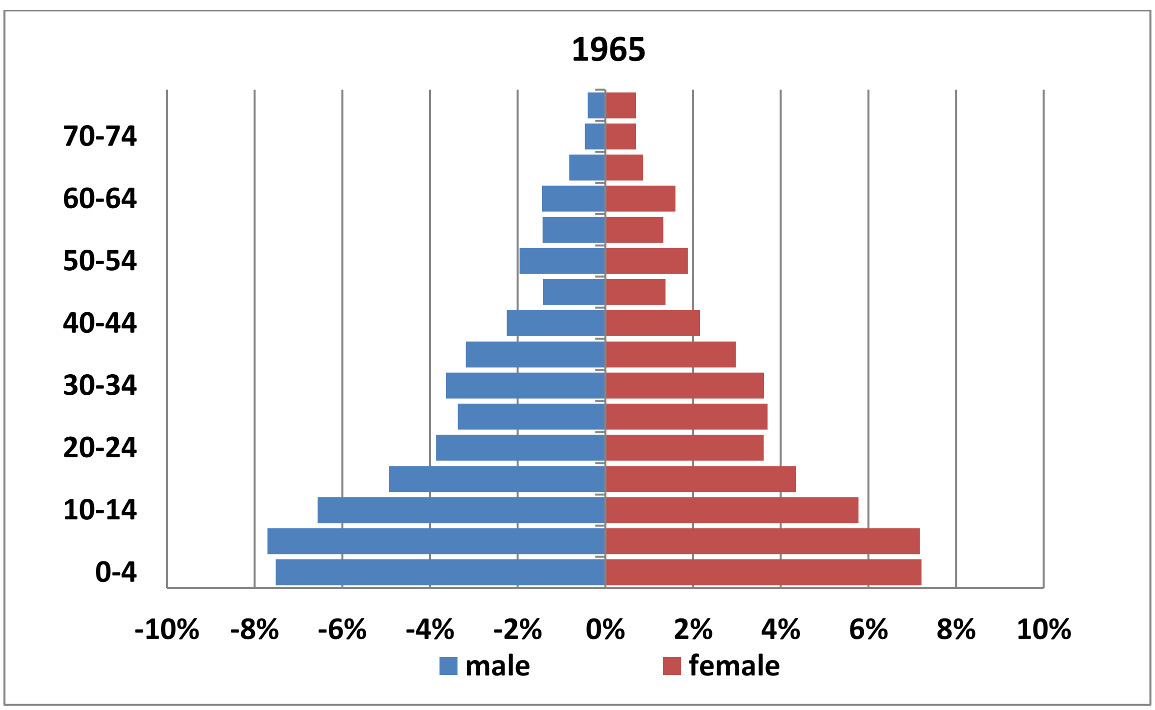
1965
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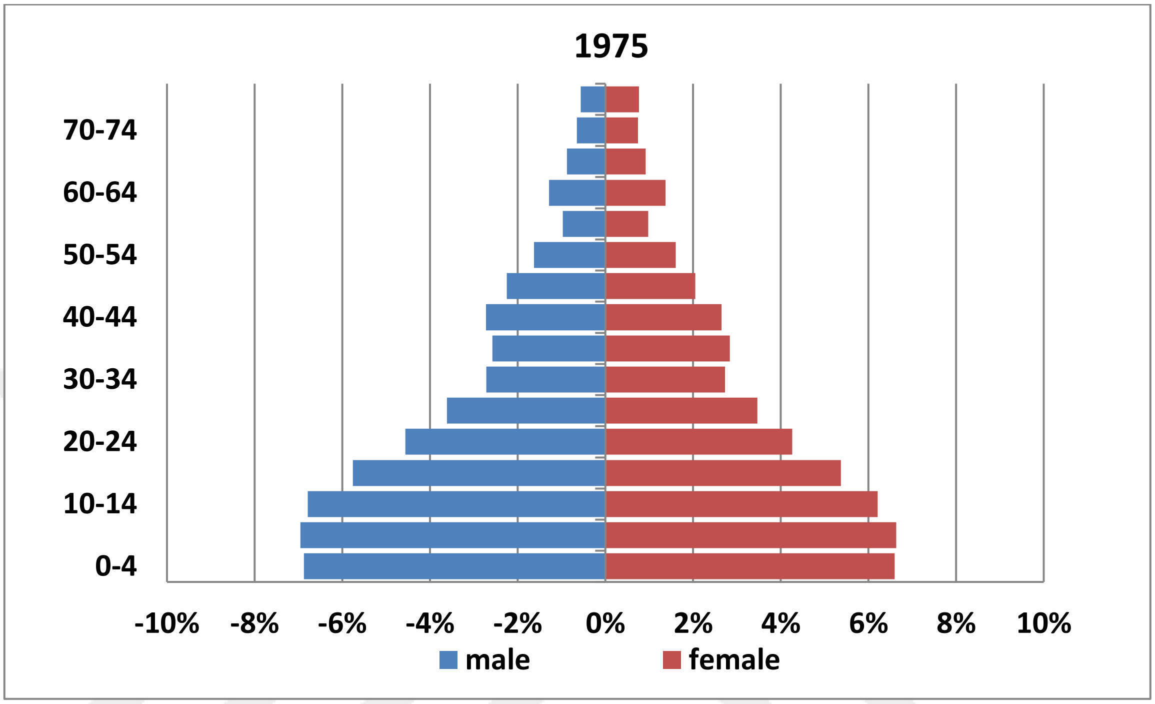
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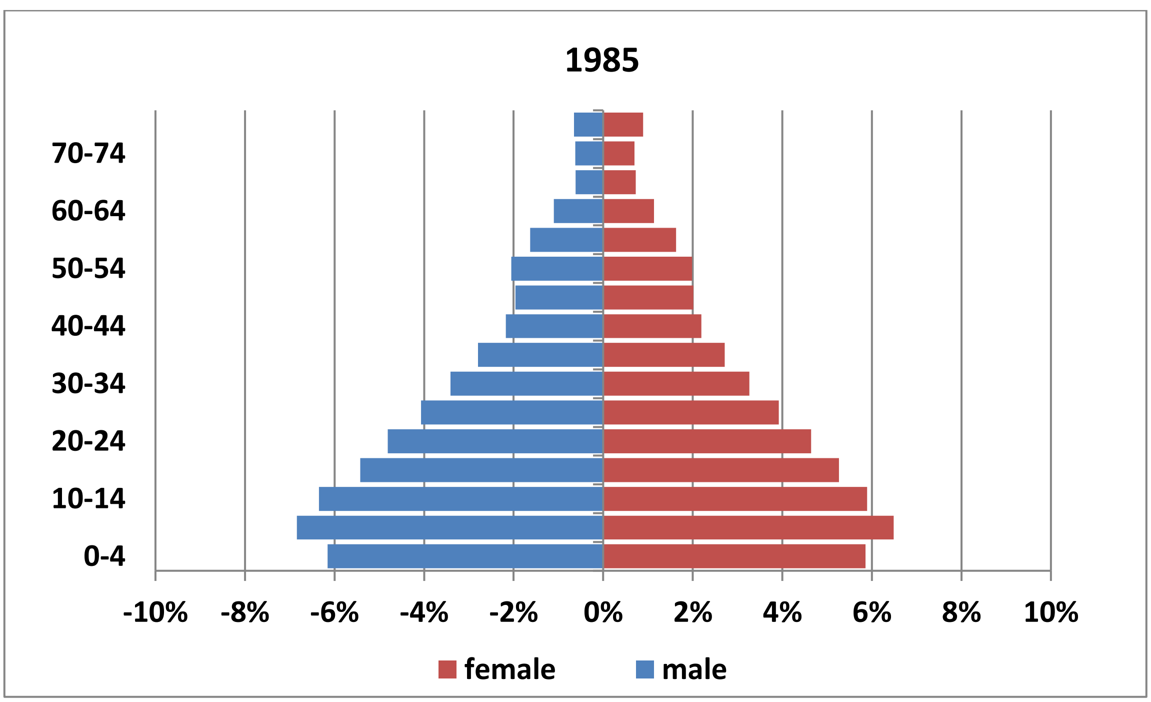
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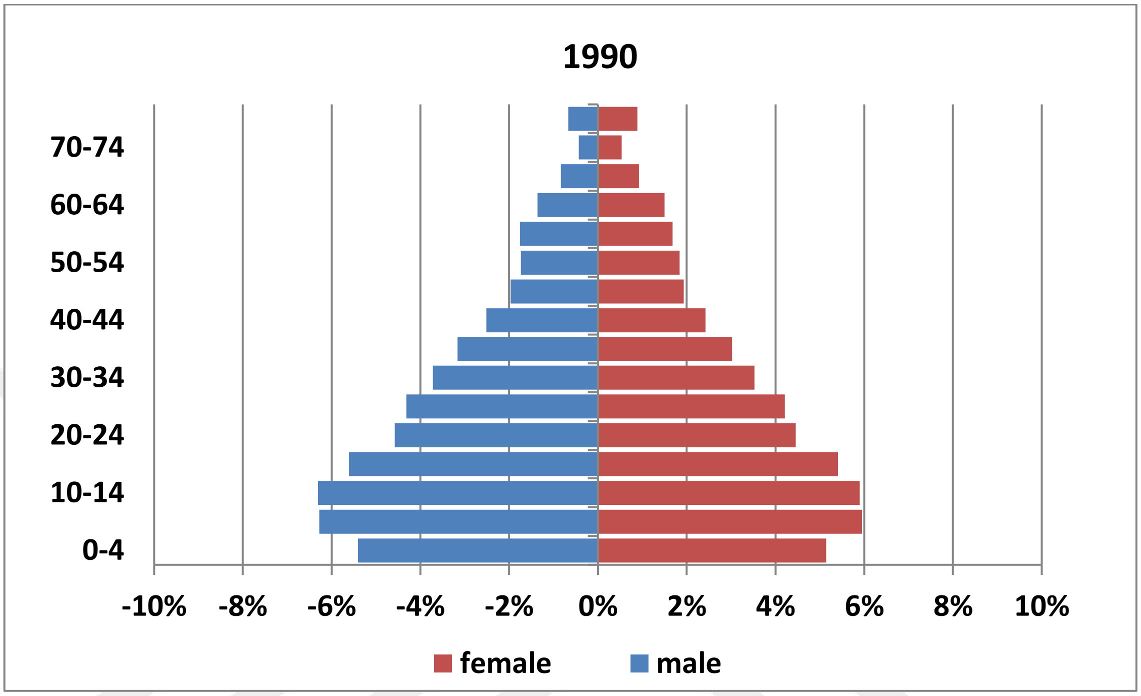
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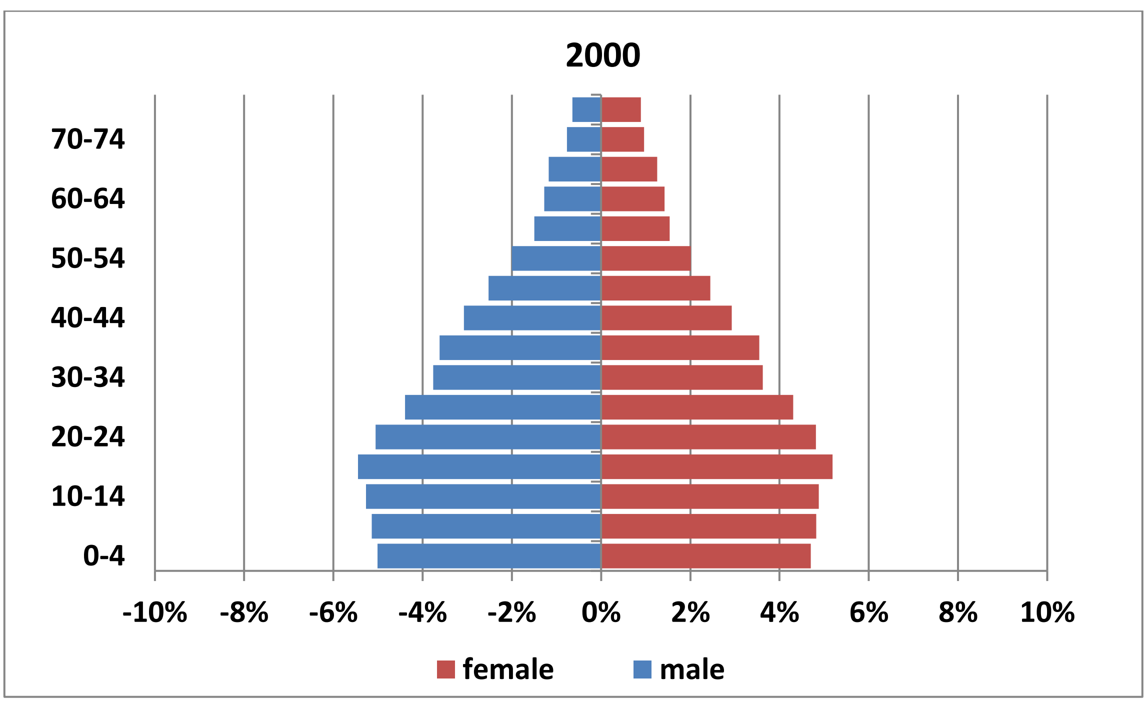
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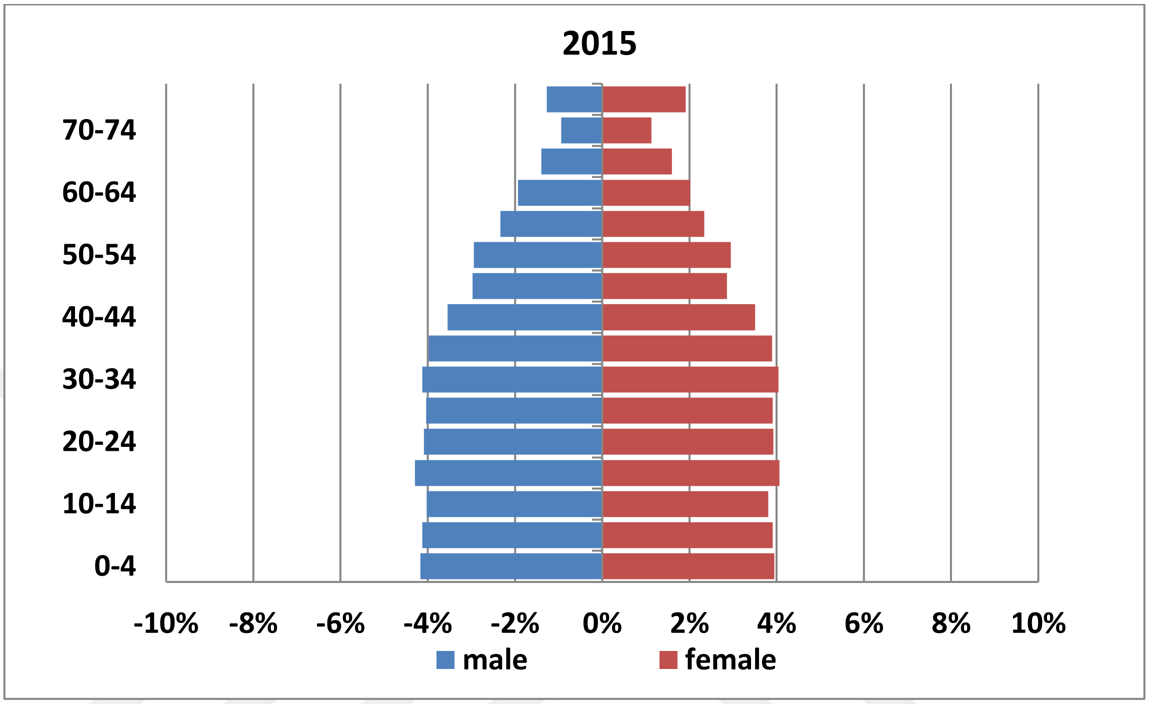

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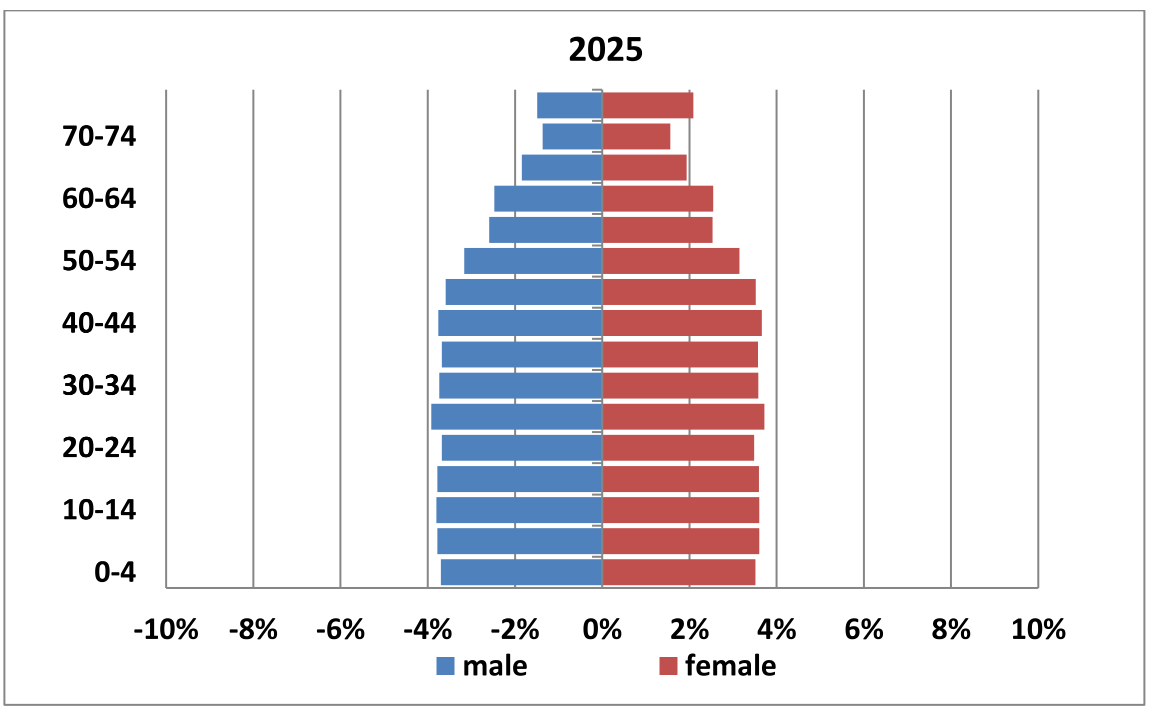

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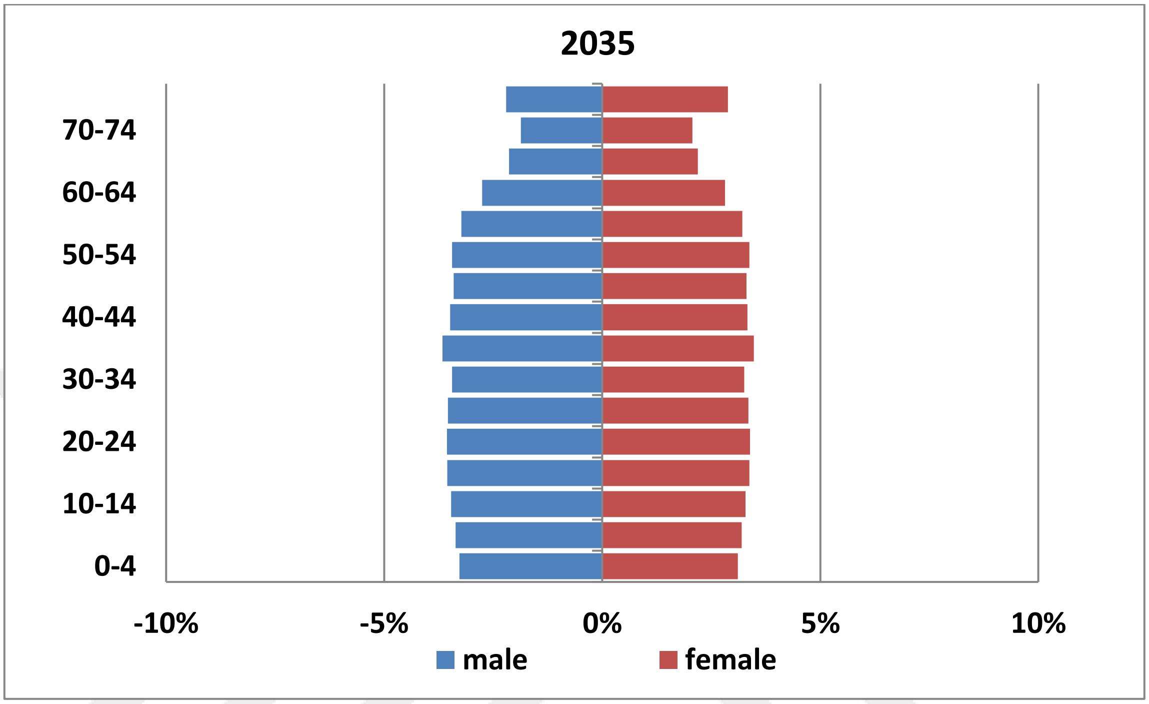
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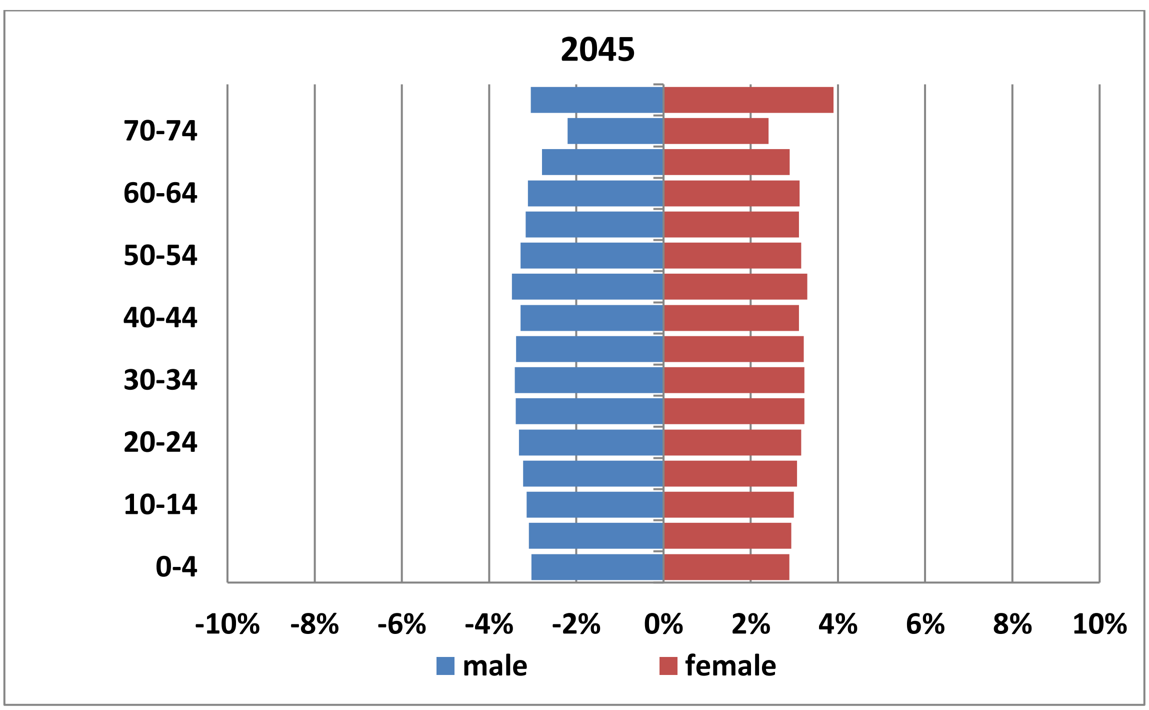
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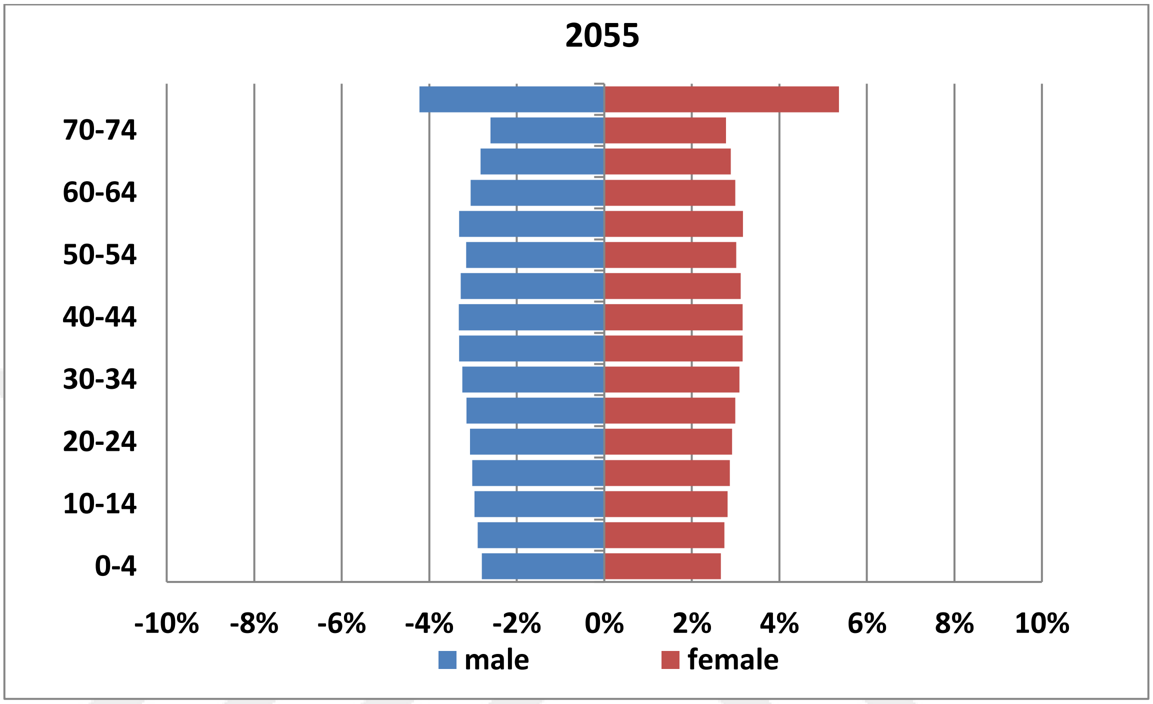
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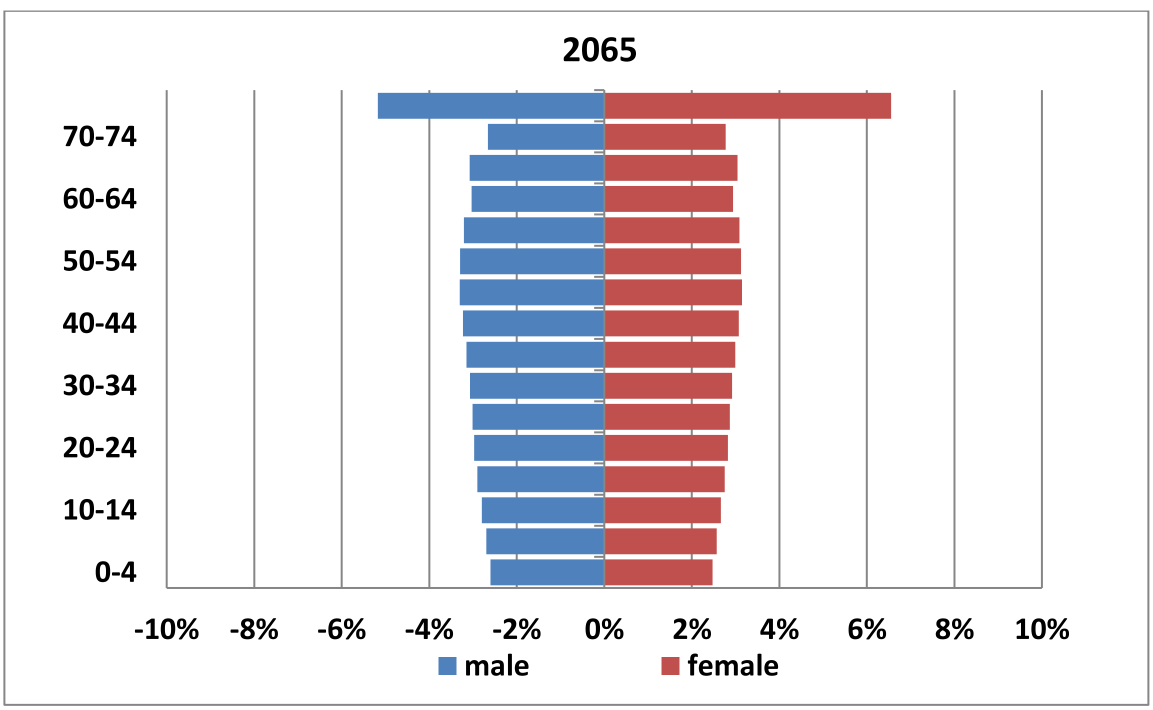
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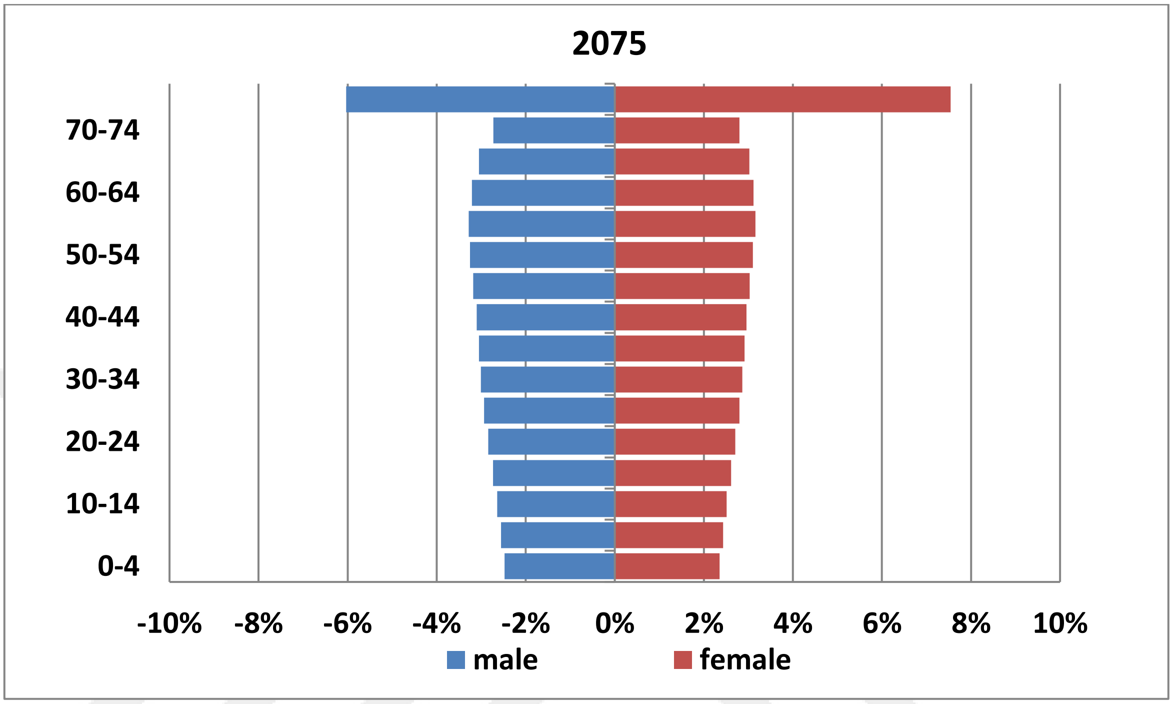


Examining these 15 population pyramids and the variations in five-year age groups for both males and females demonstrated by these pyramids, important conclusions can be made. Turkey had a high fertility rate in 1935, as implied by the population pyramid of that year. The bar of the 0-4 age group, which forms the base of the population pyramid, implies the high share of that age group in the total population and points out high fertility rate for that year. It is also possible to see the reductive effect of First World War on the fertility behavior of Turkey. 15-19 age group has significantly a lower share compared to adjacent age groups. The population of that age group belongs to the cohort which was born during the years of First World War. Population pyramid for the year 1935 can be defined as expansive considering the wide base and convex sides. This type of pyramids indicates a young and growing population, which is the basic characteristic of a developing country.

On the other hand, the population pyramid for the year 1945 has a distinctive appearance compared to the pyramid for the year 1935, with a relatively narrow base. The 0-4 age group has a comparably smaller share in the total population with respect to 5-9 age group. This decline in the fertility can be accepted as a result of the Second World War, which had a similar effect on fertility as experienced during the years of the First World War.

Through the years from 1955 to 1975, the base of the population pyramids narrowed slightly indicating a mild decrease in fertility. The decreasing trend in fertility became more visual starting from 1985. Indeed since 1980's there has been a significant decrease in total fertility rates in Turkey. Moreover, starting with the year 2000 the population pyramids with relative convex sides with respect to earlier pyramids, denote a reduction in mortality rates. So in general it can be inferred that, the population pyramids for Turkey from the past till present indicate a significant reduction in both fertility and mortality rates. This inference is a strong evidence of Turkey's journey from early stages of demographic transition to the final stage.

The population pyramids pointing out the future years of Turkey, are all derived by the population projections developed in this chapter of the thesis. The projected population pyramids inform about a continuing decline in fertility and especially in mortality rates for Turkey. It is noteworthy to mention that as the oldest group in the pyramids are 75 and over (75+), the shape of the pyramids are expending at the top. However, if the oldest group was set to 85 and over (85+), the expending top part of the pyramids would look like a slightly narrowing rectangle. Due to the lack of availability of the data regarding older age groups such as 75-79 and 80-84 for the previous years, the oldest age group had to be set as 75 and older.

Briefly, it can be stated that the main argument, which is emphasized by the population pyramids, is that; Turkey is moving from a developing country towards a developed country in terms of the characteristics of population, such as fertility and mortality behaviors. This movement carries a vital message, which is stressed once again here: “Demographic advantages resulting from the shifts in age structure as a result of demographic transition are already started and will be over in a few decades.” Estimated timings of these demographic advantages are already explained in the previous sections of this chapter for demographic window and the first demographic dividend.

IV. COMPARATIVE DEMOGRAPHIC AND SOCIO-ECONOMIC ANALYSES OF THE SELECTED COUNTRIES WITH DEMOGRAPHIC ADVANTAGES AND TURKEY

IV.1. Overview

Starting from the second half of the 20th century many countries from different regions of the world from East Asia to Latin America including some European countries lying in-between these continents have gone through shifts in age structure in favor of working age group and managed to make use of it economically in a successful way. Among all these countries Hong Kong, Indonesia, Malaysia, Singapore, South Korea, Taiwan, and Thailand, named as "Asian Tigers", are very good examples of the countries which made remarkable gains in terms of economic growth and development as fertility rates fell rapidly during their demographic transition. But countries which took the advantage of the demographic transition and the demographic window and turned the age structure shift into economic growth and development are not limited to "Asian Tigers". Countries from different regions and income levels also took the demographic advantage or still using this advantage to maintain economic growth and development.

Before considering Turkey's position in terms of demographic advantages and evaluating to what extend Turkey made use of this period so far and can make by the end of the period; it might be very informative to examine some selected countries, which successfully completed or will soon complete their demographic window or first demographic dividend, in terms of both demographic and socio-economic perspectives.

At this point, it has high importance to underline that although the demographic window and the first demographic dividend are used to express similar concepts regarding contribution of demographic factors in the economy, they are not exactly the same in definition. While the demographic window, as defined by the UN, indicates a period with a specific age group composition, in which 0-14 age group falls behind 30 percent and 65+ age group is still less than 15 percent of the whole population; the first demographic dividend expresses a gain for the economic output when the growth rate of support ratio by time is positive. In other words, timing of the demographic window and the first demographic dividend do not necessarily coincide with each other. While making the analysis, it might be more useful to consider both the demographic window and the first dividend and compare their timings.

While selecting the countries, which successfully gained from the first demographic dividend, it is intended to not to focus on one geographical region or income level, in order to take into account the effects of the differentiations in culture, geographical advantages, development levels of the countries. More importantly, the selection of the countries is made so that the diverse demographic experiences can be included in the thesis. In addition, during the selecting process not only region and income level of the country but also the magnitude of the first dividend these countries made is also taken into consideration. Moreover, the number of researches made indicating the first dividend gained by these countries was an important factor in making the selection among the countries. Considering all these criteria, the selected countries are presented according to their classifications in terms of the region and income level they belong in Table IV.1.1 according to the start year of first demographic dividend as follows.

Table IV.1.1. Selected Countries with First Demographic Dividend

(First Demographic Dividend Start Year Income Levels)

	Low Income	**Lower Middle Income**	**Upper Middle Income**	**High Income**
East Asia & Pacific	Vietnam, China	South Korea		
Latin America		Brazil		
Europe			Turkey	Ireland, Spain

Source: World Bank (Determined by using GNI per capita values and income category lower and upper limits stated in World Bank list of economies - March 2017[6])

In this section, separate country analyses for the selected countries are made first, including the comparison of these countries with their regions and income level groups they belong to indicate their differentiations from their counterparts; and then a comparison of the selected countries with Turkey is taken into consideration, in order to present Turkey’s changing socio-economic position over time with respect to these selected countries. In the first part, where country analyses took place, a brief analysis of Turkey in the same format is also presented.

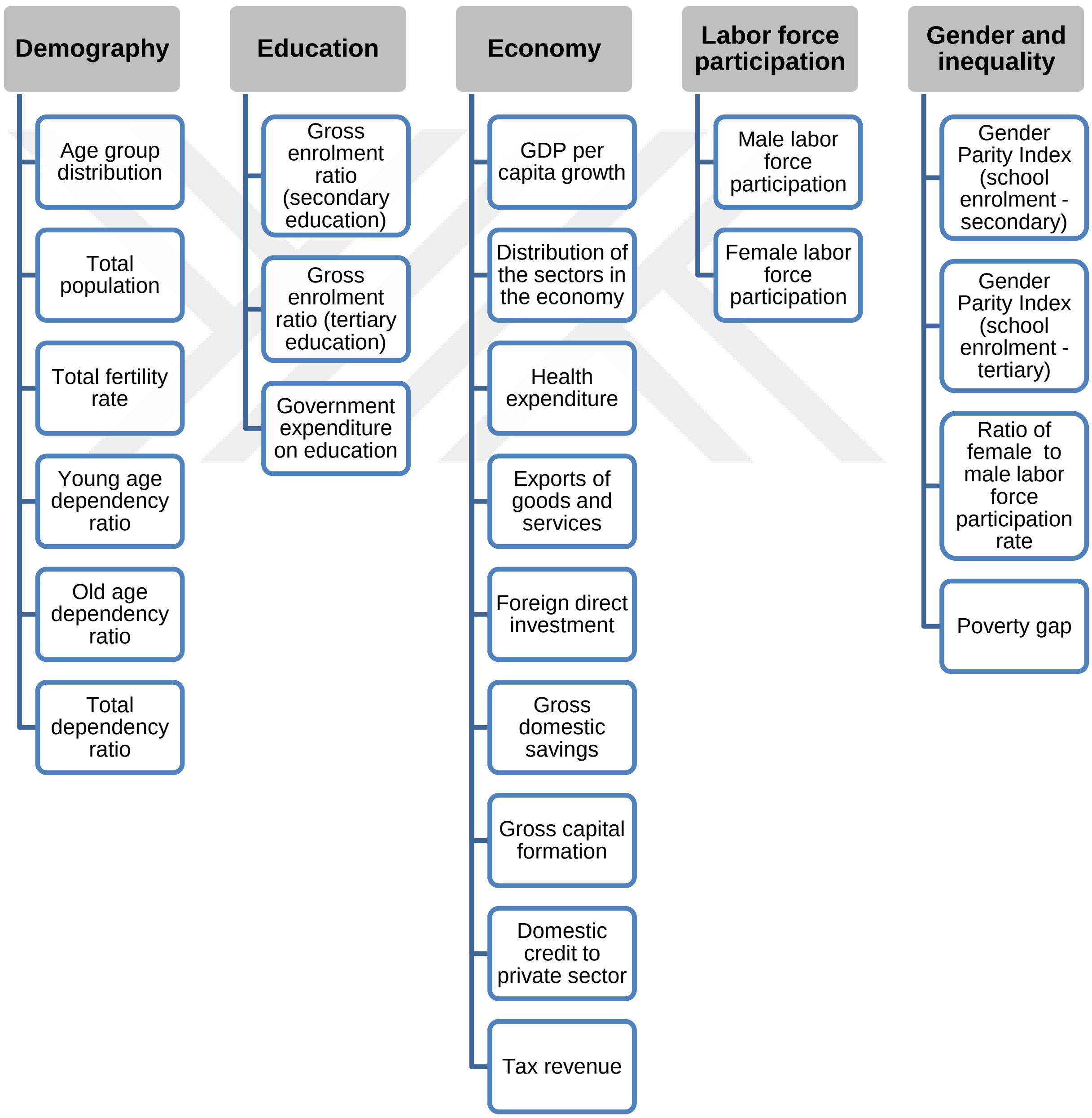
This section of the thesis has two major targets which can be useful for the following sections. First one is to find out and present the socio-economic indicators which are acknowledged to have played a significant role in economic growth according to the literature and made significant improvements over time during economic growth and development of the countries selected. Second one is to figure out the measures taken and regulations put into effect by the authorities in the countries in order to boost

[6] Income groups are calculated using the World Bank Atlas method. The groups are: low income, USD 1,025 or less; lower middle income, USD 1,026–4,035; upper middle income, USD 4,036–12,475; and high income, USD 12,476 or more.

their economic growth, while making use of demographic advantages. These measures and regulations might provide crucial clues for inputs of policy suggestions which can be proposed in the following part of this thesis for Turkey for the future before the demographic advantages are closed. It is noteworthy to mention that the aim of this section is not to answer the question “Which indicators have a direct effect on economic growth and to what extent?”

Global development dataset of World Bank is used for the selected countries for socio-economic indicators. Indicators used in this section cover many areas including demography, education, economy, labor force participation, gender and inequality. The list of indicators grouped according to the related areas mentioned can be summarized as in Figure IV.1.1.

Figure IV.1.1. Socio-economic Indicators Used in Country Analyses and Comparison



While doing the country analyses, demographic indicators are used for all of the selected countries. Similarly, gross enrolment ratios, distribution of the sectors in the economy, GDP per capita growth are among the other indicators that are commonly taken into the country analyses. The rest of the indicators are used in the country analyses, only if they were mentioned to be crucial for the development of the country in the literature. On the other hand, in the second part of this section, which the country comparisons with Turkey are made, most of the indicators presented in Figure IV.1.1 are used.

In the first part of this section, where the country analyses are made for the selected countries, the general socio-economic characteristics of these countries, which are given in Figure IV.1.1, are explained with the help of graphs and the findings based on the previous studies.

While determining which socio-economic indicators to include in this section a wide literature review is made in order to detect the most important indicators that have an effect on economic growth and development. The reasons lying behind the selection of indicators that are included in this section and their importance and contribution to the economic growth are shortly discussed as follows:

In literature, according to the studies made about the correlation between changes in demographic structure and economic growth, it is proved by the researches that among various factors, young and old dependency ratios have positive effects impacts on a country's saving rates. Both dependency ratios were denoted to have significant effect on national savings rate in a study made on 74 countries using a cross-section regression (Leff, 1969, 1971). Similar findings were discovered in another research using a cross-sectional data of 128 countries (Ram's 1982). It is important to note that national saving rate is a strong contributor on boosting economic growth in a country (Fang and Wang, 2005).

Also, young and old dependency ratios are essential not only for evaluating the effects of demographic shifts on economic growth and development but also for explaining the patterns of economic life-cycle in terms of income and consumption behaviors of the age profiles (Queiroz and Turra, 2010).

Falling dependency ratios, pointing out less people to support, are accepted as a good opportunity for boosting economic growth, as long as supported by some mandatory measures and public policies. In other words, while making use of the increase in the proportion of the working age group, demographic advantages need to be supported by educational attainment as investing in human capital can have significant returns in terms of economic development for the forthcoming years.

In maintaining development, focusing on education is essential as education continues to be a viable instrument for alleviating poverty. In a study made by Cunningham and Jacobsen in 2008, it is stated that *“policies that attempt to equalize earnings-related characteristics across the whole population, say guaranteeing universal primary education and hopefully also secondary education, may do more to equalize earnings”*. In terms of economic improvement, education has profound economic return characteristics, which brings education to top of the list as a source of development (Sandoval, 2012).

Moreover, regarding combating against inequality and enhancing living standards of a population, education plays a critical role (Queiroz and Turra, 2010). So, another point to consider is the importance given to education by the country authorities in terms of expenditure made on education in general and primary, secondary and tertiary education separately. These numbers can be good indicators of the place of education among governments’ priorities. In addition to government expenditure on education, gross enrolment ratio is another good indicator regarding education, which also points out the educational level in the country.

Investing in health care system is also one of the crucial steps in making use of growing working age population in economic growth and development. Health status of the working age population is also as important as their educational attainment level. In addition, health status of the dependents, both young and elderly, also plays an important role in economic development of the country. So it is important to investigate the changes in amount of public and private investments made for health care system, including not only working population but also young and elderly, over time. Total health expenditure, which is the sum of both public and private health expenditure, is also another indicator used in this section of the thesis.

Gender inequality is also one of the important socio-economic issues that need to be studied. One of the best ways of measuring gender equality is to check whether there are any differentiations in having the opportunity of accessing education and labor market. In order to do so, data for educational attainments and labor force participation rates for both males and females can be used to detect possible inequalities about gender issues. In this thesis, while labor force participation rates for both males and females are used to detect possible inequalities in labor market; regarding measuring gender inequality in education, gender parity index is used as an indicator in order to measure differentiations among boys and girls in accessing education opportunities. Gender parity index is also a useful index in demonstrating the progress in gender inequality over time. In addition, ratio of female to male labor force participation rate can be evaluated as a useful indicator regarding gender equality in labor market, which is also used as in this section.

Besides the improvements need to be made in education and labor market; the transformation in economic structure is essential in making use of demographic window. New job openings for the growing share of working age population can be managed by making structural changes in economy via shifting from primary sectors to secondary and tertiary sectors. In other words, an economic shift is required from production or extraction of natural resources to manufacturing and services industries in order to cope with growing labor supply caused by the demographic shift and supported by investment in education.

GDP per capita growth is one of the most significant indicators in economy reflecting the increase in productivity and makes it possible to compare a country with the others in terms of economic performance. GDP per capita is also used as a measure of standard of living which is one of the anticipated results of economic development. In this study, GDP per capita growth is taken as the major source of measuring economic growth.

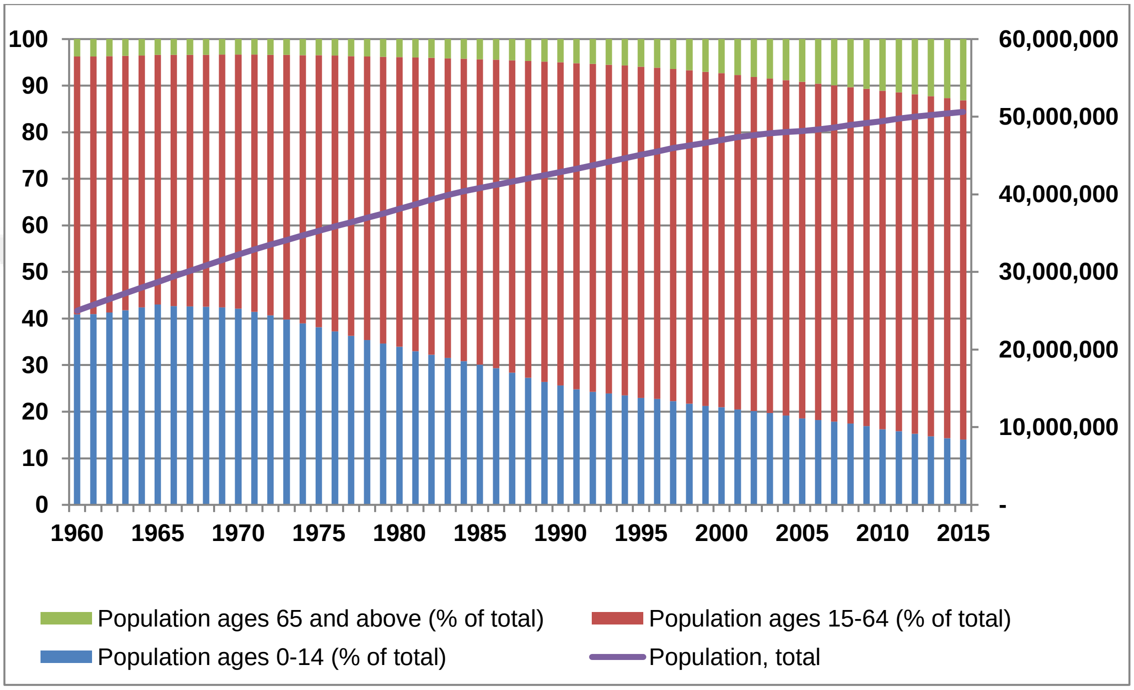
Urbanization, in case it exceeds a particular threshold in terms of economic development, is positively associated with human capital accumulation. In other words, urbanization plays a non-negligible role in speeding human capital accumulation. Urban areas not only have higher levels of educational attainment in average but also have higher returns to education (Bertinelli and Zou, 2008). Urban areas provide better and more various options in terms of earnings and education compared to rural areas. Urbanization leads to a decrease in fertility, causing increase in investing on human capital and consequently resulting in a faster economic growth (Zhang, 2002). Considering all these findings in the literature, it can be stated that urbanization is strongly and positively correlated with the increase in educational attainment level and economic growth, which makes it a part of fundamental indicators as a subject of interest in this study.

IV.2. Country Evaluations

IV.2.1. South Korea

The demographic window of opportunity for South Korea started in the middle of 1980's and has been continuing till present. The population percentages of the age groups 0-14, 15-64 and 65+ are used in order to demonstrate the beginning and continuation of the demographic window for South Korea as shown in Figure IV.2.1.1. The decrease in the percentage of the 0-14 age group is very clear especially starting from the second half of the 1970's as a result of the rapid decrease in fertility rates starting from beginning of 1960's. On the other hand the percentage increase for the 65+ age group becomes visible starting from 1990's with a value of almost 5 percent and reaches a value of 13 percent by the end of period in 2015. The population of the country doubles from around 25 million to 50 million between 1960 and 2015, a 55 year time period.

Figure IV.2.1.1. Population Distribution for the Specific Age Groups and the Total Population

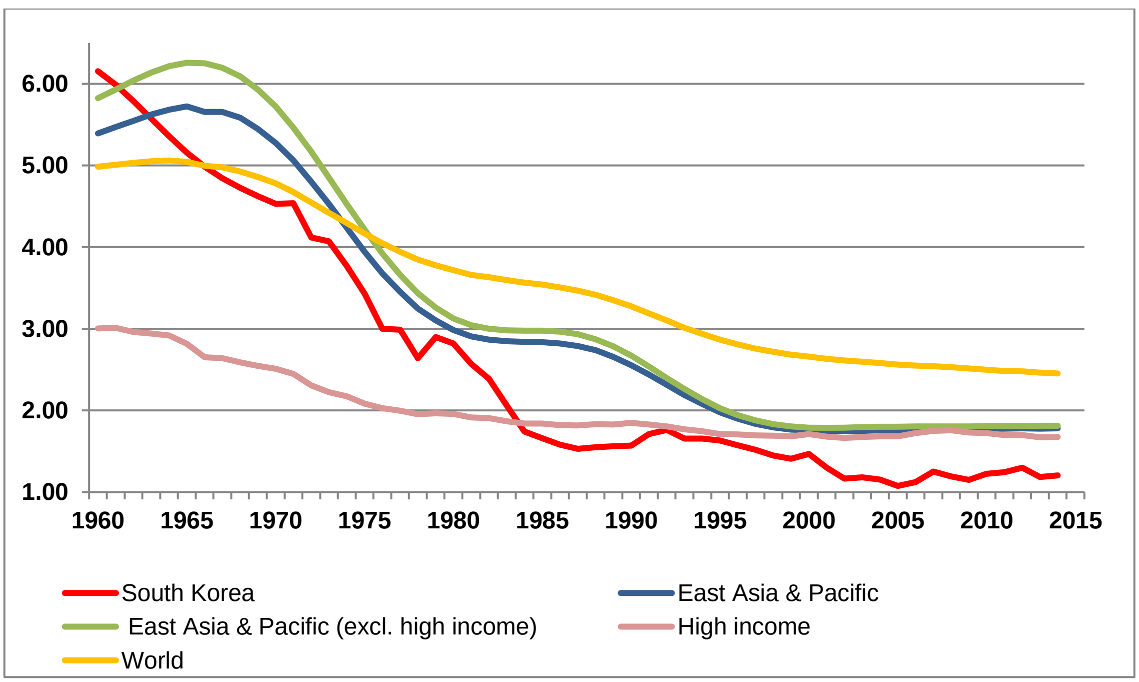


Source: World Bank

Following the population control policies adopted by the South Korean government in 1962, family planning programs highly contributed to the fertility decline in the country. Besides investments made by the government in reproductive health, population's positive attitude towards using contraception methods played an important role in fertility reduction. It is noteworthy to mention that induced abortion was widespread in urban areas of the country even before 1960's. In addition, not only high child raising costs as a result of rapid urbanization and rising standards of living but also rising age at marriage for women in the country had positive effects on fertility decline (Kim, 1994). The rapid fertility decline in South Korea starting from 1960's and continuing until the second half of 1980's can be clearly seen in Figure IV.2.1.2. Compared to the East Asia and Pacific region where the country belongs, the slope of the decrease trend in total fertility rate is remarkably steeper. In 1960, total fertility rate of the country is very high with a value of 6,16, while it has a value of 5,82, 5,39 and

4,98 for East Asia and Pacific (excluding high income), East Asia and Pacific and the world respectively. In high income countries fertility rate was around 3 children per woman in 1960, which was the value in South Korea in mid-1970's. Starting from mid-1980's fertility rate in South Korea fell below the value in high income countries and stayed below till present. In 2014, the total fertility rate of the country reaches a value of 1,21 which is very low even compared to the replacement level of 2,1 after following a horizontal trend since the first half 2000's. On the other hand, the horizontal trend for the region, both including and excluding high income countries, starts at the second half of 1990's which is earlier compared to South Korea but this time it reaches a higher total fertility rate in 2014 with a value of 1,81. It is noteworthy to mention that in the year 2014 the total fertility rate for the world is 2,45, which is slightly changed since the beginning of millennium.

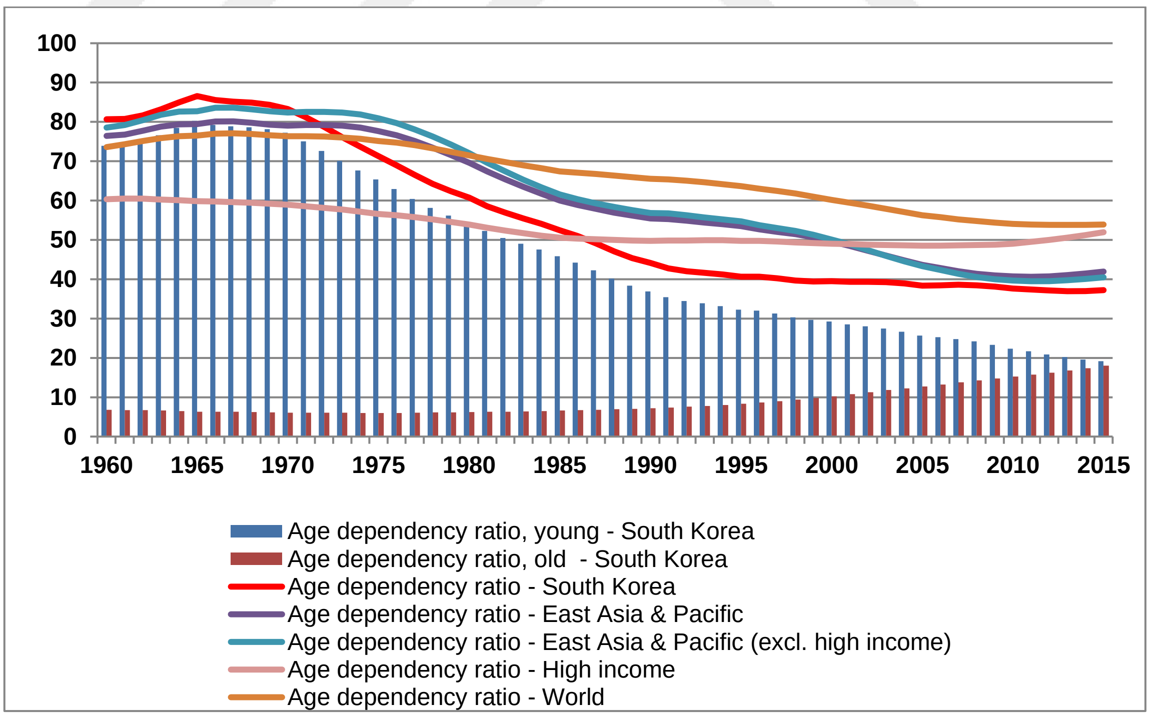
Figure IV.2.1.2. Total Fertility Rates



Source: World Bank

As a result of the rapid fertility decline between 1960 and mid 1980's, young dependency ratio in South Korea starts to decrease after the year 1965 as shown in Figure IV.2.1.3. The decrease follows a milder trend after the beginning of 1990's. On the other hand, old dependency ratio has a horizontal pattern until 1990's, after which the increase trend starts. It is important to point out that dependency ratio in South Korea was higher compared to the region and the world in the beginning but as a result of the sharp downward trend, caused by rapid fertility decrease, its value falls behind in the first half of 1970's and stays below till the end of the time period. In addition, as age dependency ratio in high income countries has been low for the whole time, the value in South Korea could catch up and fall below it only after mid-1980's.

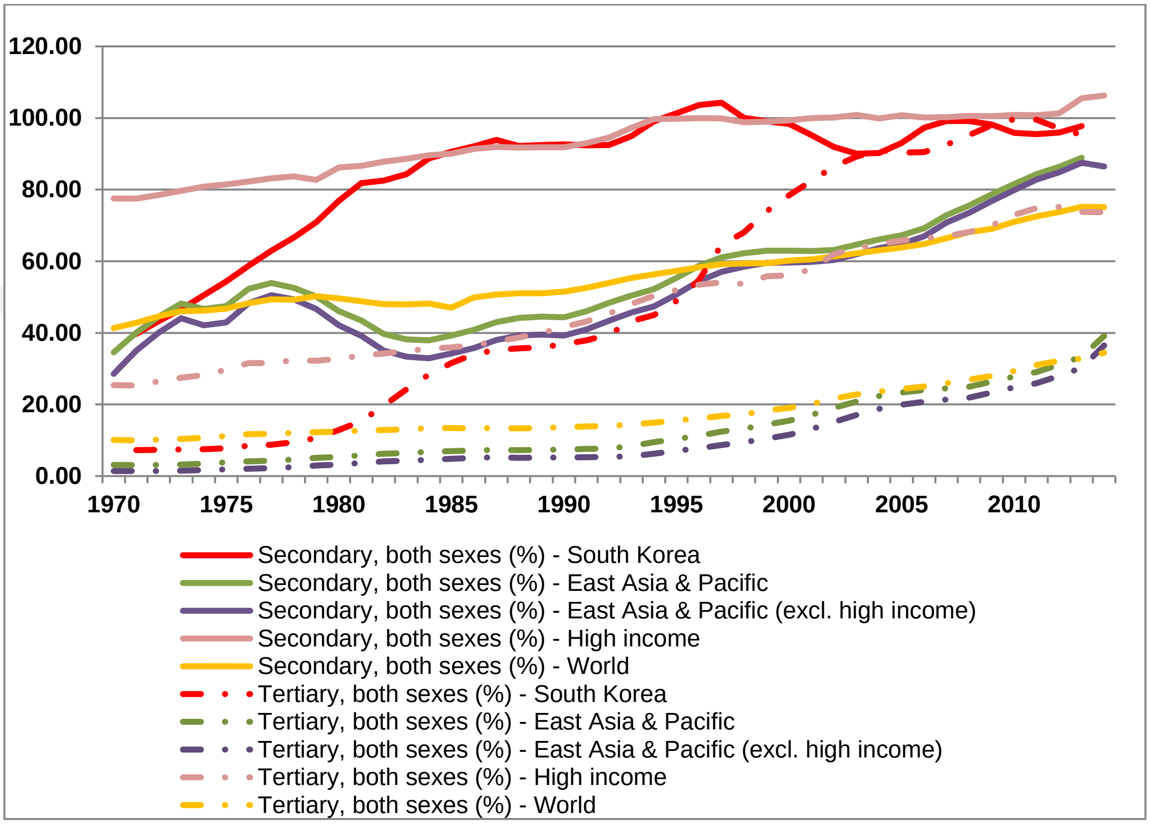
Figure IV.2.1.3. Age Dependency Ratios (Young, Old and Total - % of working-age population)



Source: World Bank

From the beginning of 1960's, strategy shift in the country's education system from focusing on compulsory primary education to a system aimed to bring in skills and knowledge to students, in other words a shift towards a production-oriented education system, contributed to a quality education which had a key role in reaching success in terms of economic development. While government's investments in education also resulted in gaining increase in educational attainment, fewer children of school age as a result of decreasing fertility led to more disposable income in household level and more expenditure per student by the government. Shortly, during 1960-1990 time period, demographic changes and government policies helped forming a society with higher quality and level of education (Gribble, 2012). In Figure IV.2.1.4, gross enrolment ratio for both secondary and tertiary education for South Korea is given and compared by the region it belongs and the world. Even though, the ratio for South Korea is similar to the ratios of the region and the world in the beginning of 1970's, a positive diversification starts in the first half of 1970's for secondary education and in the first half of 1980's for tertiary education. The increasing difference in gross enrolment ratio for South Korea with respect to the East Asia and Pacific region and the world is remarkable reaching a value of around 40 percent for secondary and around 70 percent for tertiary education. While the gap for secondary education starts to diminish in the second half of 1990's, the gap for tertiary education starts to narrow after 2010. By the end of the period, gross enrolment ratios for secondary and tertiary education in South Korea are very close with values of 97.7 percent and 95.4 percent respectively, while these ratios for East Asia and Pacific region are 87.9 and 39.2 for secondary and tertiary education. It is worth pointing out that the difference in tertiary education between South Korea and East Asia and Pacific region by the end of the period is considerably high. On the other hand, even though the enrolment ratio for secondary education in high income countries was still slightly over the value in South Korea by the end of the period, enrolment ratio for tertiary education in South Korea outstripped the value of high income countries after mid-1990's.

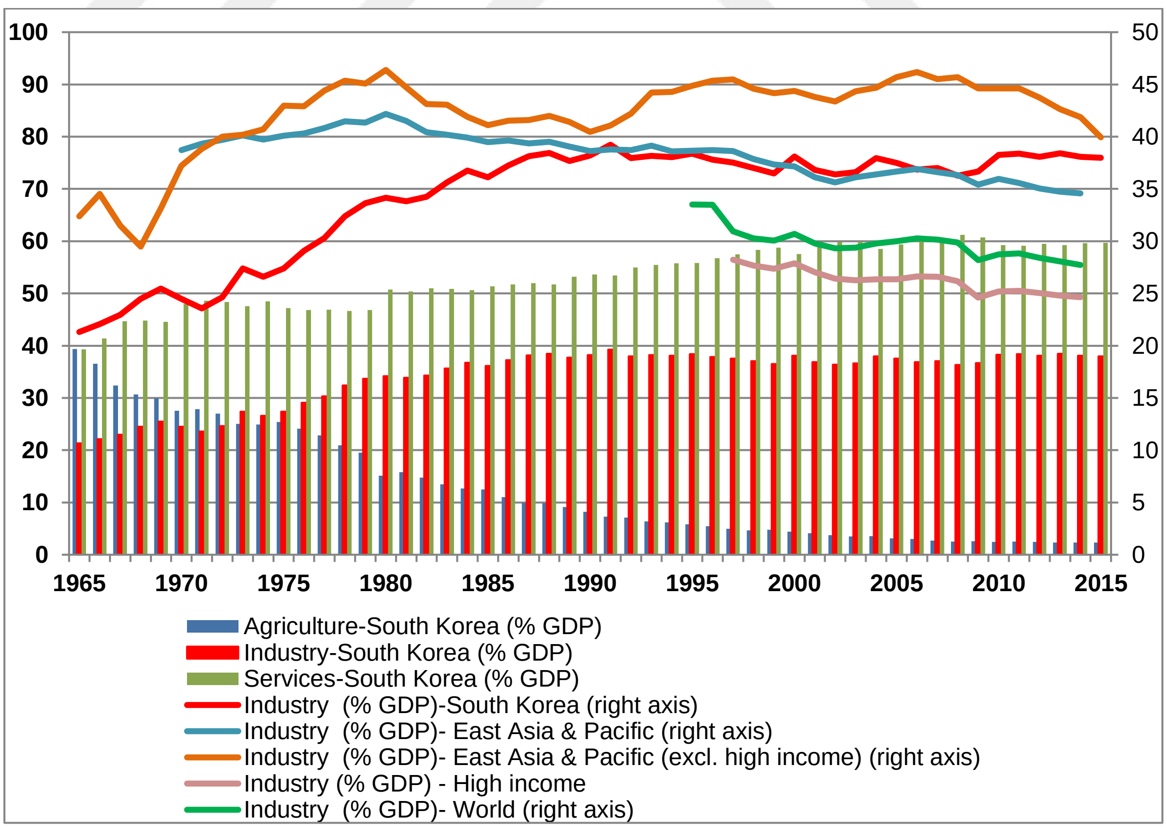
Figure IV.2.1.4. Gross enrolment ratio, secondary and tertiary, both sexes (%)



Source: World Bank

After the end of the Korean War in 1953, the South Korean economy was basically focused on fishing and farming, both of which were accepted as week industries. Starting from mid-1960's until 1990's, increase in capital investment, as a consequence of improving relations with Japan, resulted in not only development in farming and fishing industries but also formation of manufacturing and shipping industries. In addition, the war in Vietnam created an opportunity for the South Korean firms to take part in infrastructure projects in Vietnam. Also foundation of chemical, iron and steel industries gradually, had positive impacts on balance of trade in South Korea (Gribble, 2012). In Figure IV.2.1.5, development of the sectors of Korean economy over time is presented and considering the improvements in industry sector in South Korean economy, this sector is compared with the East Asia and Pacific region, high income countries and the world. The dominance of agriculture in the South Korean economy diminishes gradually over time, as it started with almost 40 percent in 1965 and fell to a value of 2 percent in 2015. On the other hand, the value of industry sector as percentage of GDP increased from 20 percent to 38 percent, while the value of service sector started with a value of 40 percent and reached to a value of 60 percent in 50 years. In 1970, even though the industry sector in South Korea was 14 points below its region as percentage of GDP, this gap closed by time and even reversed in 2014 as industry sector in the country became 4 points above as percentage of GDP compared to its region. Since mid-1990's the share of the industry sector in South Korean economy has always been higher than the share in high income countries and the world.

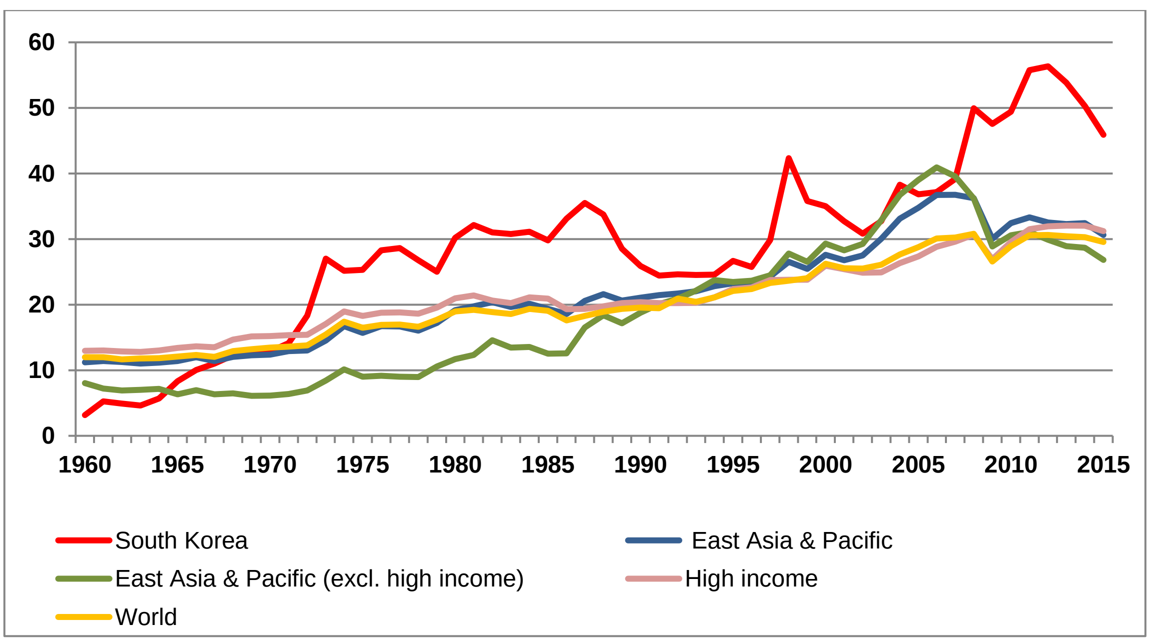
Figure IV.2.1.5. Agriculture, Industry and Services (% GDP)



Source: World Bank

Adoption of capital market economy, structural changes made in favor of manufacturing industry and development of shipping industry contributed heavily on improvement of export of goods and services in South Korean economy. As demonstrated in Figure IV.2.1.6, exports of goods and services as percentage of GDP rose remarkably between 1970 and 1990 compared to East Asia and Pacific region, high income countries and the world. During this 20 year period exports of South Korea was around 27 percent of the GDP on average, which was almost 10 points above the exports of East Asia and Pacific region, high income countries and the world separately. When high income countries in the region were excluded the difference raised to 15 points. After 2010, this gap increased in favor of South Korea, making its peak with a value of 56 percent of the GDP in 2012.

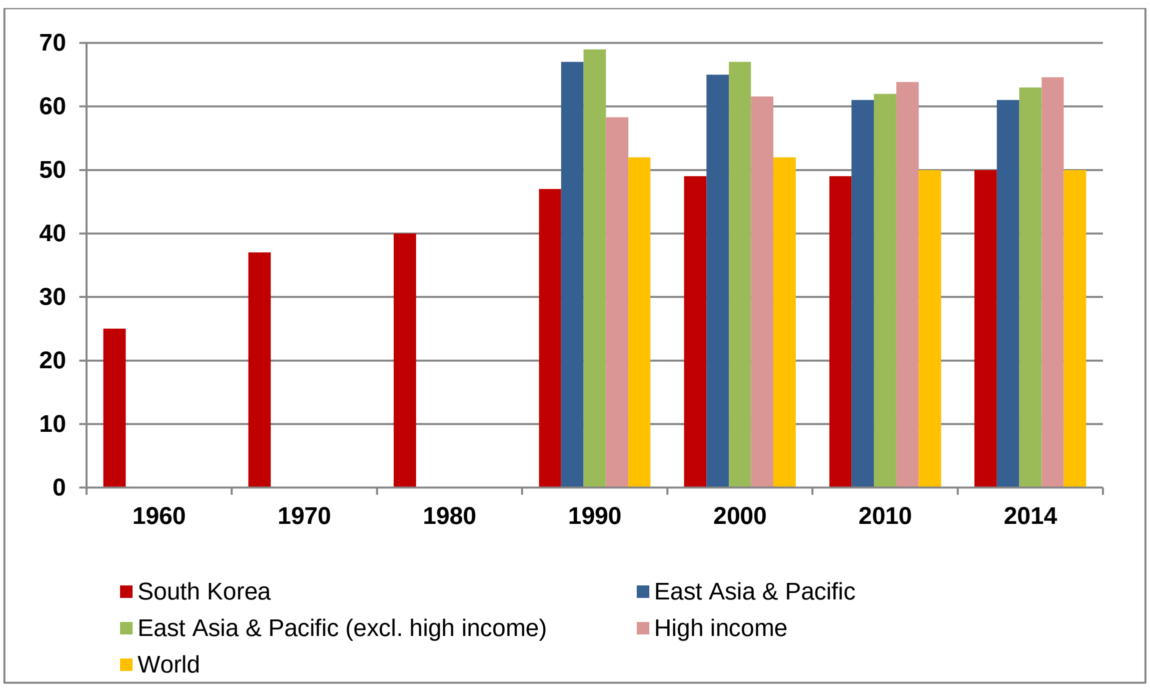
Figure IV.2.1.6. Exports of Goods and Services (% of GDP)



Source: World Bank

Steady increase in labor force participation rate for females as a result of socio-economic changes, also contributed to the development of the economy in South Korea. Female labor force participation rates for South Korea almost doubled itself between the years 1960 and 1990 from 25 percent to 47 percent as given in Figure IV.2.1.7. Since 1990, the rate for South Korea followed a horizontal pattern with an increase of only 3 percent in 25 years. Although the remarkable increase in female labor force participation rate in South Korea, it is important to underline that the rate is still low compared to the rates in East Asia and Pacific region both including and excluding high income countries and high income countries. However the gap between South Korea and the region has been narrowing in the last decades, as a result of decreasing female labor force participation rates in the region, while the gap between South Korea and high income countries has been increasing due to the increase experienced in the ratio in high income countries.

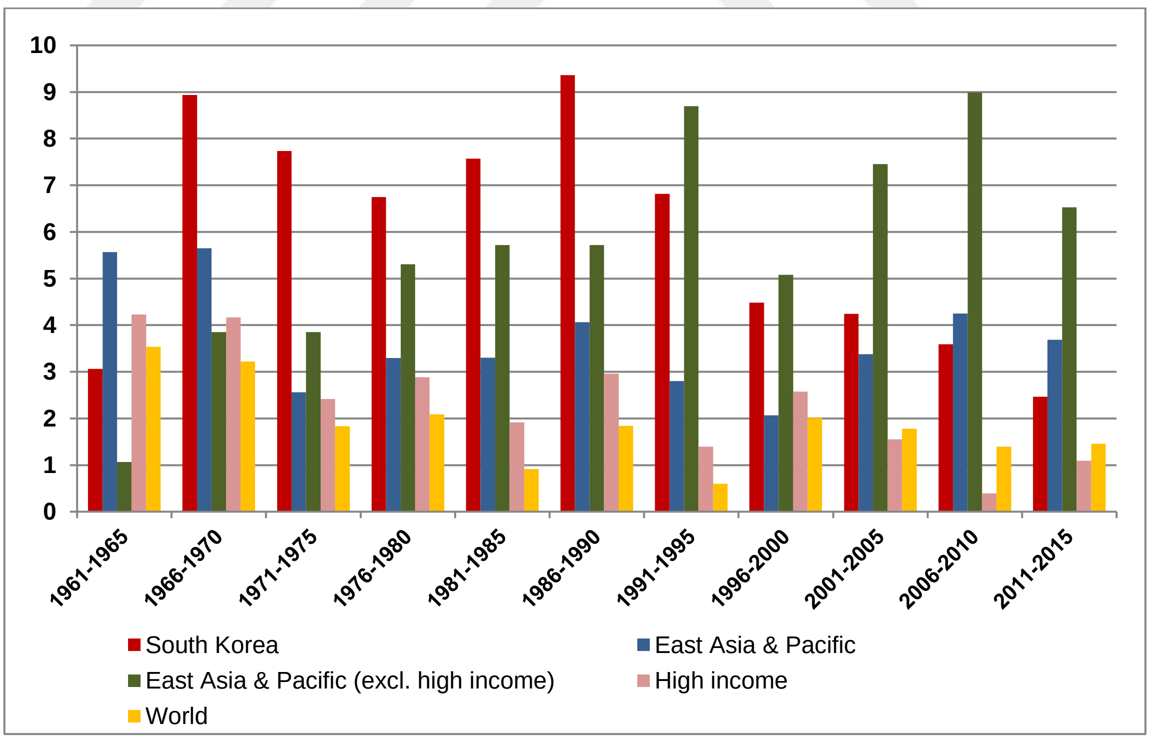
Figure IV.2.1.7. Female Labor Force Participation Rate (% Female Population 15+)



Source: World Bank

With the help of demographic changes such as decreasing dependency ratios especially between 1970 and 1990, following rapid fertility decline, supported with structural changes in education system and in the sectors of the economy, including positive contribution of the open market economy, South Korea made remarkable increases in GDP per capita over the years which are also presented in Figure IV.2.1.8 as 5 year averages between 1961 and 2015. From mid-1960's until beginning of 1990's, GDP per capita growth in South Korea outstripped the one in East Asia and Pacific region around 4 percent and 3 percent on average, including and excluding high income countries of the region respectively. In addition the 5 year average GDP per capita growth in South Korea has always been remarkably higher than the one in high income countries except 1961-1965 period.

Figure IV.2.1.8. GDP per capita growth (5 year average %)

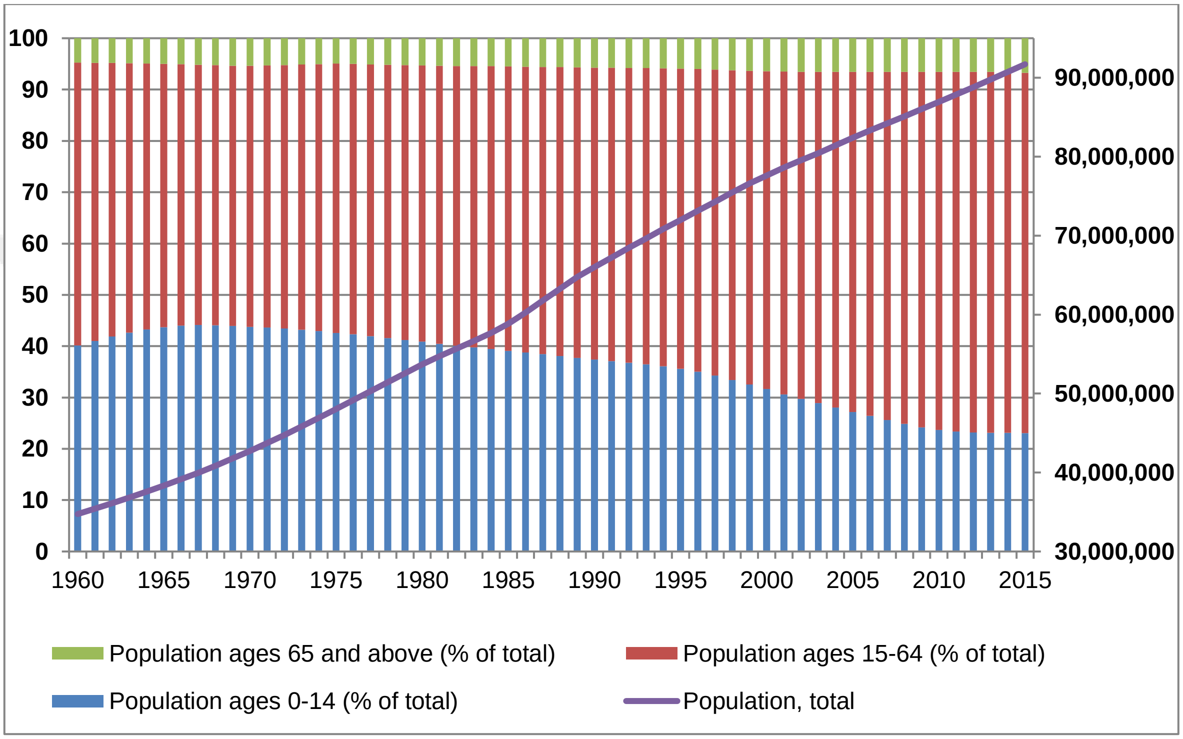


Source: World Bank

IV.2.2. Vietnam

Vietnam can be said as having a young population, looking at the age group composition given in Figure IV.2.2.1. Until first half of 1990's 0-14 age group composes over 35 percent of the whole population. Even then the portion of this young age group in the whole population decreases gradually, reaching a value of almost 30 percent in 2002. This year is the beginning of demographic window of opportunity for Vietnam, with older population aged 65 and more still making less than 15 percent of the population. According to the age structure of the country the demographic window is still open and will be open for a few more decades. It is worth to mention that the increase in the older population, which has a value less than 7 percent currently, is slow; making the window last longer compared to some of the other countries going through the same phase of the demographic transition. The population has grew almost 1.8 percent annually on average since 1960 and the growth ratio is almost stabilized around 1.08 percent for the last 10 years.

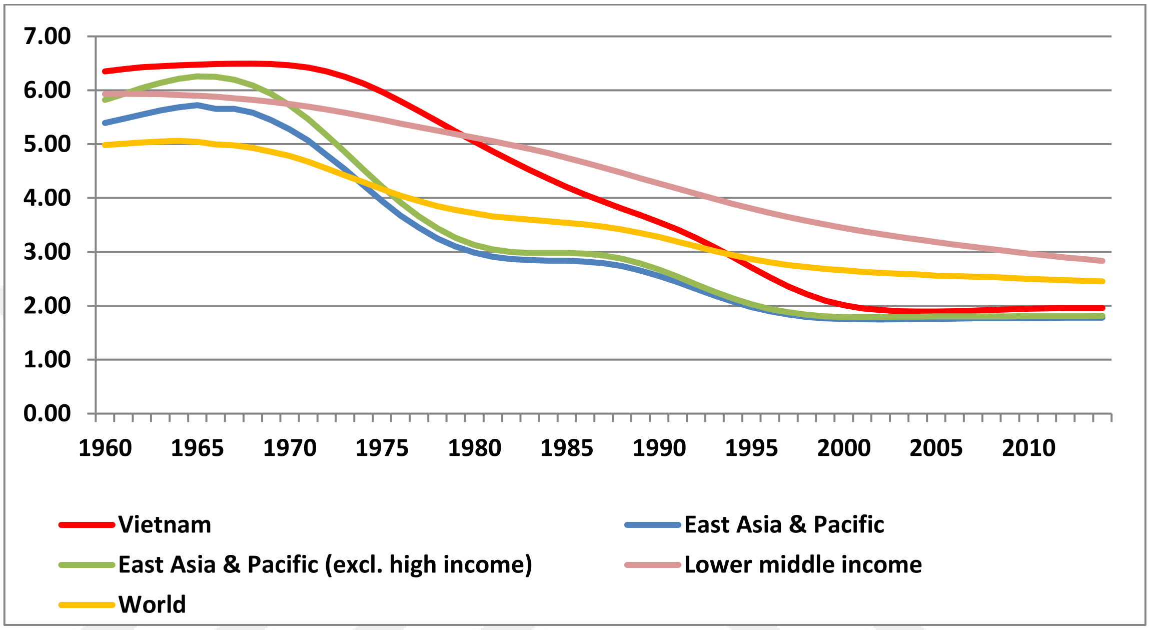
Figure IV.2.2.1. Population Distribution for the Specific Age Groups and the Total Population



Source: World Bank

Vietnam had very high total fertility rates in its history continued more than a decade. During 15 years, between 1960 and 1975, the total fertility rate was 6.4 on average, while it was 4.8 on average for the world for the same time period. Since the first half of 1970's the total fertility rate continued to fall until 2000 and then almost became stable with a value 1.95-1.96 for the last five years. Behind this dramatic fertility rate fall, which was faster than in many other countries, there were two major factors: One of them was the family planning program implemented by the government aimed to impede rapid population growth. The other one was the discontinuance of the foreign aid and investments after the end of Vietnam War in 1975. The decrease in total fertility rate in Vietnam and its comparison with the region, lower middle income countries and the world is given in Figure IV.2.2.2.

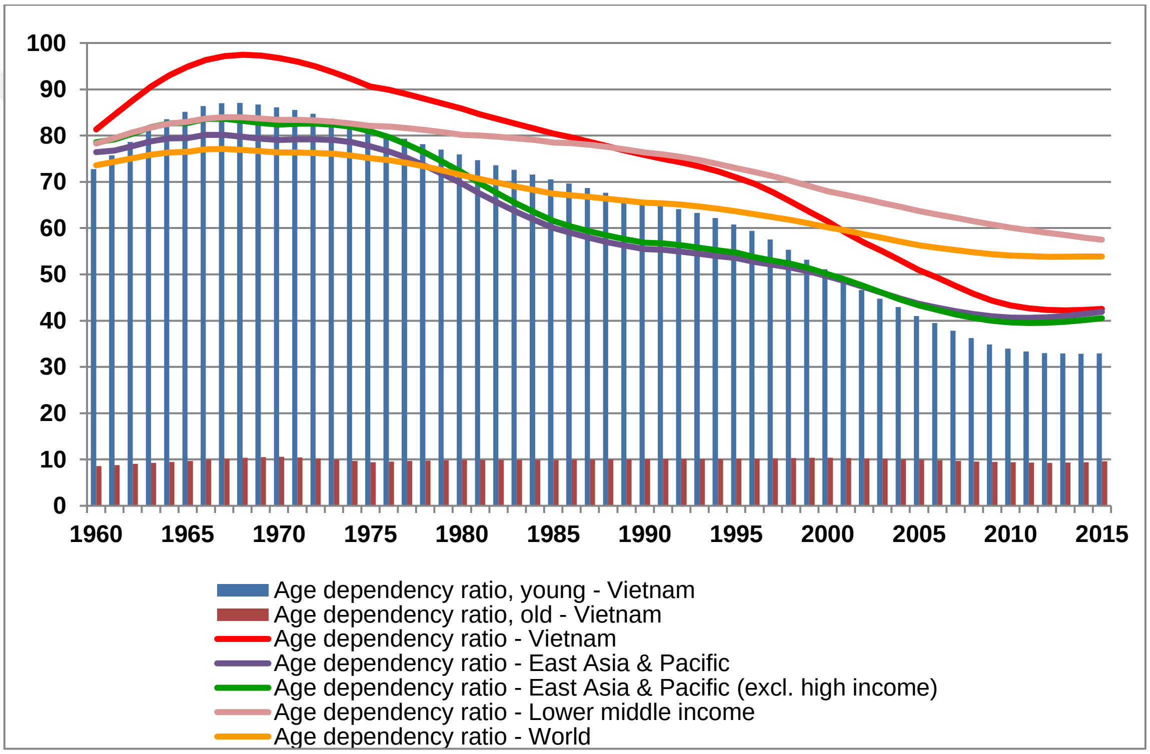
Figure IV.2.2.2. Total Fertility Rates



Source: World Bank

The changes in age dependency ratios for Vietnam, the region and the income level it belongs and the world are presented in Figure IV.2.2.3. Because of the gradually increasing total fertility rate until beginning of 1970's, total age dependency ratio increased by the end of 1960's and followed a downward pattern until 2010. However the slope of the downward pattern of the dependency ratio steepens in the 1990's parallel to the higher fertility decrease, which was 5.7 percent on average for the same period. It is noteworthy to point out that the changes in total fertility rates directly affect only young dependency ratios in the short run. In other words, while the young dependency ratio decreased parallel to the decrease in the total fertility rate, old dependency ratio displayed a stable horizontal pattern around 9 to 10 percent in value. It can be derived from the figure that, total age dependency ratio for Vietnam was remarkably higher than the region and the world until the mid-1990's. After then, its value converged to the value of the world, while its convergence to the region's was not until beginning of 2010's, with a lag of 20 years. The convergence in age dependency ratio in Vietnam to the value in lower middle income countries occurred in mid-1980's, which was almost 15 years earlier than its convergence to the value in the world.

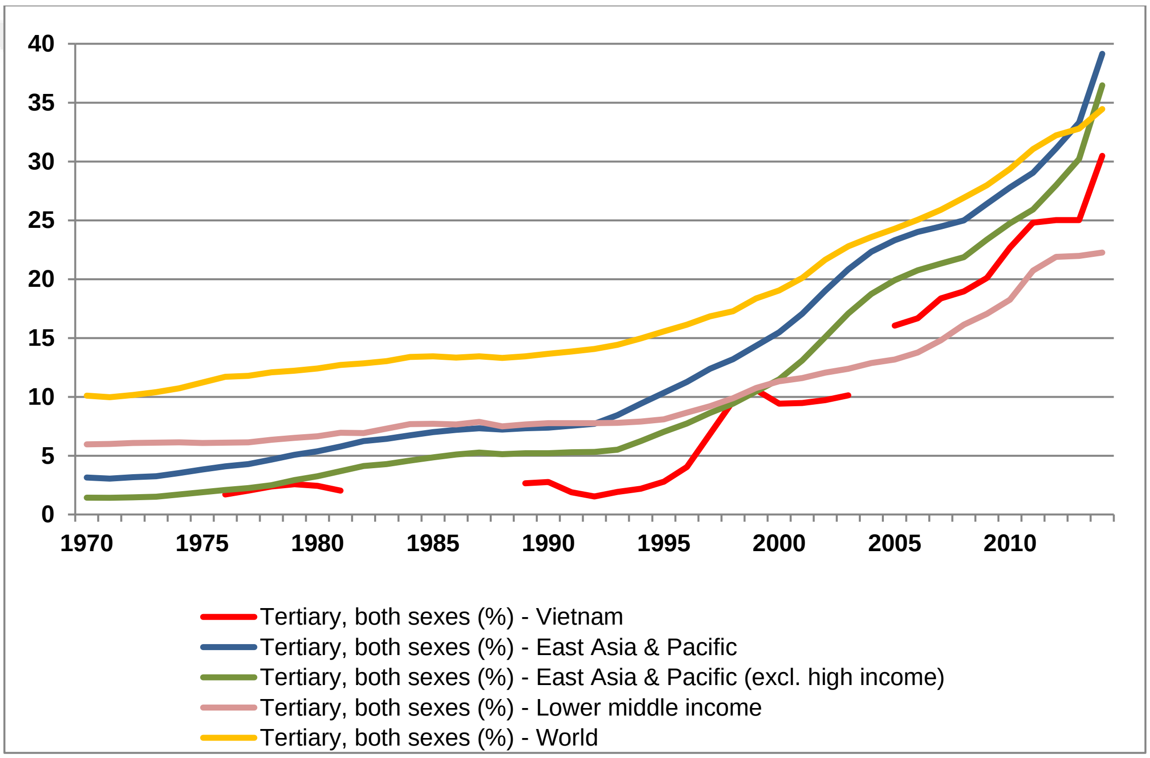
Figure IV.2.2.3. Age Dependency Ratios (Young, Old and Total - % of working-age population)



Source: World Bank

In literature Vietnam is said to be poor in terms of educational attainment level. Among recommendations regarding gaining economic growth, investing in education in order to increase general education level in the country comes on the top of the list. Figure IV.2.2.4 shows the changes in gross enrolment ratio in tertiary education in Vietnam and compares it with the region, lower middle income countries and the world. Looking at the figures it is obvious that the education level in tertiary education in the country was very low, and is still low even though the progress made especially after the mid-1990's. In year 2014, only 30 percent of the population who was in the official age for the tertiary education is enrolled in universities, which is below the value for the region and the world but higher than the ratio in lower middle income countries for the last decade. As gross enrolment ratio for secondary education for Vietnam is mostly missing, it is not taken into consideration in this study.

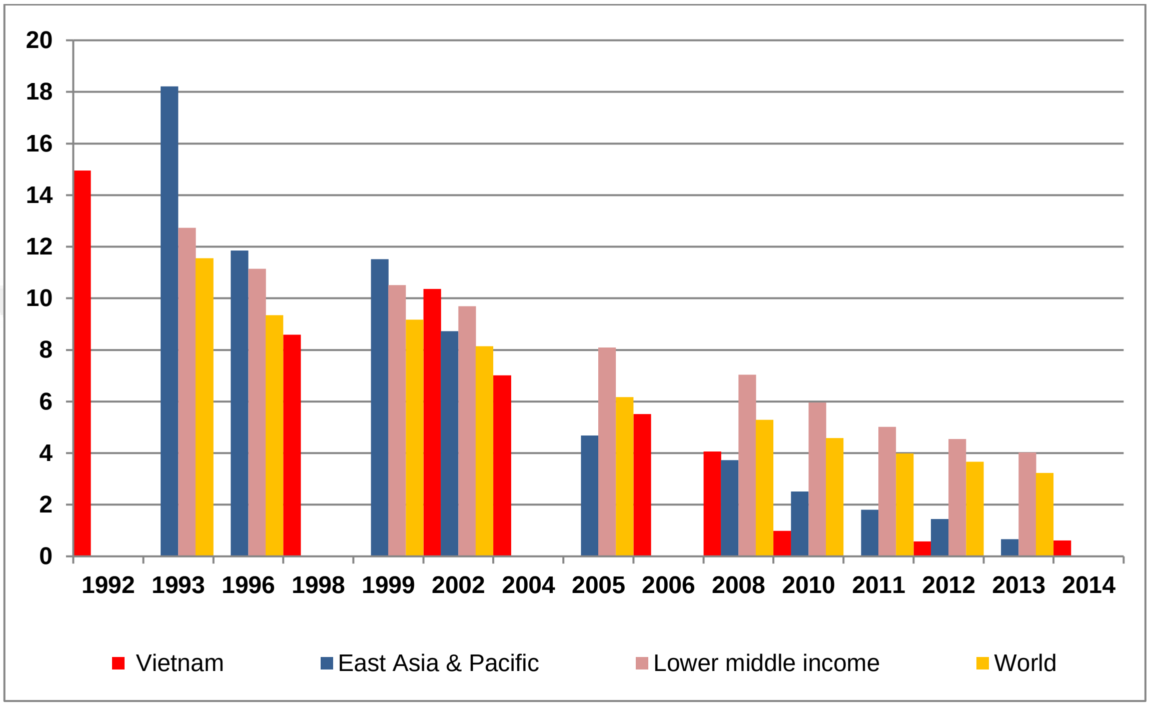
Figure IV.2.2.4. Gross enrolment ratio, tertiary, both sexes (%)



Source: World Bank

Between mid-1970's and late 1980's, the government of Vietnam carried out socialist policies, including deciding on both the level and type of production and the level of the prices of the goods. During that time, more than 80 percent of the population was living in rural areas but the farms producing agricultural good were administered by the state. Similar to many other countries ran by socialism, the economic growth of the country was evaluated as below moderate. However, following the policy reforms made in the late 1980's, big state farms were replaced with household farms, where they could raise their own crop and sell it in the markets. Also economic activity besides the government's was also legalized and prices of the goods were set free gradually. Another big step taken by the authorities was encouraging foreign direct investment and foreign trade by eliminating barriers regarding imports and exports. Considering the rapid economic growth following these changes, policy reforms made can be considered as fruitful. On the other hand, during years of rapid economic growth, increase in inequality was also observed. However, though the increase in inequality, progress against combating poverty was made during 1990's. Main reasons behind this success can be summarized by three factors. Firstly, economic growth based on agricultural production supported poor households who were mainly living in rural areas where main economic activity was cultivation. Secondly, during the economic transformation the allocation of agricultural land to household was made in a fair way by the government. Lastly, the inequality in accessing education could be evaluated as low in the country. All these 3 factors protected the poor in the country, even though the increase in inequality (Glewwe and Dang, 2011). The decrease in poverty in Vietnam and its comparison with the region, lower middle income countries and the world is demonstrated in Figure IV.2.2.5. Over the whole period in general, the decrease in poverty gap in Vietnam was faster than it was in the whole other comparison groups, making the poverty gap in the country extremely lower than the values in its counterparts, especially from the beginning of 2010's.

Figure IV.2.2.5. Poverty gap at $1.90 a day (2011 PPP) (%)

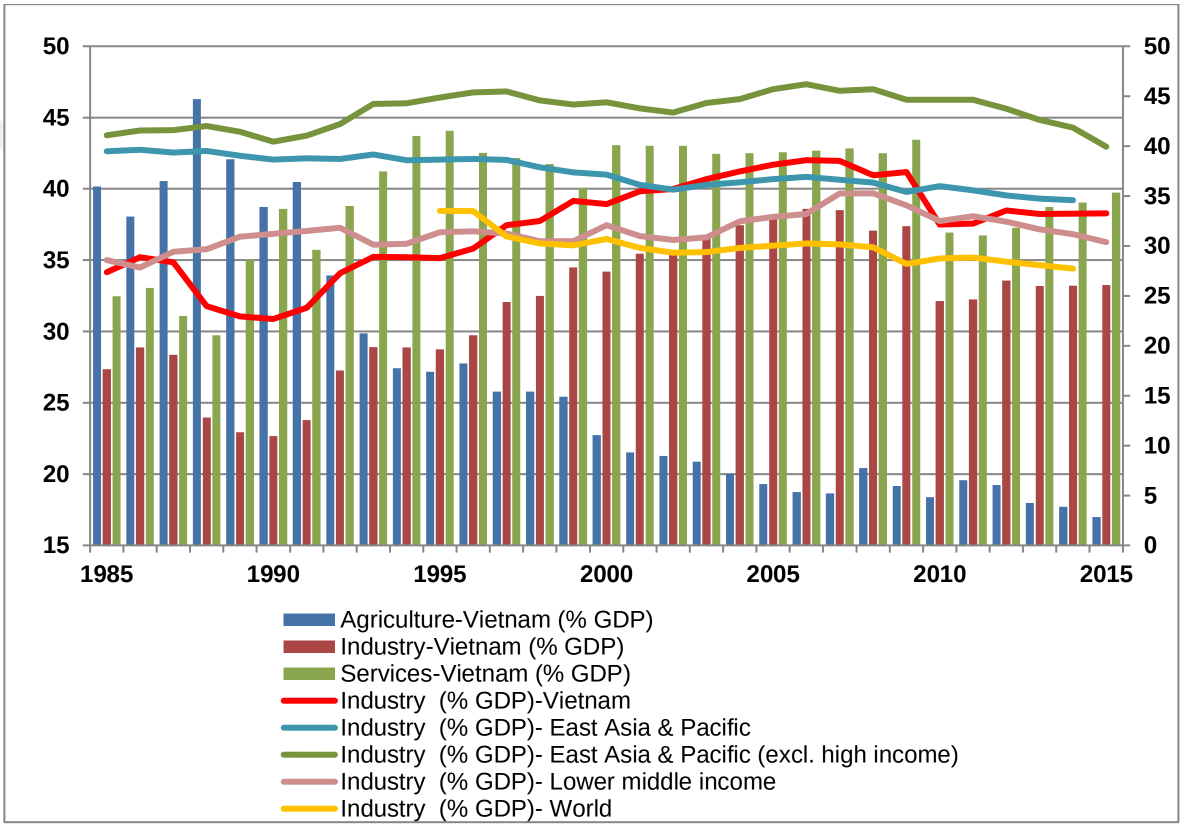


Source: World Bank

The structural change in the economy in Vietnam is presented in Figure IV.2.2.6. The comparison of the industry sector with the region, lower middle income countries and the world is also included in the figure. During the economic growth in 1990's, the ratio of the agriculture sector in the whole economy as the percentage of GDP decreased gradually around 40 percent to 20 percent. The boosted economic growth by agriculture in this period can be explained by the increase in productivity caused by the policy changes in this sector. In Vietnam the industry sector in general had an increasing trend between beginning of 1990's and late 2000's from approximately 20 percent to 40 percent, which was just the reverse of the change in agricultural sector. When compared with the region and the world, as a result of the development of the industry sector in Vietnam, the share of this sector caught and outstripped the share in lower middle income countries and the world in second half of

1990's; while it was in the first half of 2000's, when the share in the country almost became equivalent to the share in East Asia and Pacific region.

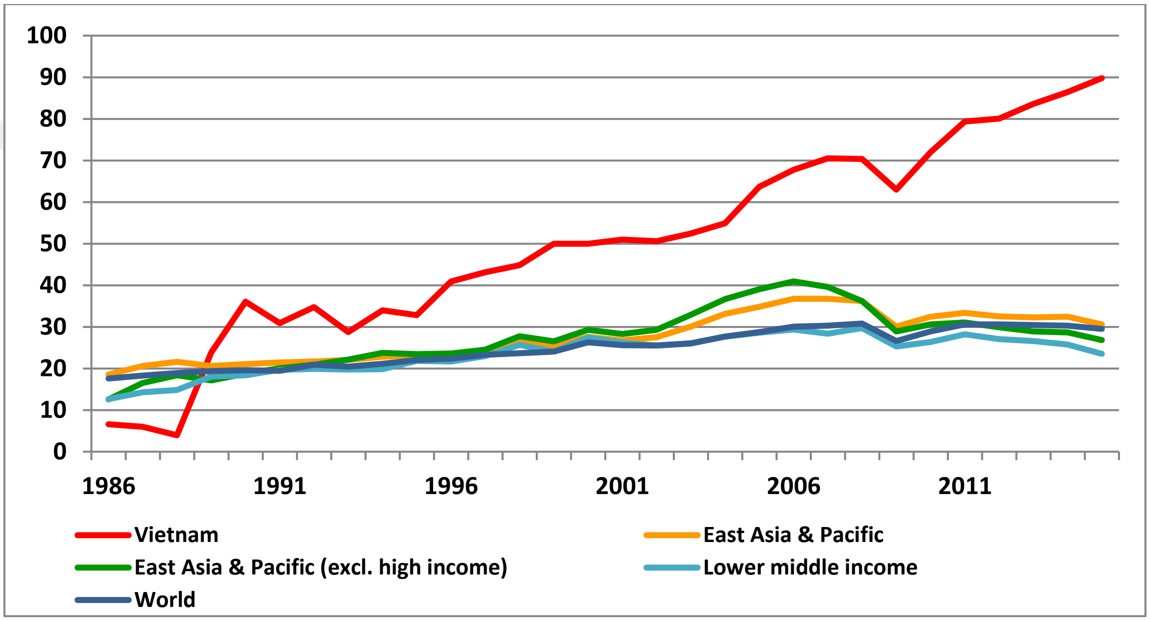
Figure IV.2.2.6. Agriculture, Industry and Services (% GDP)



Source: World Bank

Vietnam's economic integration with the world and trade agreements signed with Eurasian Economic Union, European Union, South Korea and the Trans-Pacific Partnership and etc., also made contributions to the economic development of the country. Increase in foreign trade of the country in terms of export of goods and services is illustrated in Figure IV.2.2.7. Starting from beginning of 1990's the increase in the exports was remarkable with an annual increase of around 56 percent on average. Compared to the region, same income group countries and the world, exports as percentage of GDP is outstanding with the positive gap increasing over time with a difference more than 60 percentage in 2015.

Figure IV.2.2.7. Export of Goods and Services (% of GDP)

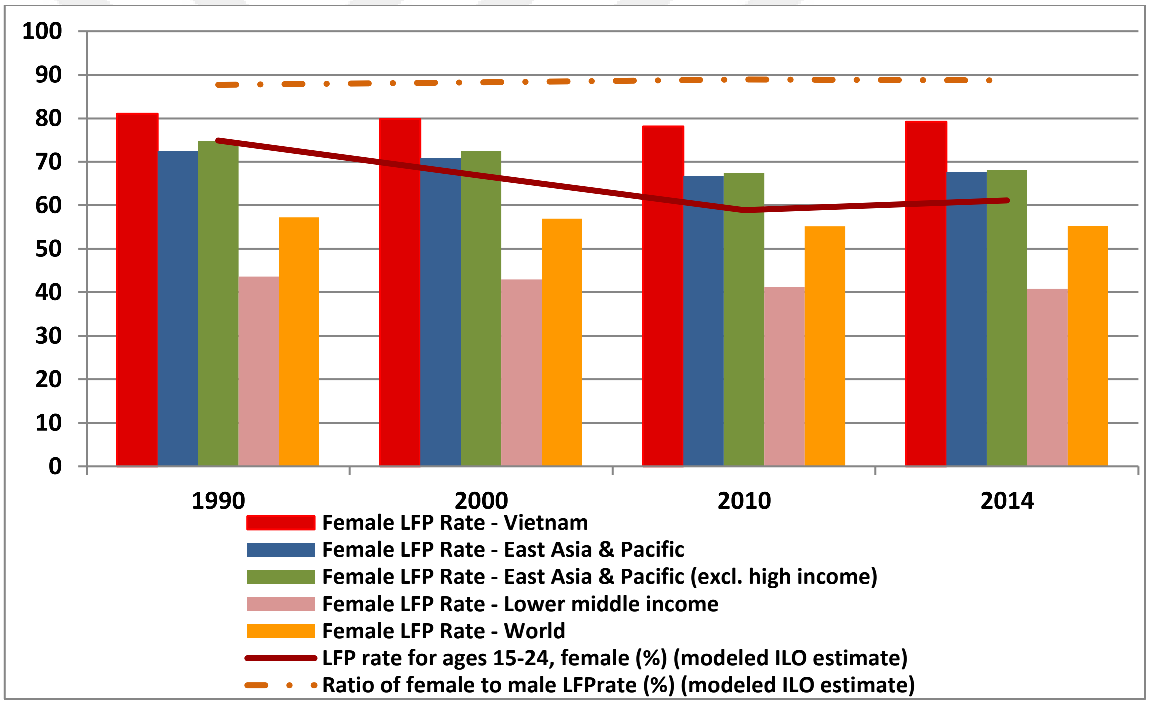


Source: World Bank

Even though gender inequality still exists in various fields of social and economic life in Vietnam, female labor force participation rate has been considerably high with a value of around 80 percent compared to East Asia and Pacific region, lower middle income countries and the world with values of around 70 percentage, 42 percentage and 56 percentages on average respectively, as shown in Figure IV.2.2.8. As a result of the high female labor force participation rates, ratio of female to male labor force participation is also substantially high around 90 percent. It is important to point out that although female labor force participation rates for young ages (15-24) had been high in the 1990’s, there had been a gradual decrease until beginning of 2010’s. The decrease in the female labor force participation of the young age groups can be explained by the increase in the gross enrollment ratios. While the gross enrollment ratio in tertiary education for females in 1998 was around 8 percent, it rose up to around

23 percent in 2010. On the contrary to high income countries, the high female labor force participation rates in general can also be explained by low educational requirements of agriculture sector, rather than by the educational attainment levels of the females.

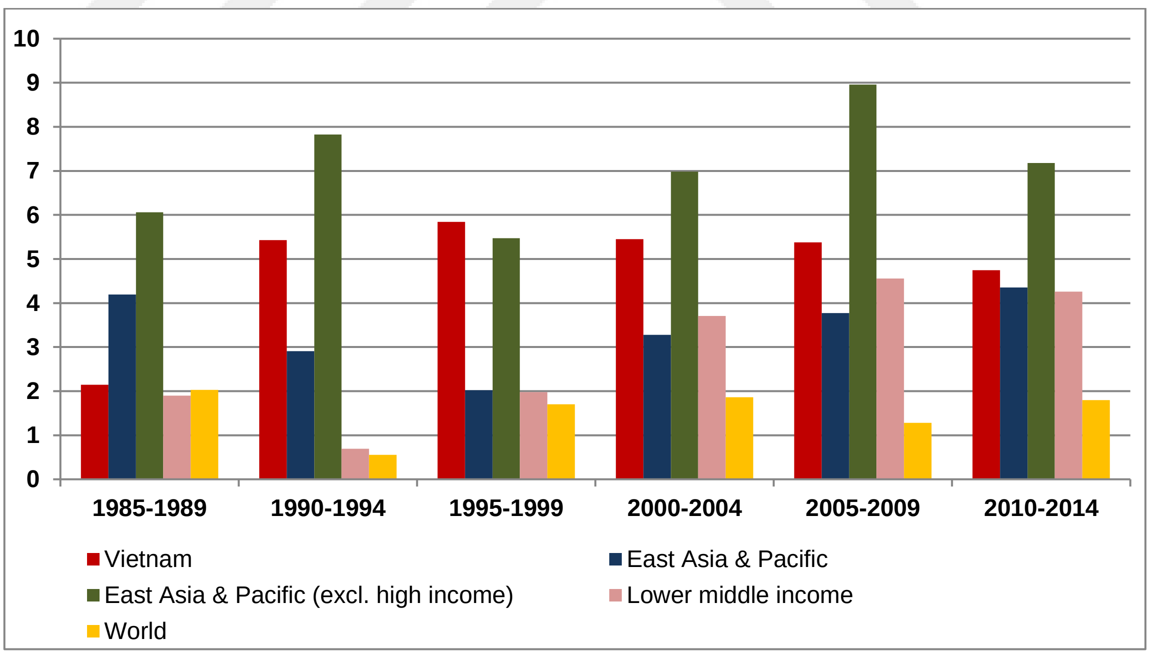
Figure IV.2.2.8. Labor force participation rate, female (% of female population ages 15-24, 15-64) and Ratio of female to male labor force participation rate (%) (modeled ILO estimate)



Source: World Bank

Decrease in total fertility rates and dependency ratios, increase in educational attainment levels especially in tertiary education, structural reforms including the transition from a closed socialist economy to an open capitalist economy with a growing industry sector where exports had been rising can be named as the major reasons of the growing economy in Vietnam. In Figure IV.2.2.9, GDP per capita growth rates are presented for Vietnam, East Asia and Pacific region, lower middle income countries and the world. The GDP per capita in Vietnam rose from around 2 percent to more than 5 percent in the first half of 1990's compared to previous term. This high growth rate lasted until the end of the period, being always higher than the value of the region, lower middle income countries and the world, except the region excluding high income countries. The economic growth achieved by Vietnam concurrently with the reduction in poverty in the country is evaluated as a great success in the studies made on Vietnam. However, it is essential to underline that albeit striking improvements in various socio-economic indicators so far, economic modernization, structural transformation, enhancement of human capital and gender equality remain as the missing parts which need further progress in order to impel economic growth and development at a broader scale.

Figure IV.2.2.9. GDP per capita growth (5 year average %)

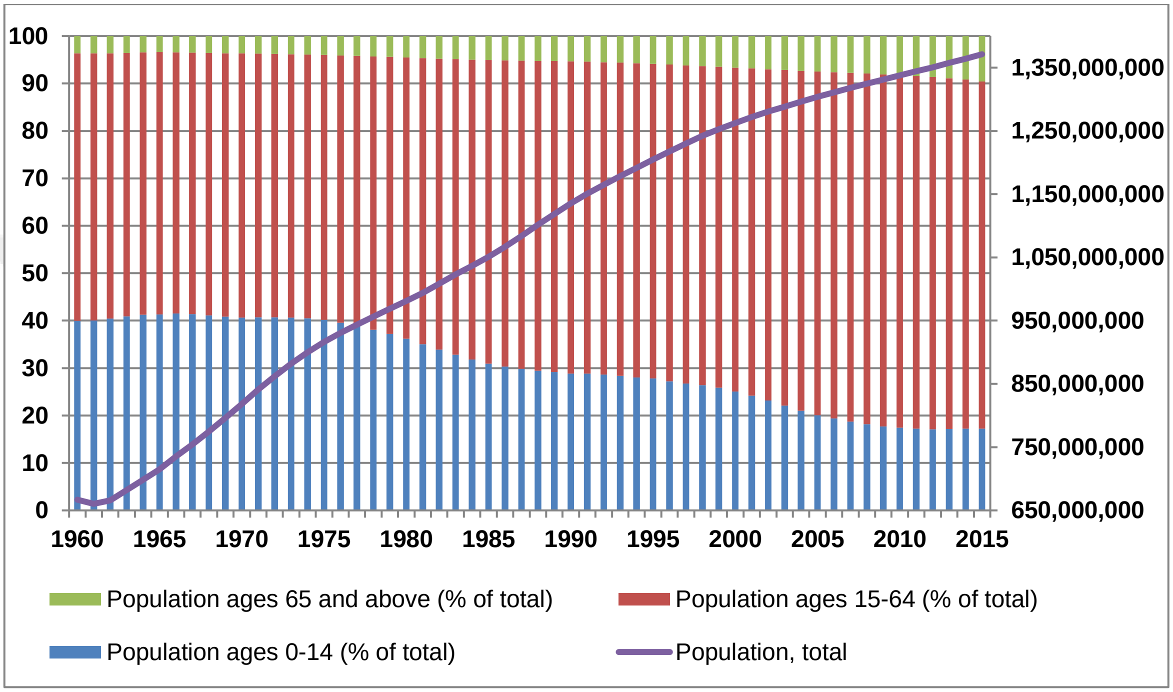


Source: World Bank

IV.2.3. China

China’s age structure has been started to change since the second half of 1970’s. 0-14 age group that has been around 40 percent of the population by that time, started to decrease gradually for the next decade to a value of around 30 percent in 1985. Following a horizontal pattern for a 10 year period, the percentage of this young age group went through another downward trend period with a decreasing slope until the end of the period in 2015, reaching a value of around 17 percent. On the other hand, the increase in the share of 65+ age group, that had an initial value of around 4 percent in 1960, was around 1.8 percent on average annually and this growth rate led to an old age population with 10 percent share in 2015. Looking at the demographic trends in China’s history, it can be said that the country entered the demographic window of opportunity in 1987 and still not left the demographic window as presented in Figure IV.2.3.1. Population of China increased to 1.37 billion in 2015 from 670 million in 1960, being doubled over 55-year time period. It is important to mention that the population grew 2.6 points on average annually during 1960’s and first half of 1970’s. However this increasing trend was lowered gradually and resulted in an annual growth rate of 0.6 percent on average from the beginning of millennium till now.

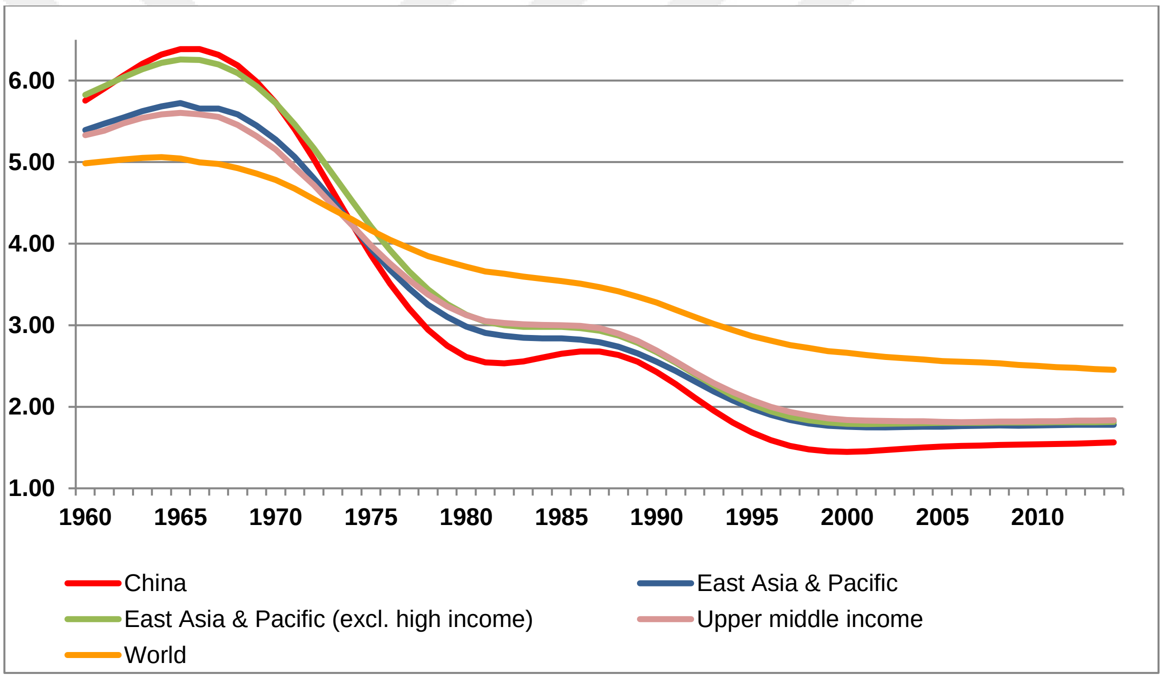
Figure IV.2.3.1. Population Distribution for the Specific Age Groups and the Total Population



Source: World Bank

Following the increasing trend of annual growth rate of the population, considering the positive impacts of family planning programs and socio-economic factors, the total fertility rate started to decrease in 1970's as shown in Figure IV.2.3.2. The decrease in total fertility rates in China can be denoted in a two-stage period, one occurred between 1965 and 1982, while the other one took place between 1987 and 2000. In general, over the 55-year time period, the decrease in total fertility rate in the country was prominent from 6.4 in 1965 to 1,6 in 2014. The implementation of socio-economic reforms and adoption of strict state family planning policies, namely one child policy, both in urban and rural areas contributed to a great extend in the fertility decline in the country. Besides family planning policies, increase in educational attainment levels and labor force participation levels of females, increased life expectancy at birth and urbanization had also decreasing effects on total fertility rate as observed in various countries in East Asia. As a result of these factors, today China took its place in the low-birthrate society. As presented in the figure China started with total fertility rates higher than the rates of East Asia and Pacific region, upper middle income countries and the world and ended up with values lower than the values of all the groups it was compared.

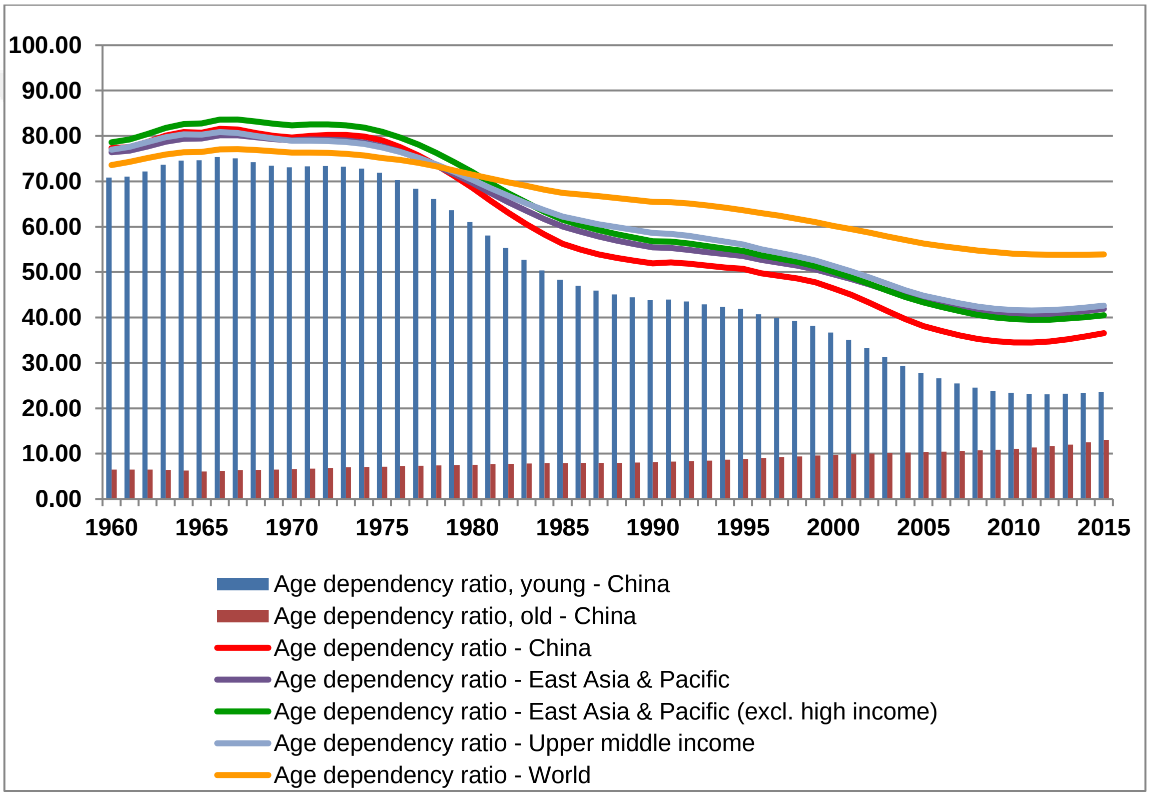
Figure IV.2.3.2. Total Fertility Rates



Source: World Bank

In the early 1960's total dependency ratio in the country was higher than all groups except East Asia and Pacific region excluding high income countries. However, the dependency ratio fell below all the comparison groups starting from 1979 and stayed so till the end of the time period. The major factor causing the decrease was the sharp downward trend in young dependency ratio from a value of 74 percent to a value of 23 percent between 1968 and 2015, supported by a low gradual increase in old dependency ratio from around 6 percent to 13 percent throughout the period as presented in Figure IV.2.3.3.

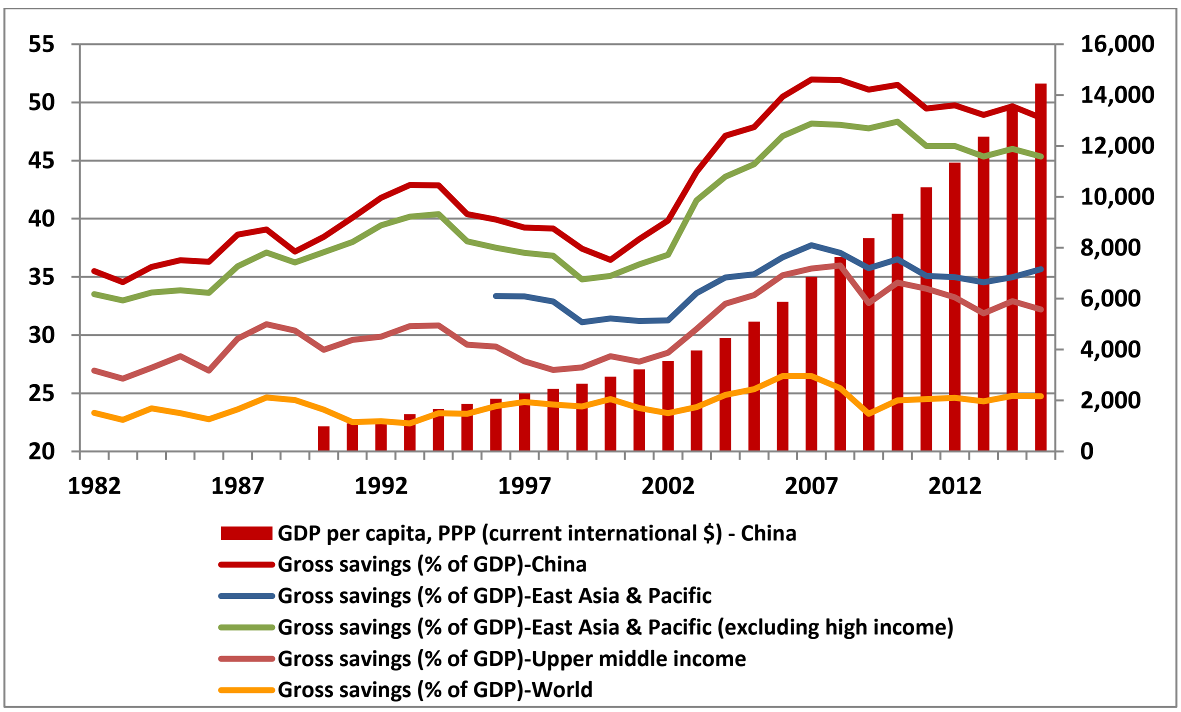
Figure IV.2.3.3. Age Dependency Ratios (Young, Old and Total - % of working-age population)



Source: World Bank

According to the model design in Shi et al. (2002) China's saving rates were negatively correlated with young and old dependency ratios, similar to the various researches done in the literature supporting the relationship (Leff, 1969, 1971; Ram's 1982). In addition to the correlation between the national savings and the dependency ratios, changing individual saving behavior of the population in accordance with the demographic transition will be an important issue for the authorities while taking policy decisions for the country, as long as market liberalization will continue in the country's economic transformation. In the late 1970's, as the economic reforms started, its positive effects were seen in the economy in terms of significant increase in income per capita and the saving rate. High saving rates were accepted as one of the requirements for triggering the growth in economy for the long-term. Actually economic growth and the level of the savings are said to be interrelated as saving rates in high and middle income countries exceed the one in low income countries (Fang and Wang, 2005). In Figure IV.2.3.4, gross savings as percentages of GDP are given for China, East Asia and Pacific region, upper middle income countries and the world. Also, GDP per capita of China based on purchasing power parity (PPP) is added in the figure to demonstrate the correlation between them as told so in the literature. It is remarkable that China's saving rates were always higher than the groups compared in the figure. Moreover, the rapid increase in Chinese savings between in the 2000's is noteworthy from around 35 percent to around 52 percent.

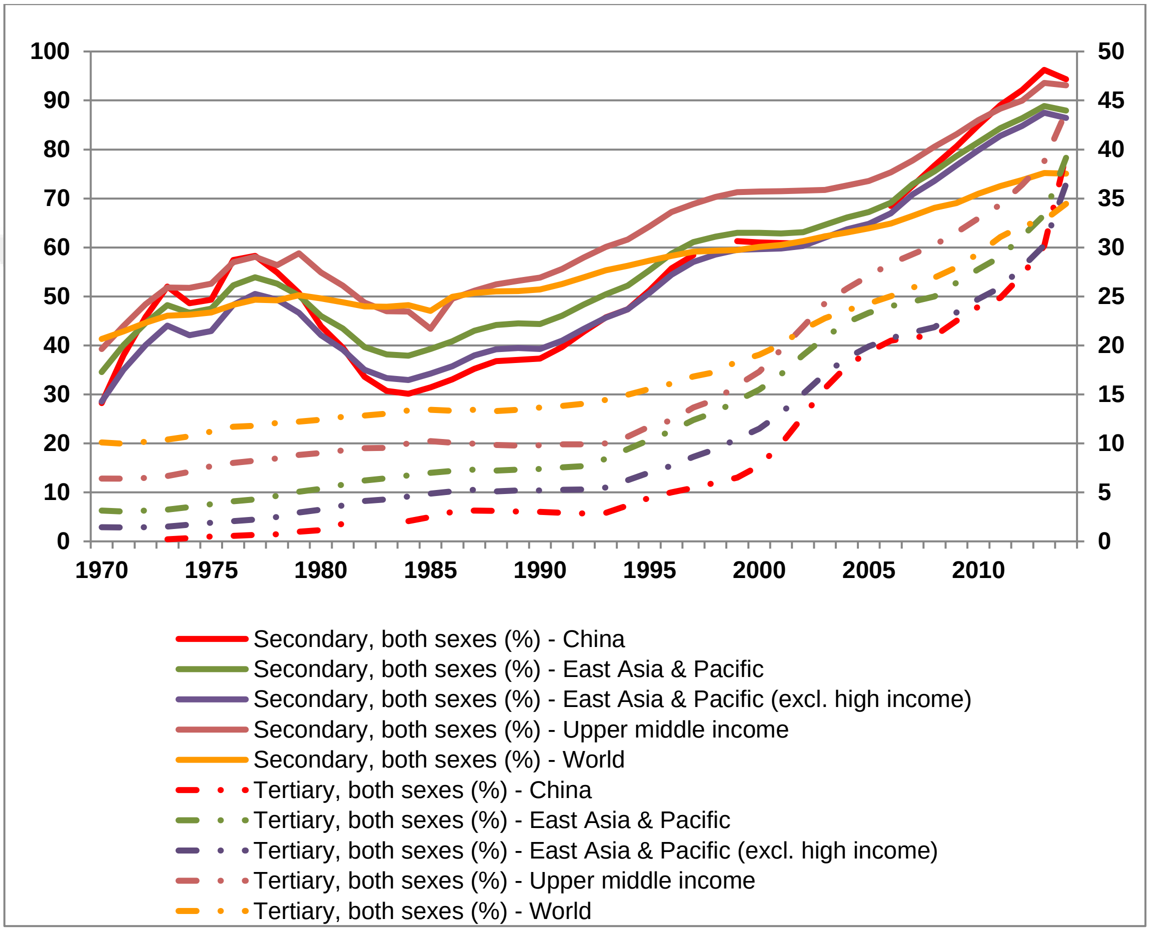
Figure IV.2.3.4. Gross Savings (% GDP) and GDP per capita (PPP)



Source: World Bank

During the social and economic transformation in China, from a socialist planned economy to an emerging market economy, the cost of child bearing increased rapidly as the termination of free education after a nine-year compulsory education. By the end of collective farming in the rural areas of China and consecutively coming to an end in the guaranteed life time employment, raising children became more expensive bringing financial burden on the parents. However, human capital started to become more important during the socio-economic transformation, as the return on educational attainment rose as a result of changing structure of the labor market in the country (Mason and Feng, 2005). Not only the families' but also the government's emphasis on education of the children resulted in the increase in educational levels, partly caused by the increase in the government's expenditures on education. The changes in gross enrolment ratio for secondary and tertiary education are given in Figure IV.2.3.5. Gross enrolment ratio for secondary education in China rose from 30 percent in the first half of 1980's, being the lowest, to 94 percent in 2014, being the highest among the groups it is compared. However, gross enrolment ratio for tertiary education stayed below all the groups compared until the last couple of years.

Figure IV.2.3.5. Gross Enrolment Ratio, Secondary and Tertiary Education, Both Sexes (%)



Source: World Bank

The government expenditure on education as percentage of GDP for various years is shown in Table IV.2.3.1 indicating the increasing attention of the government on education. The remarkable increase can be seen in the second half of 2000's. While the government expenditure on education was less than 2 percent in 1980, it rose up to more than 6 percent, being higher than the East Asia and Pacific region, upper middle income countries and the world.

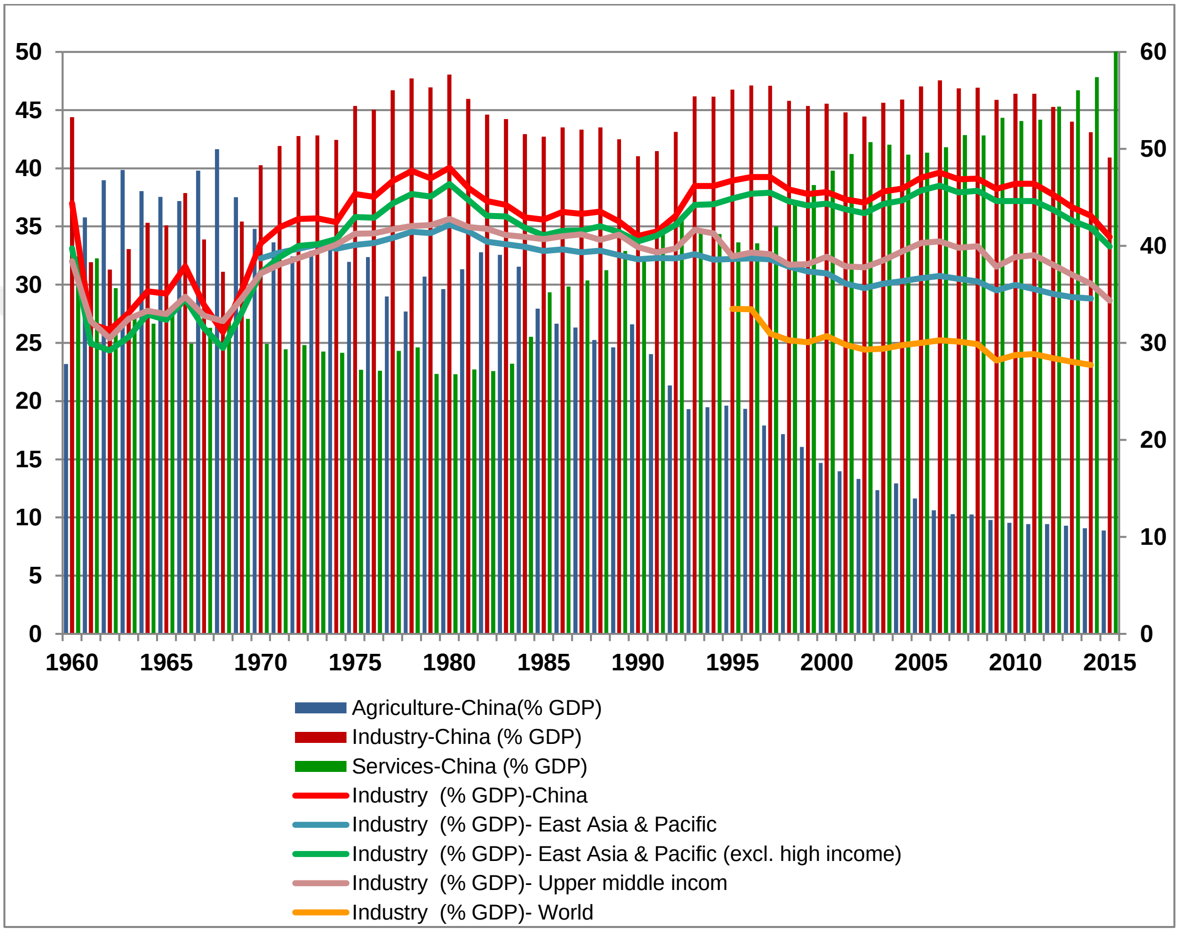
Table IV.2.3.1. Government Expenditure on education (% GDP)

	China	East Asia & Pacific	East Asia & Pacific (excl. high income)	Upper middle income	World
1980	1,93	2,96	N/A	N/A	N/A
1982	2,05	3,90	N/A	N/A	N/A
1995	1,85	3,11	2,45	N/A	N/A
1999	1,90	N/A	N/A	4,22	4,22
2008	4,89	3,51	3,51	4,10	4,41
2010	6,29	3,78	4,08	4,59	4,63
2012	6,30	4,54	N/A	4,17	4,42

Source: World Bank

Since the implementation of economic reforms and open economy policy starting in the late 1970’s by the Chinese government, the economy in the country grew rapidly especially from beginning of 1980’s until 2010. While the share of agriculture sector drop from almost 40 percent to less than 10 percent over the last 50 years, industry sector rose up 15 percent from around 30 percent to 45 percent as presented in Figure IV.2.3.6. The shrinkage in agriculture became more visible after the middle of first half of 1980’s. On the other hand, the growth of the industry sector was noteworthy in the 1970’s, which followed a slightly fluctuating horizontal pattern afterwards. The share of the industry sector has been higher than the compared groups and showed a similar and parallel pattern to East Asia and Pacific region excluding high income countries.

Figure IV.2.3.6. Agriculture, Industry and Services (% GDP)

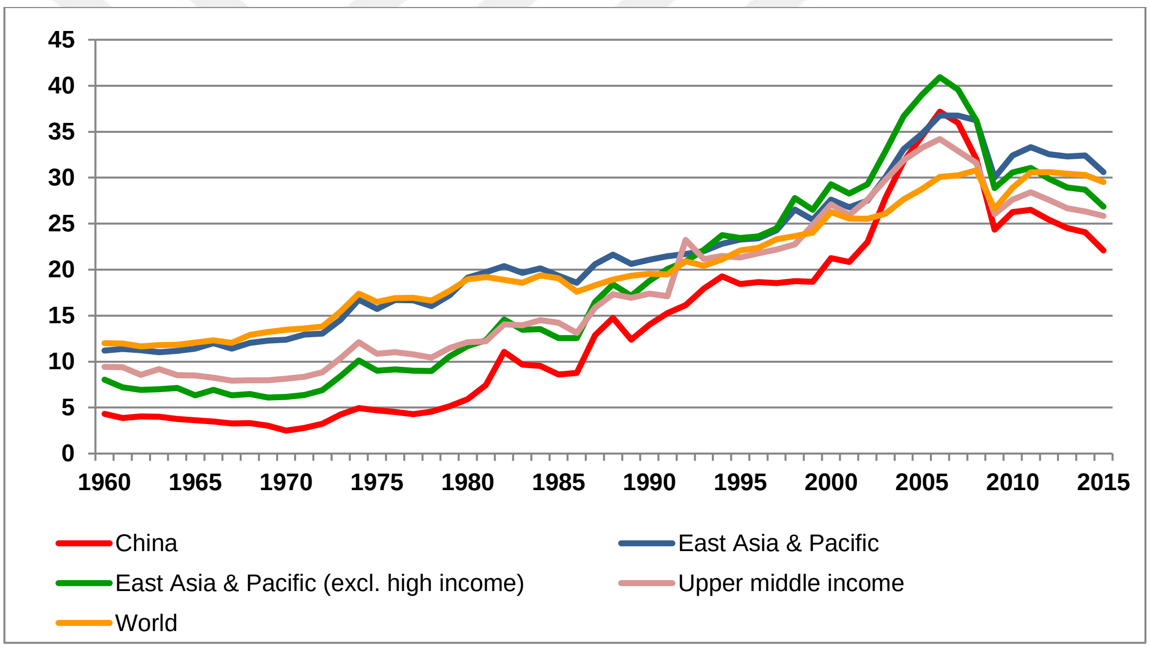


Source: World Bank

In the recent years, China became one of the countries used as a platform for production internationally, considering the low labor cost hard to compete in the global arena. The export of manufacturing goods grew tremendously especially in the 2000's. The export of goods and services is given in Figure IV.2.3.7. Low level of exports compared to the region, same income countries and the world in the previous decades changed after the beginning of 2000 and in 2006 exports of China outstripped East Asia and Pacific region, upper middle income countries and the world.

As a result of the open-door policy and low labor costs, many companies all around the world became eager to do production in urban and coastal areas of China, where economic zones with special regulations were developed. China's attention on labor-intensive industries, with the support coming from relieved restrictions on in-migration, made great contribution to expanding opportunities in employment, absorbing labor surplus from rural areas (Oizumi, 2011).

Figure IV.2.3.7. Export of Goods and Services (% of GDP)

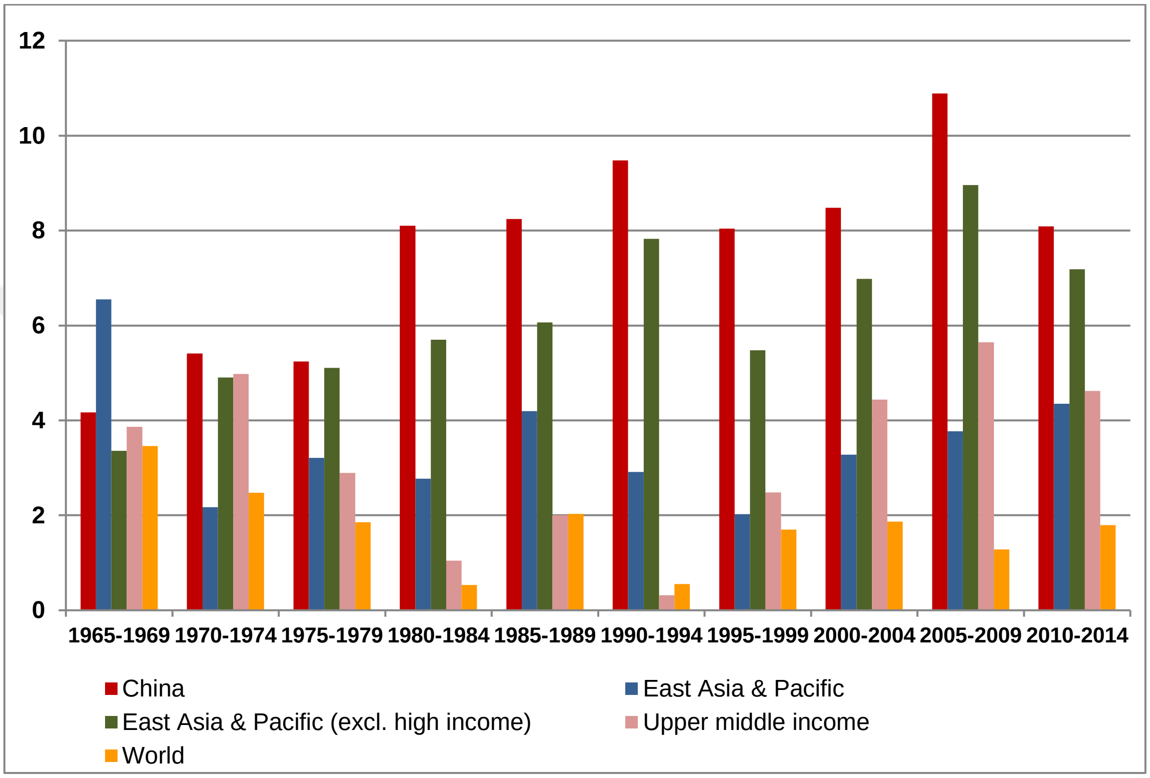


Source: World Bank

Besides these reforms, accomplishments in gender equality including improvements in female literacy rate and gender parity index in school enrollment for secondary and tertiary education points out the socio-economic developments made in the country in the last decades. Female literacy rate rose from around 50 percent in the beginning of 1980's to 95 percent in 2015, closing the gap with the region and the same income level countries. Gender parity index for education started to increase in mid-1980's until mid-2000's, again closing the gap with the region it belongs and the upper middle income countries. The index for China rose from 0.7 to 1 and from 0.5 to 1.2 in secondary and tertiary education respectively between the middle of 1970's and 2010's. The ratio of female to male labor force participation rate for the country has always been above the ratio of the region and upper middle income countries, showing a downward trend after the beginning of 2000.

As a combination of advantages served by demographic changes including decrease in total fertility rates and dependency ratios, socio-economic reforms from a planned to an open economy, structural changes resulted in the changes in the shares of the industries in the economy, in addition to the improvements in gender equality collectively contributed to the economic growth. The GDP per capita growth for the 5-year averages between 1965 and 2014 is given in Figure IV.2.3.8. The remarkable increase in GDP per capita growth for China is clear in the figure especially for 1980-2009 time period. During this period GDP per capita growth for the country is significantly bigger than the growth of East Asia and Pacific region and upper middle income countries.

Figure IV.2.3.8. GDP per capita growth (5 year average %)

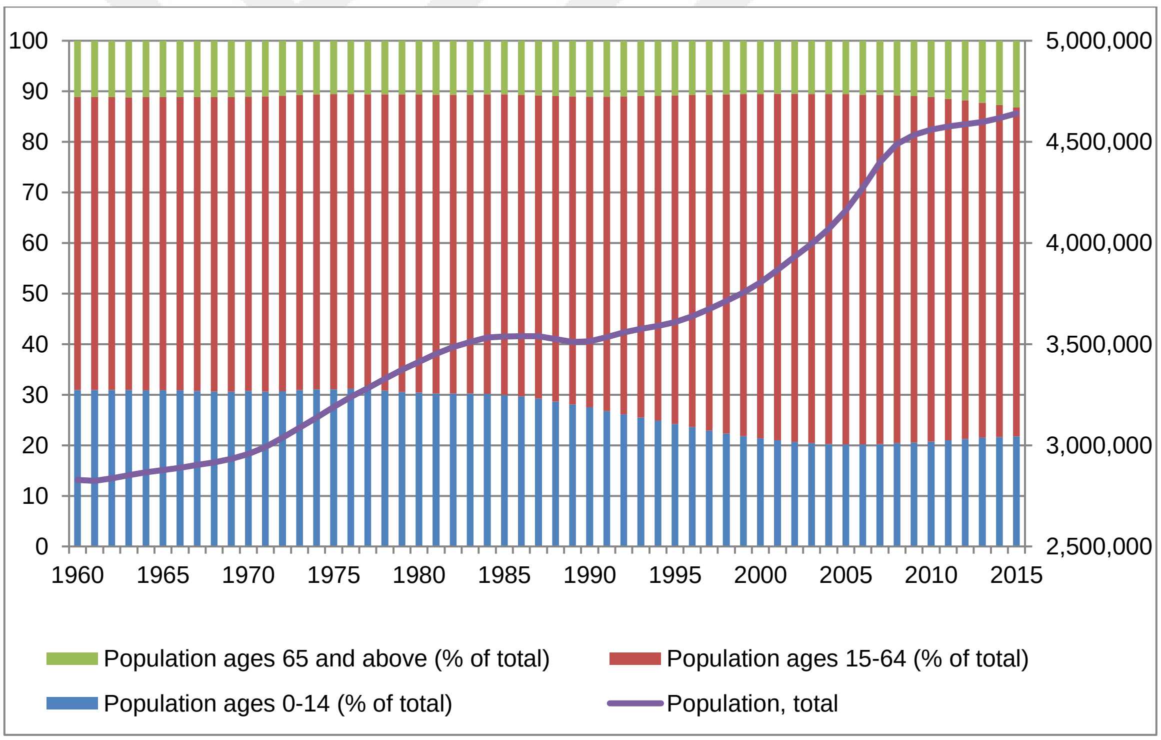


Source: World Bank

IV.2.4. Ireland

Until mid-1980's, the share of 0-14 age group in the population stayed slightly above 30 percent, which was followed by a mild decrease with and average value of around 2 percent per annum until mid-2000's. The share of this young age group finally fell down to around 22 percent in 2015 as shown in Figure IV.2.4.1. On the other hand, the share of the 65+ age group stayed almost constant around 10 percent on average during 1960-2015 time period. Looking at the changes of these two age groups, it can be stated that Ireland entered demographic window of opportunity in 1985 and the window is still open. Even though the fertility rate of Ireland had a decreasing pattern during the period in general, the increasing trends observed several times in the fertility rate can be pointed out as the major reason in the relatively high population increases occurred two times between the beginning of 1970's and mid-1980's and mid-1990's and end of 2010's. During the first one the annual growth rate on average increased to 1.3 percent, while second one had an average annual increase of 1.7 percent. In order to emphasize the magnitude of the annual population growth during these two periods, it is noteworthy to mention that except these two periods the annual increase rate of population in Ireland was around 0.3 percent.

Figure IV.2.4.1. Population Distribution for the Specific Age Groups and the Total Population

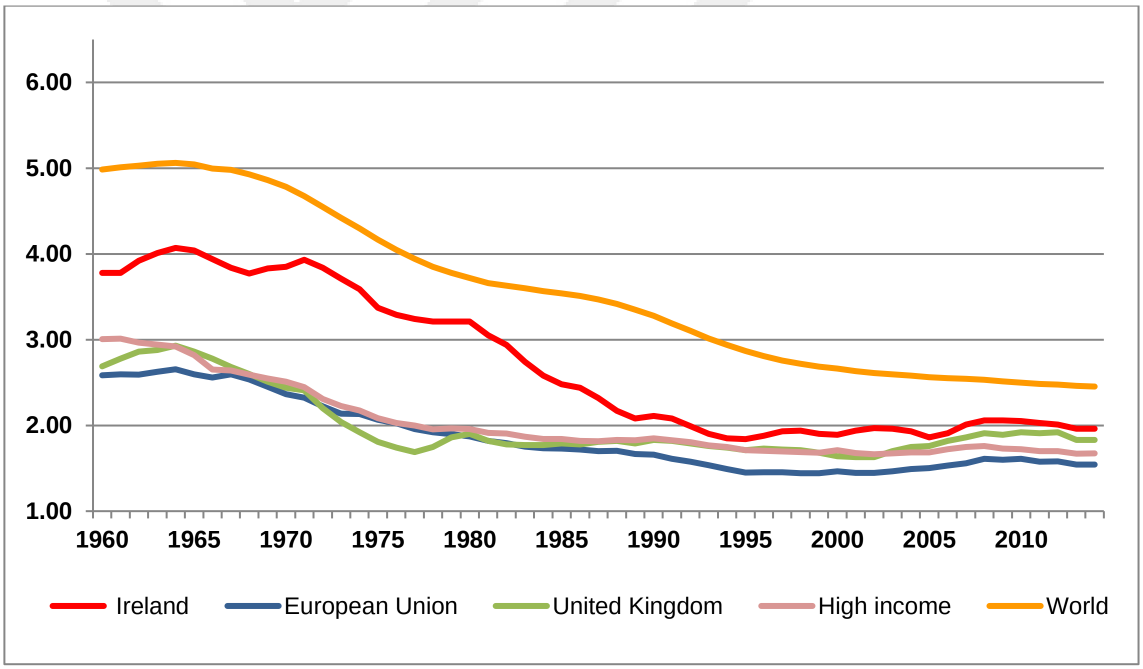


Source: World Bank

In Figure IV.2.4.2 total fertility rates in Ireland is compared with the rates of European Union, United Kingdom, high income economies and the world. The total fertility rate in Ireland had been significantly high compared to many other European countries and high income countries until 1990's. During 1960's while the fertility rate in

Ireland was around 3.9 births per woman, it was around only 2.8 births per woman in United Kingdom and high income countries. However, as a result of the family planning programs and the release of limitations on birth control in 1970's, the fertility rate in the country started to fall significantly especially after the legalization of contraceptive usage in the country in 1979. After mid-1990's, fertility rate in Ireland converged to the fertility rates of European Union, United Kingdom and high income countries and stayed below 2 births per woman on average till the rest of the period.

Figure IV.2.4.2. Total Fertility Rates

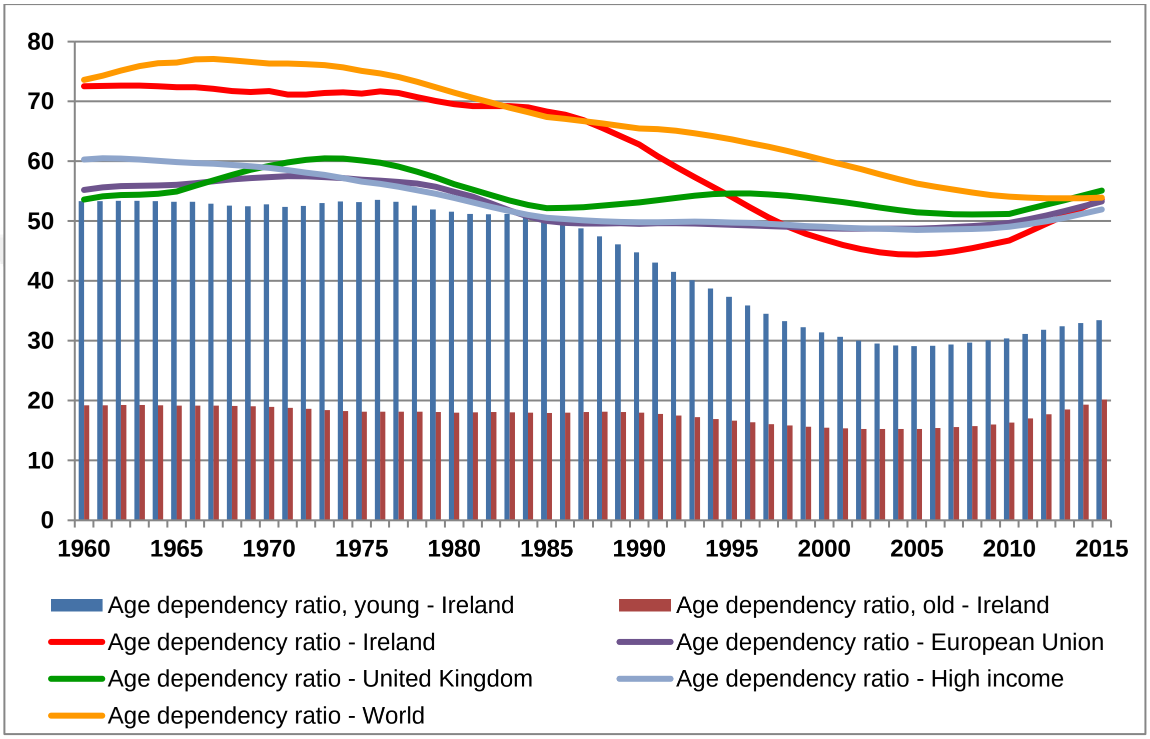


Source: World Bank

From the beginning of 1960's and mid 1980's, age dependency ratio in Ireland was over 70 percent, which had been significantly high compared to European Union, United Kingdom and high income countries as shown in Figure IV.2.4.3. Starting from mid-1980's a remarkably decrease in the dependency ratio was observed; resulting in relatively low values compared to the region and same income group countries.

Between end of 1990’s and mid-2000’s, age dependency ratio in Ireland was lower than the compared groups with a value of around 46 percent on average. After this period there has been a slight increase in the ratio till present. When the decomposition of the dependency ratio for Ireland is made, it can be seen that the major reason for the decrease in age dependency ratio was the decrease in young age dependency ratio started in mid-1980’s, reaching an almost a constant value of 30 percent in the beginning of 2000’s. By contrast, old age dependency ratio in Ireland stayed almost constant for the whole period around a value of 17 percent on average. However, to be more precise it can be said that old age dependency ratio which was around 19 percent in the beginning of 1960’s dropped down to almost 15 percent in mid-2000’s and rose up to 20 percent by the end of the period, having a mild U pattern in general. The main reason lying behind the conspicuous decrease in age dependency ratio can be stated as the rapid decrease in total fertility rate during 1970’s and 1990’s. It is important to underline that sudden decrease in age dependency ratio had a key role in making use of demographic advantage in terms of economic growth in Ireland which was named as a demographically-induced economic boost (Fortin, 2001; Bloom, 2003).

Figure IV.2.4.3. Age Dependency Ratios (Young, Old and Total - % of working-age population)



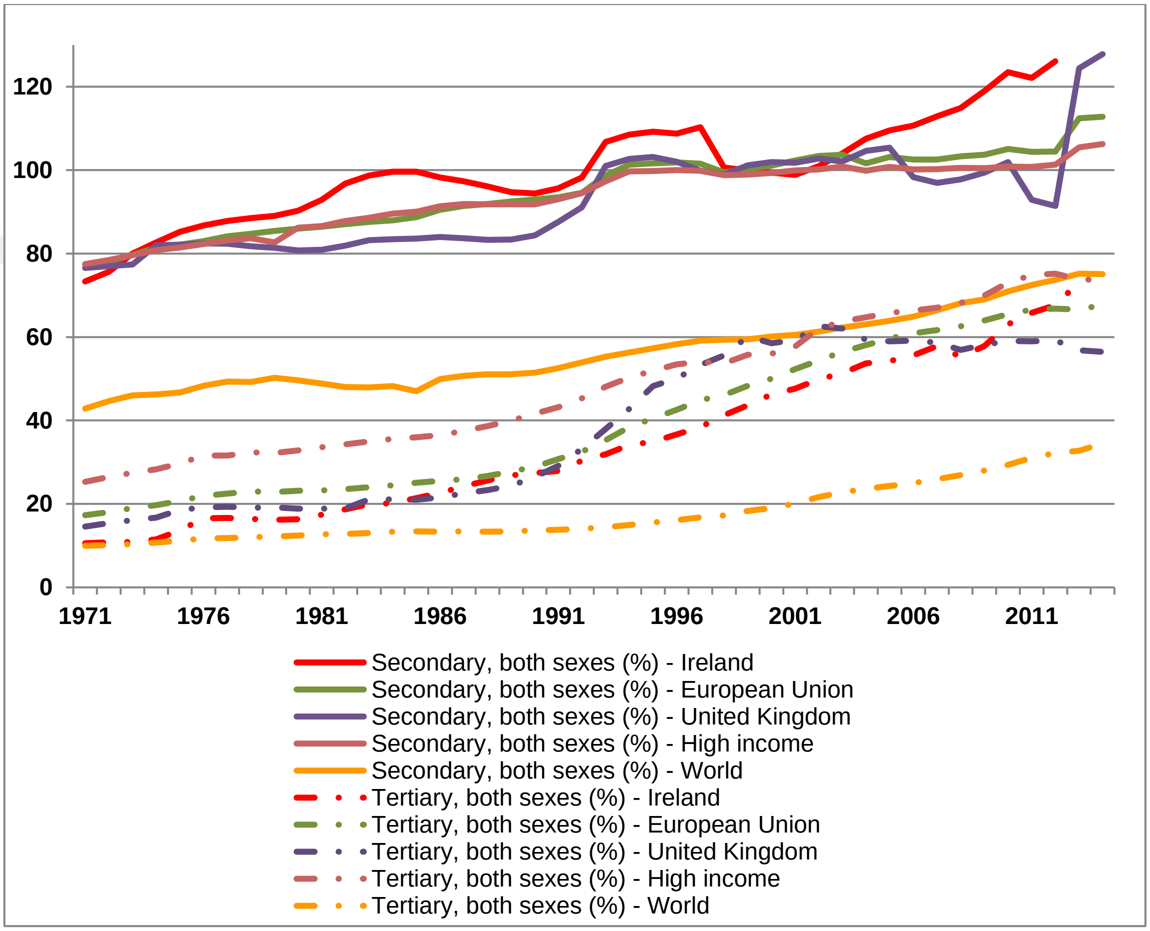
Source: World Bank

With the introduction of free secondary education in the mid-1960's, there had been a significant increase in the enrolment ratio of secondary education in Ireland which consequently resulted in increase in entering higher education. As it can be seen in Figure IV.2.4.4, gross enrolment ratio for secondary education in Ireland was lower than the ratios in European Union, United Kingdom and high income countries in the beginning of 1970's with a value of slightly lower than 75 percent. However, starting from the second half of 1970's, there has been a clearly observed increase in the enrolment ratios for secondary education in Ireland and afterwards enrolment ratio in Ireland was higher than the ratios of compared groups in general. Especially after mid 2000's the ratio rose up from around 100 percent to around 125 percent in less than 10 years. The trend of enrolment ratio for tertiary education in Ireland has been slightly different than the ratio for secondary education. It has been below or close to the values of European Union, United Kingdom and high income countries until 2010. It was only in recent years that the enrolment ratio for tertiary education in Ireland was in an upward trend which was steeper than the trend of compared counterparts. The enrolment ratio in the country for tertiary education finally rose up to 73 percent in 2013 which was higher than the ratio in European Union and United Kingdom but slightly below the ratio in high income countries. In general, it can be commented that since 1970’s there has been an improvement in the enrolment for secondary education in Ireland which was followed by a lagged improvement in the enrolment for tertiary education.

In addition, considering 5-year average values, the government expenditure on education as a share of GDP in Ireland was slightly higher than the shares of compared groups starting from 1980’s for 15 years and in the recent years also reaching a value of slightly more than 5 percent for 2006-2010 time period.

The positive effects of educational reforms can be seen in the long run as commonly expected. While most of the other Northern Europe countries started to invest in education in post-war years and experienced its contribution to the economy even in the 1970’s; Ireland had a chance to have a similar experience with a 20 year-delay, because of starting to invest in education about 20 years later compared to these countries (Koman and Marin, 1996; Gerald, 2006).

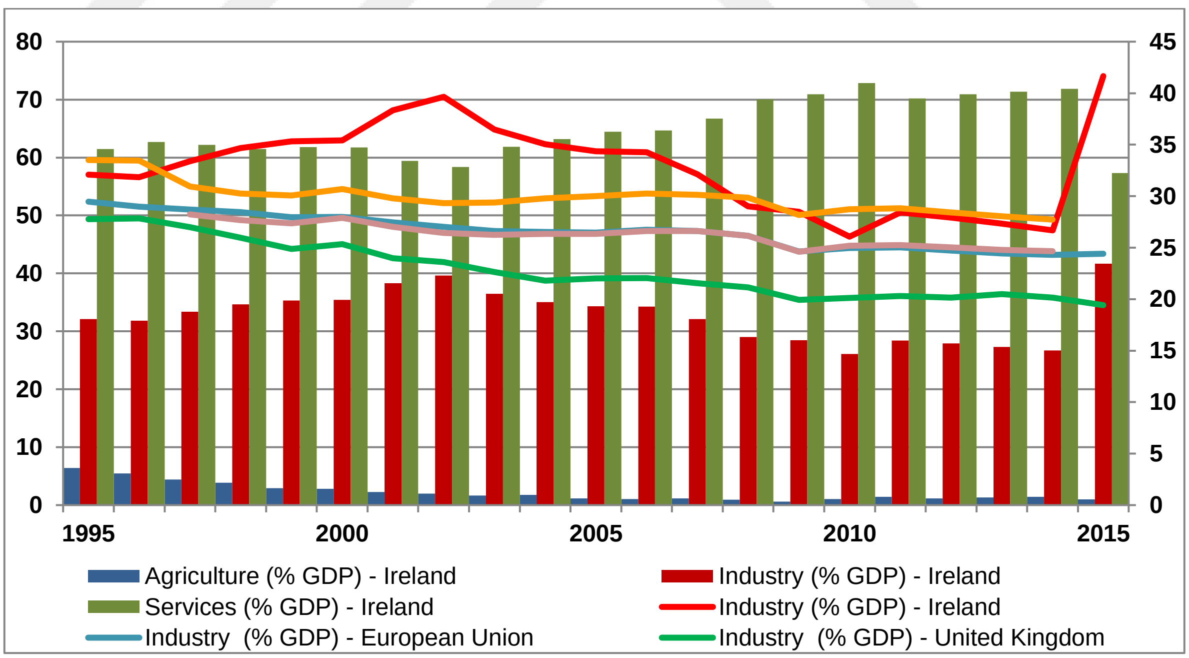
Figure IV.2.4.4. Gross Enrolment Ratio, Secondary and Tertiary Education, Both Sexes (%)



Source: World Bank

In Ireland the importance given to industry sector was developed by time, following 1960's, when agriculture was the dominant sector of the economy and its share in the economy was considerably higher compared to the neighboring countries. In the late 1950's a policy change in economy was introduced in order to attract foreign investment in manufacturing sector. This policy change was originated from the increasing necessity that industry sector had to take place of the agriculture sector which was losing importance unavoidably as occurred in all of the developing economies. The transformation of manufacturing sector which started in the 1970's from low technology and traditional industries to high technology industries greatly contributed to the economic development in Ireland. Today, the group of the sub-sectors of the manufacturing industry in Ireland, including electronics and pharmaceuticals plays an important role in triggering economic growth (Gerald, 2006). In Figure IV.2.4.5, the changes in the shares of the sectors in the economy in Ireland and comparison of the industry sector with various groups and countries are presented. The diminishing share of the agriculture sector can be seen clearly in the figure. While the share of the industry sector varies between 30 and 40 percent in general, the share of the services sector increases from around 60 percent to around 70 percent over 20 years. The share of the industry sector in Ireland has been in general bigger than in European Union countries, high income countries and the world for the last 20 years.

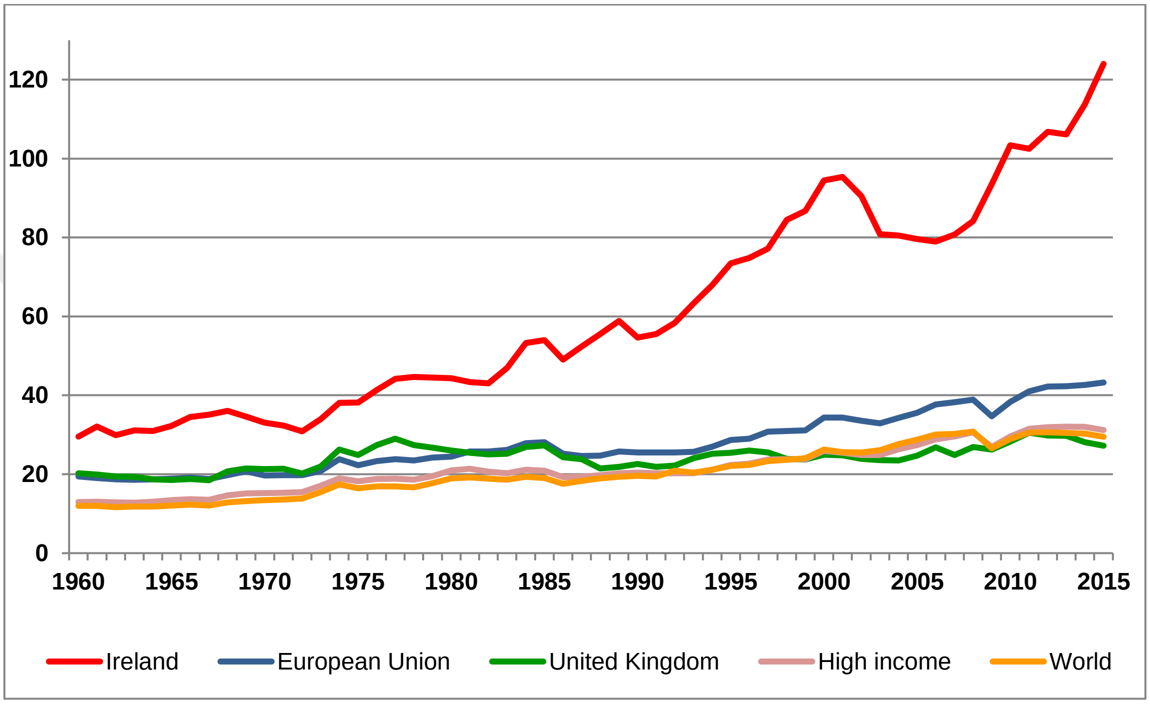
Figure IV.2.4.5. Agriculture, Industry and Services (% GDP)



Source: World Bank

The policy change contributed strongly on the transformation of the economy in Ireland. Reduction of the corporate tax rate contributed to taking attention of international companies in the beginning. Later, accumulation of skilled labor force took the major role in attracting foreign investment (Barry and Bradley, 1997). Multinational firms also accelerated the demand for skilled labor force and significantly served to reversing out-migration of skilled labor. The contribution of the foreign firms was not limited with the in-flux of the skilled labor force. They also implemented new management skills and modern technologies which were new to the country itself. Foreign direct investment in the manufacturing sector that was export oriented brought Irish economy to a higher level. While foreign owned companies exported about 90 percent of their manufacturing products, local firms in Ireland exported only 36 percent of their manufacturing products. It can be said that, foreign firms in Ireland to a great extend enabled opening of the Irish economy to abroad (Gerald, 2006). Export of goods and services in Ireland rose tremendously starting from the beginning of 1970’s as shown in Figure IV.2.4.6. While the exports as a percentage of GDP was only around 30 percent in the beginning of 1970’s, it gradually increased to more than 120 percent in 2015, experiencing a decreasing period during mid-2000’s.

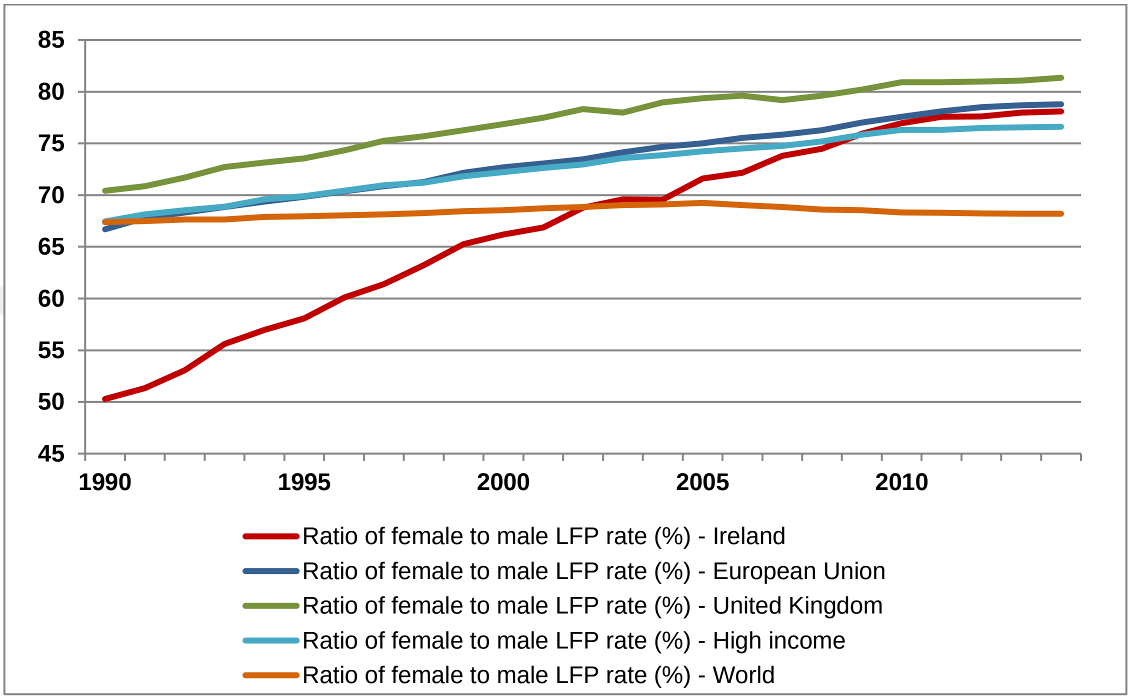
Figure IV.2.4.6. Export of Goods and Services (% of GDP)



Source: World Bank

The outstanding increase in female labor force participation rates was also another key factor that fueled up the Irish economy. During 1980-2000 period, female labor force participation in the economy rose up, especially due to 25-40 age group. Although growing economy could be taken as the major reason in increase of the female labor force participation, the availability and the prevalence of the contraception played an important role. It is important to mention that during that period of time male labor force participation followed a horizontal pattern, making only slight changes in participation rate. In Figure IV.2.4.7, ratio of female to male labor force participation rate is presented. The upward pattern for Ireland is remarkable, where the ratio increased to almost 80 percent from 50 percent during 1990-2015 period. The gap between Ireland and the compared groups narrowed rapidly and in 2015 Ireland caught up with the European Union and high income countries.

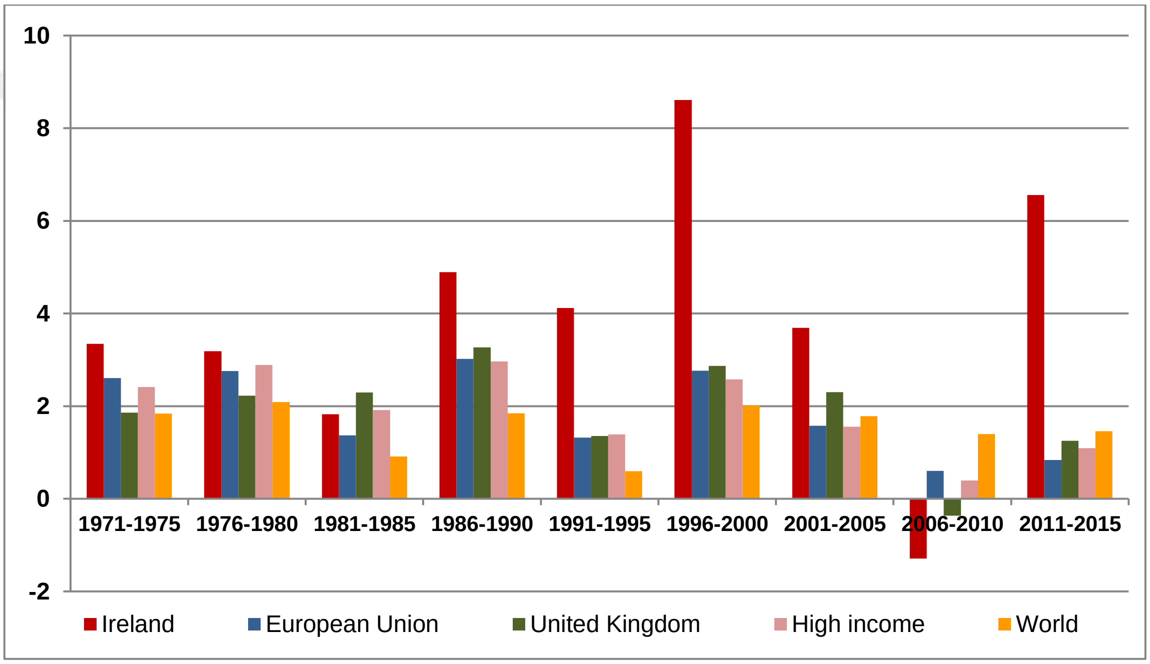
Figure IV.2.4.7. Ratio of Female to Male Labor Force Participation Rate (%)



Source: World Bank

Ireland can be given as a good example of one of the countries that gained substantial economic growth recently by making use of demographic advantages resulting from the shifts in age structure. However, it is noteworthy to underline that this economic success would not came true without the adequate set of policy reforms and choices made by the government such as providing free secondary education, making necessary structural reforms in order to make a shift among the shares of the sectors, maintaining a secure environment for foreign investment, supporting manufacturing and export oriented open economy and foster female labor force participation in the economy. In Figure IV.2.4.8, GDP per capita growth rates for 5-year average values are given for Ireland and the counterparts. Except 2006-2010 time period, Ireland achieved great success in maintaining economic growth which was always higher than the growth in European Union and high income countries. The growth in Irish economy between 1986 and 2000 was tremendous, especially for the 1996-2000 period with a value of more than 8 percent. In general, Irish economy grew almost 4 percent annually on average for 45 years, which is two times the economic growth in high income countries.

Figure IV.2.4.8. GDP per capita growth (5 year average, %)

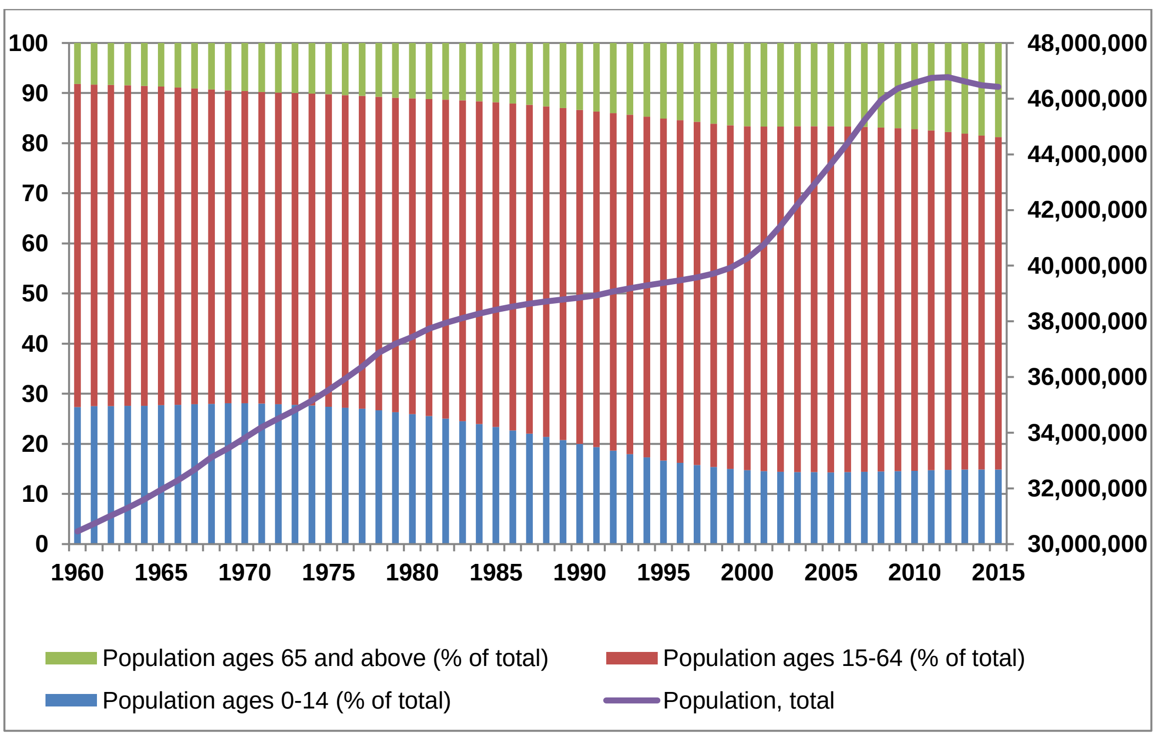


Source: World Bank

IV.2.5. Spain

Young age group in Spain had been slightly less than 30 percent until mid-1970's. After then the share of this age group demonstrated a gradual decrease by 2000, which was followed by a horizontal pattern after reaching the value 15 percent. On the other hand, the share of old age group of the population, with an initial value of 8 percent, increased continuously, where the speed of increase accelerated after mid-1980's and slowed down again since beginning of 2000's, reaching a value of almost 19 percent in 2015. The percentage distribution of the age groups show that, Spain was already in the demographic window of opportunity in the beginning of 1960's and left the window in mid-1990's. The population change in the country has been unique considering the changes in its total fertility rate over the whole period. While Spain had a population of around 30.5 million in 1960, following a linear increase for 20 years, the population of the country reached to almost 37.5 million in 1980. The population increase went through a slowing down period till the end of 1990's, as a result of the rapid decrease in total fertility rate. However, the population started to increase quickly and had an annual growth rate of 1.5 percent on average for a decade. After the beginning of 2010's the pattern of the population had a downward trend for the first time over 55 year-time period, going back to a value of 46.4 million in 2015. To summarize the whole story, the share of the age groups and the changes in total population in Spain is presented in Figure IV.2.5.1.

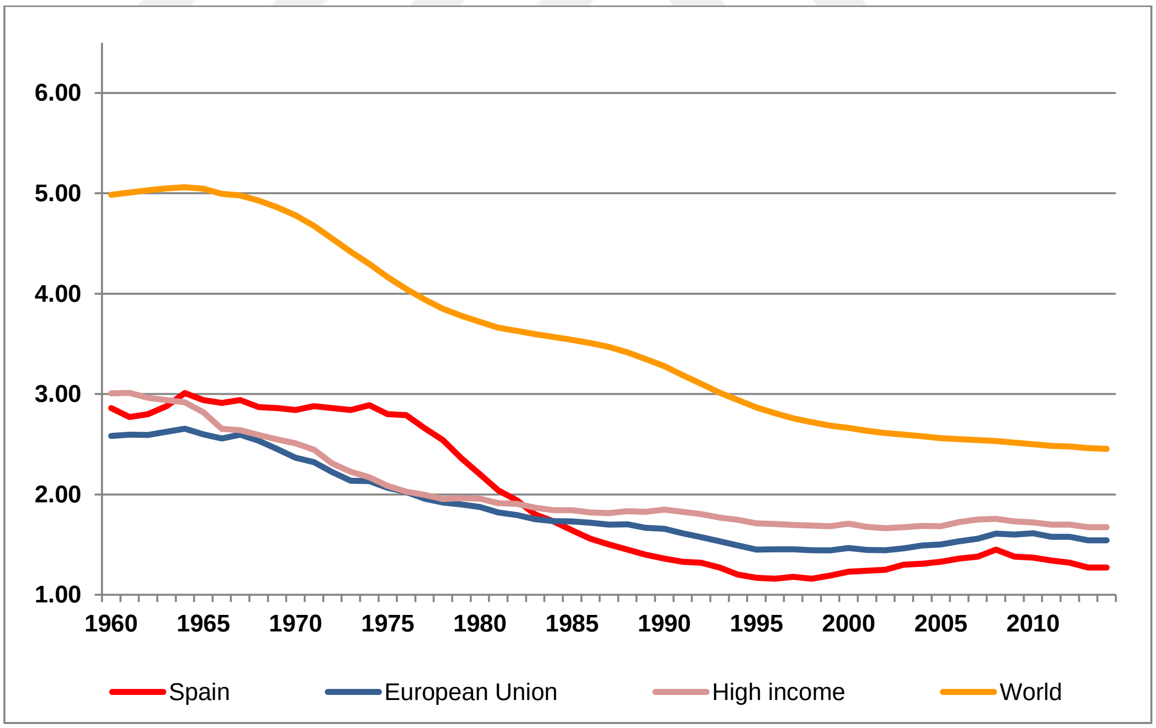
Figure IV.2.5.1. Population Distribution for the Specific Age Groups and the Total Population



Source: World Bank

Between 1965-1975 time period the total fertility rate in Spain had been relatively high with a value of almost 3 births per women compared to European Union and high income countries as shown in Figure IV.2.5.2. Starting from mid-1970's fertility rate in the country started to decrease 4 percent a year on average until mid-1990's and dropped down to a value of 1.17 in 1995 which was considerably low compared to any country in the world. However, an increase in fertility rate was observed in 2000's until 2008, going up to a value of 1.45 births per women due to the increase in number of immigrants with higher fertility behavior (Renteria, Romero, Souto, 2009). Due to the decline in fertility in the recent years, total fertility rate in the country went down to 1.27 births per women in 2014.

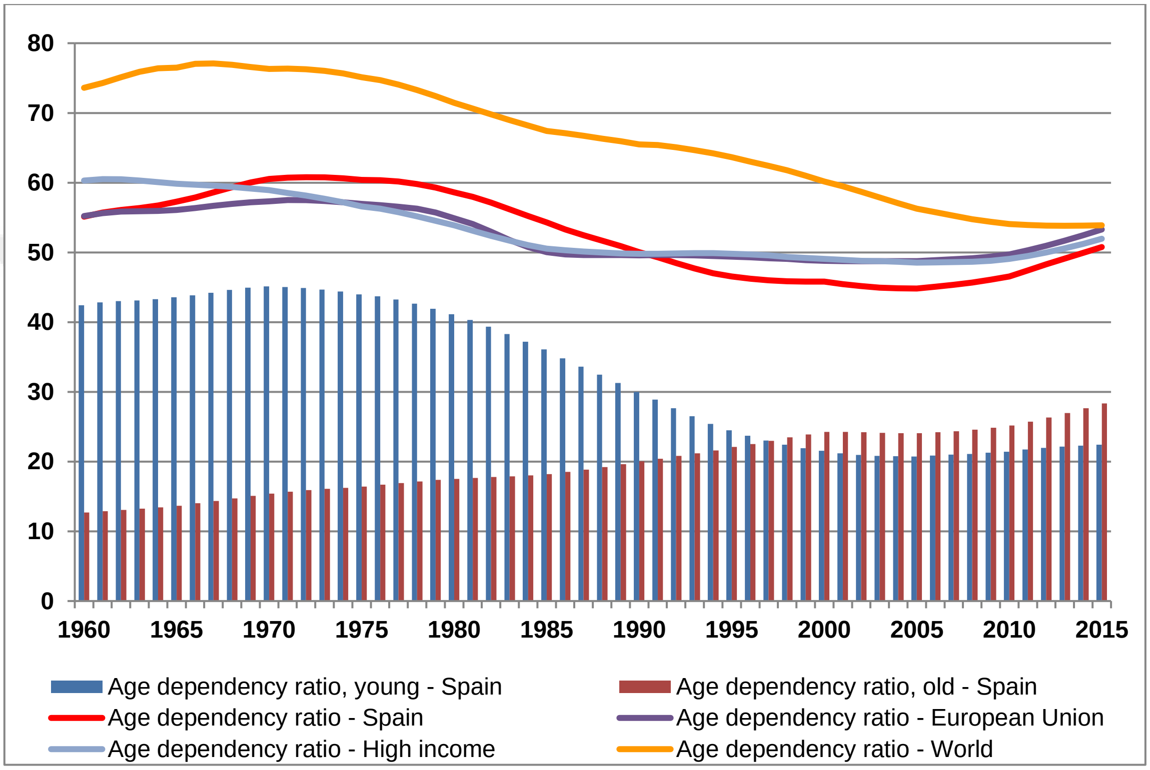
Figure IV.2.5.2. Total Fertility Rates



Source: World Bank

Demographic transition in Spain can be evaluated as unique compared to other European countries. The country had one of the fastest aging populations among the counterparts. The demographic transition in Spain started later but the transition had been faster compared to the countries in Europe (Perez, 2001; Renteria, Romero, Souto, 2009). The late start in demographic transition exposed itself by the high levels of fertility in 1960's and 1970's compared to other European countries. On the other hand, rapid fertility decline started in late 1970's and lasted until 1990's accelerated the demographic transition and resulted in a rapid aging population. These demographic developments were also seen in the changes in age dependency ratios for Spain. In Figure IV.2.5.3, young, old and total dependency ratios for Spain and total dependency ratios for European Union, high income countries and the world are presented. The total dependency ratio in Spain in general had been slightly higher than European Union and high income countries until 1990. Then it stayed mildly below the rates of the counterparts. Even though there had been a noticeable amount of decrease in young dependency ratio in Spain during 1975-1995 period, because of the continuous gradual increase in old dependency ratios, the decrease in the age dependency ratio had been somewhat limited. In 1960 the age dependency ratio in Spain was around 55 percent, while in 2014 it dropped down only 4 points and had a value of almost 51 percent.

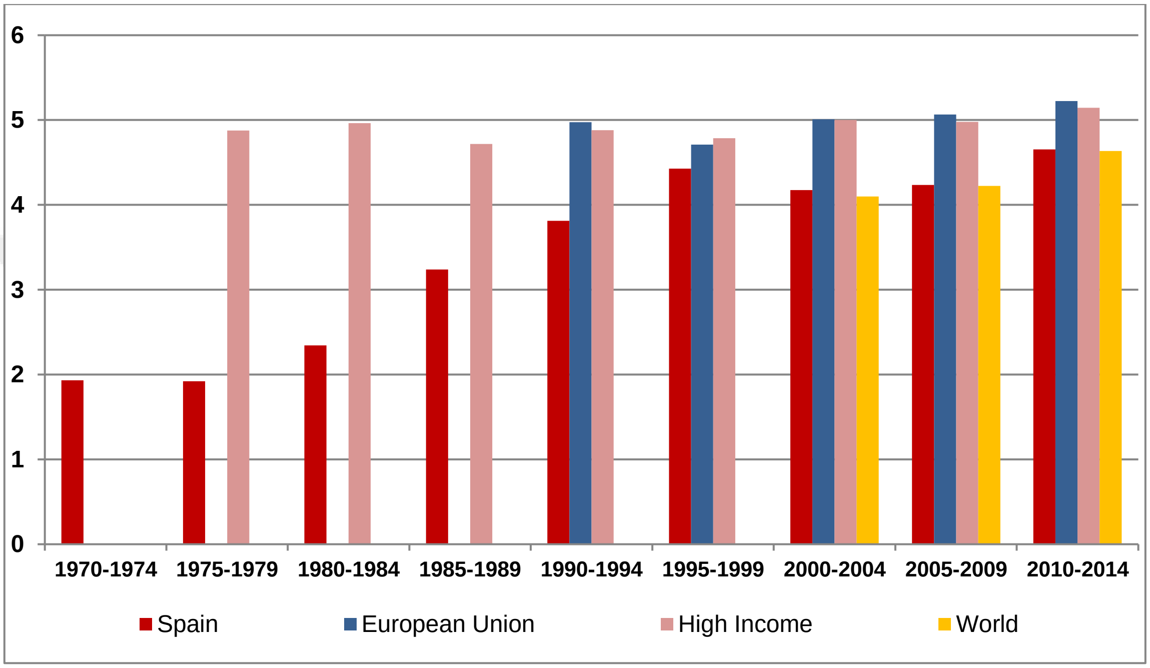
Figure IV.2.5.3. Age Dependency Ratios (Young, Old and Total - % of working-age population)



Source: World Bank

Despite low levels of government expenditures on education as percentage of GDP in 1970's in Spain, the GDP share of expenditures on education had been increasing steadily until the end of 1990's from around 2 percent to almost 4.5 percent as given in Figure IV.2.5.4. While the initial levels of education expenditures were considerably low in the beginning, as the importance given to the education by the government increased, the gap between Spain and European Union and high income countries narrowed over time. For 2010-2014 period, the financial resources used for the education by Spanish government has reached to around 4.7 percent of the GDP of the country, reducing the gap to 0.5 points with European Union countries.

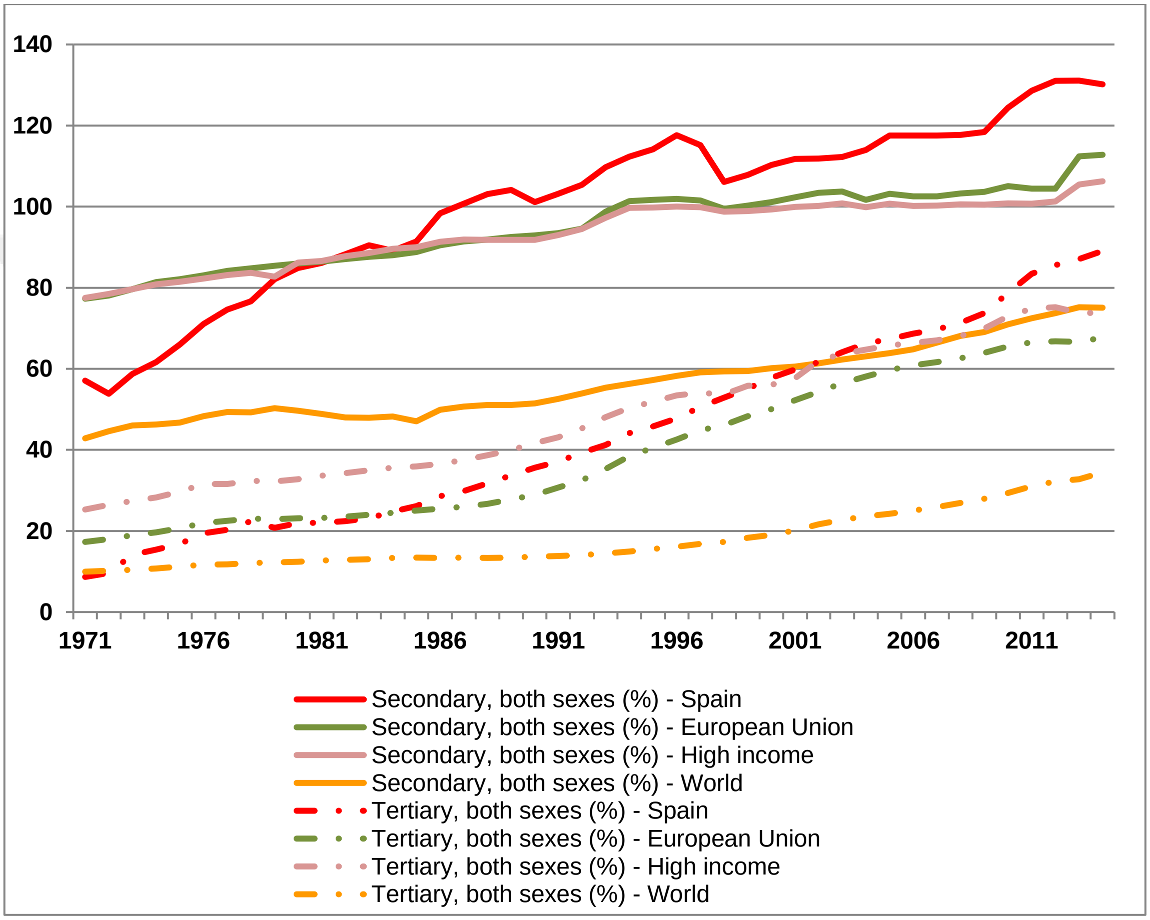
Figure IV.2.5.4. Government expenditure on education, total (% of GDP, 5 year average)



Source: World Bank

The positive contribution of the increase in expenditures made by the Spanish government on education can be seen on enrolment ratios for both secondary and tertiary education. Even though the enrolment ratio for secondary and tertiary education had been below European Union and high income countries until mid- 1980's, with the rapid increase in the following years, Spain achieved remarkable enrolment ratios which are approximately 20 points higher than its counterparts both in secondary and tertiary education. It is noteworthy to mention that in the beginning of 1970's enrolment ratios for secondary and tertiary education for Spain were around 55 percent and 10 percent respectively. Figure IV.2.5.5 illustrates the developments in enrolment ratios for Spain and compares them with the ratios for European Union, high income countries and the world.

Figure IV.2.5.5. Gross Enrolment Ratio, Secondary and Tertiary Education, Both Sexes (%)

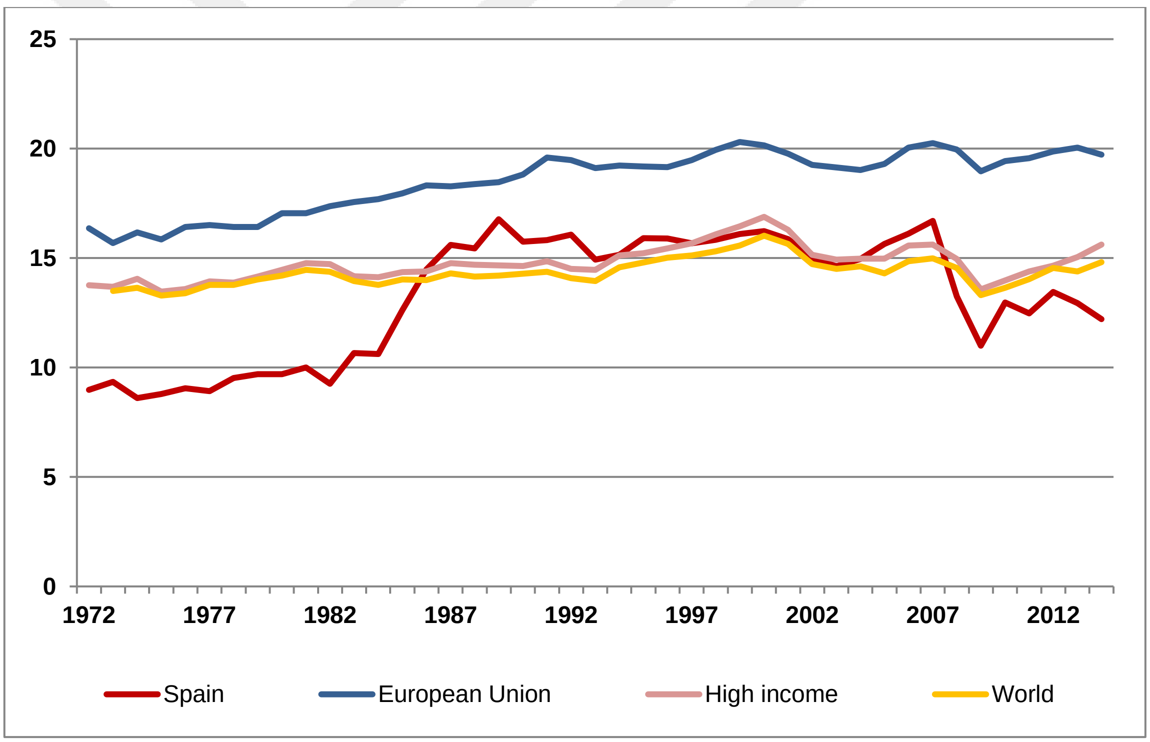


Source: World Bank

Spain has gone through an era of public sector reforms while moving into a democratic system following the death of General Francisco Franco in 1975. Deep tax policy and tax administration reforms were two of these important reforms made in 1980's and 1990's. After joining European Economic Community (EEC) in 1986, Spain started implementing Value Added Tax (VAT) in accordance with the harmonization with EEC. Fiscal reforms aimed to increase tax revenues had been successful and the revenues were used in public services and infrastructure which can be pointed out as one of the reasons maintaining sustainable economic growth in Spain (Martinez-

Vazquez and Torgler, 2009). In Figure IV.2.5.6, tax revenues as percentages of GDP are presented for Spain, European Union, high income countries and the world. The increase in tax revenues of Spain in 1980's is eye catching, going up to almost 17 percent in 1989 from around 9 percent in 1982. While Spain was considerably below its counterparts in terms of tax revenues until mid-1980's, in the following years it caught up with its counterparts except the last a few years.

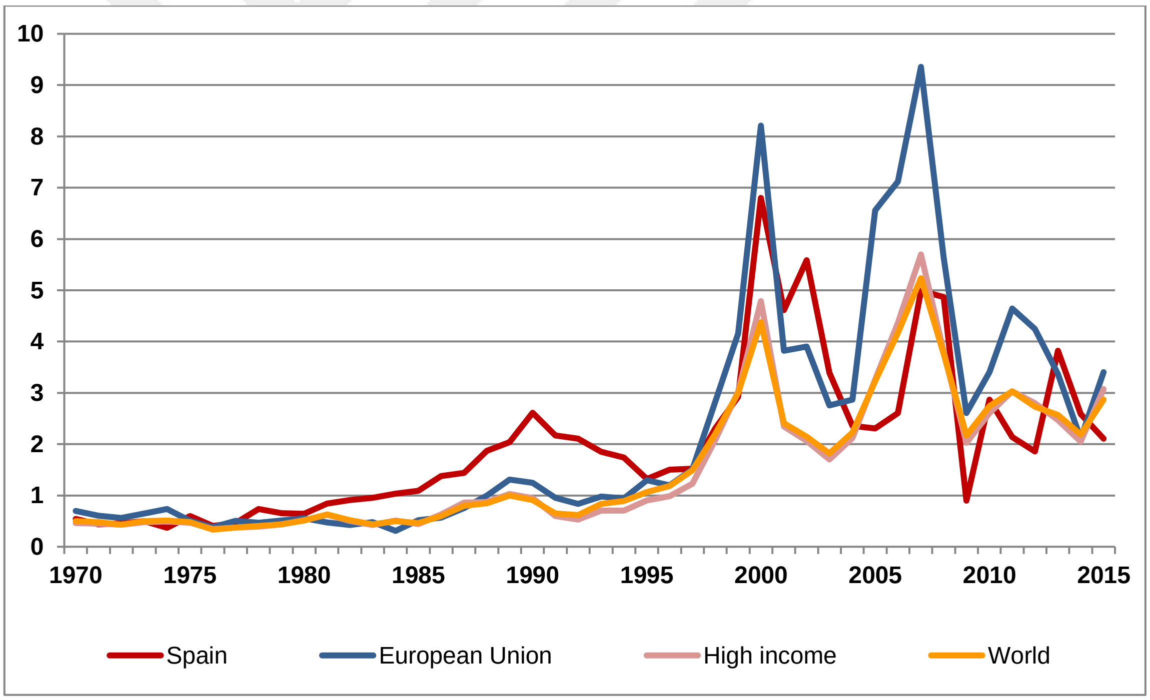
Figure IV.2.5.6. Tax revenue (% of GDP)



Source: World Bank

It is argued that foreign direct investment came from France and Germany to Spain, after the accession of Spain in the European Union could be explained by the strong support for Spain being in the union came from France and Germany and noticeable economic gains made by both French and German companies. While French companies had the advantages of new customer-oriented policies, German companies continued doing business with companies which were originally located in the Spanish market (Puig and Castro, 2009). Indeed, foreign direct investment came to Spain grew tremendously after mid 1980's and had been remarkably higher than the foreign direct investment came to European Union and high income countries until the second half of 1990's. The developments in foreign direct investment as percentages of GDP for Spain and its comparison with the counterparts are demonstrated in Figure IV.2.5.7.

Figure IV.2.5.7. Foreign direct investment, net inflows (% of GDP)



Source: World Bank

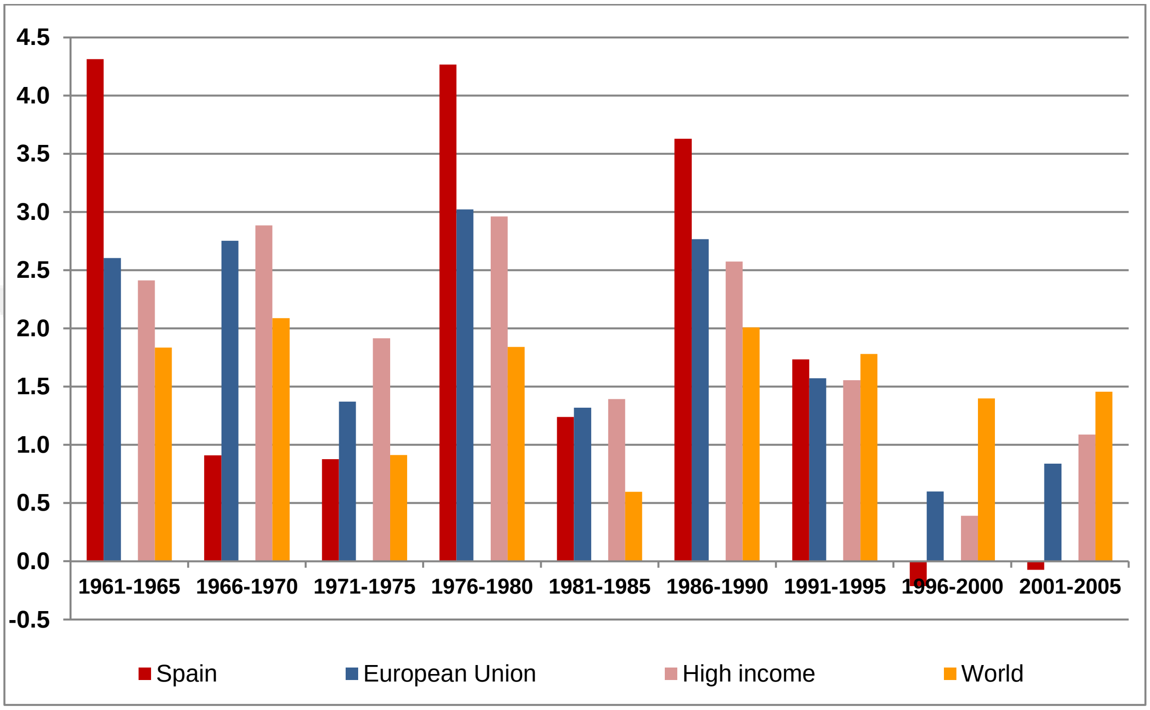
In general Spain has been a member of the European Union with one of the highest unemployment rates for the last few decades. The country had advantages in terms of unemployment benefits, job security and the system of wage bargaining compared to many other European countries, all of which could be named as some of the reasons of the continuing high unemployment in Spain. In the 1970's unemployment rose and by 1980 it reached to a value of more than 20 percent (Bover, Garcia-Perea, Portugal and Sorensen, 2000). After some year of decrease, unemployment went up to almost 25 percent in 2014.

From 1980 to 1995 total labor force participation rate in Spain stayed around 50 percent while female labor force participation rate increased from 28 percent to 36 percent and male labor force participation rate decreased from 77 percent to 65 percent. In this respect, it can be stated that the contribution of the increase in female labor force participation rate neutralized by the decrease in male labor force participation rate. So, despite other countries selected in this study which made use of demographic contribution, in Spain the positive impacts of improved gender equality in labor market on economic growth was strongly limited.

So in short, in addition to the advantages originated from European Union accession and foreign direct investment came from the member countries such as France and Germany and grown tax revenues due to tax reforms made by the government, demographic changes also contributed to the economic growth of the country. There are various studies concluding Spain’s gain from the first demographic dividend in 1980’s and 1990’s (Rentaria, Romero, Souto, 2009; Romero, Abio, Patxot and Souto, 2016).

As presented in Figure IV.2.5.8, the 5-year average GDP per capita growth in Spain had been outstanding for 1961-1965, 1976-1980 and 1986-1990 periods with values of 4.3, 4.3 and 3.6 respectively. It is worth to emphasize that 1965-1975 period which Spain had smaller economic growth compared to European Union and high income countries, the fertility rate was high and so was the age dependency ratio.

Figure IV.2.5.8. GDP per capita growth (5 year average, %)

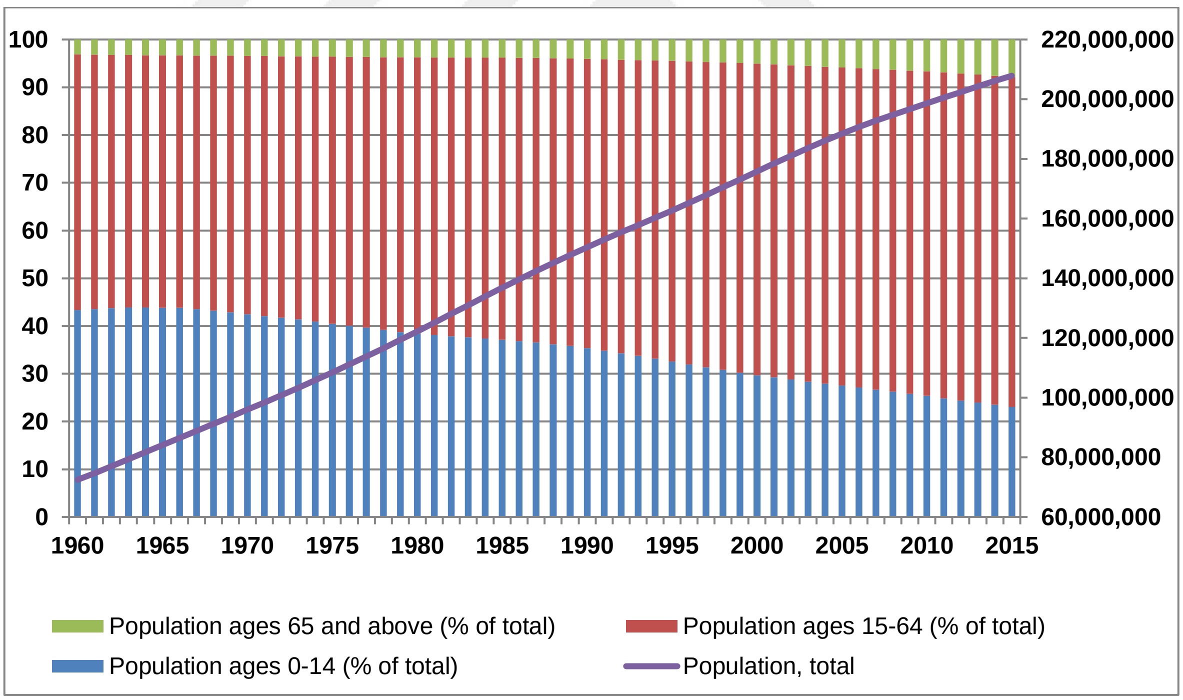


Source: World Bank

IV.2.6. Brazil

Brazil had a very young population in the past, especially between 1960-1975 time period, where the share of the young population had been over 40 percent of the whole population. However, there had been a gradual decrease in the young age population from 40 percent in 1975 to 23 percent in 2015 which was expected as a consequence of the demographic transition. On the other hand, old age population of the country displayed a mild increase until 1985, with an average growth rate of 0.8 percent annually. Afterwards, the rate of increase in the old age group had an increasing trend in general with an average growth rate of around 2.5 percent and resulted in almost 8 percent share for the old age population in 2015. The trends in the age groups show that Brazil entered the demographic window of opportunity in 2000 and will be in the window for a few more decades as long as the demographic trends stay stable. In literature, Brazil is assessed to have entered the demographic window slightly earlier than other Latin America countries (Wong and de Carvalho, 2004). The country initially had approximately a 72.5 million population in 1960 and has grown up to almost 208 million in 2015, following a linear trend in general. Figure IV.2.6.1 depicts the changes in the shares of the age groups in the country and Brazil's population developments over the decades. In general it can be stated that the characteristics of the demographic transition in Brazil have been set by the rapid changes (de Carvalho and Wong, 1999; de Carvalho 1997-1998; Queiroz and Turra, 2010).

Figure IV.2.6.1. Population Distribution for the Specific Age Groups and the Total Population



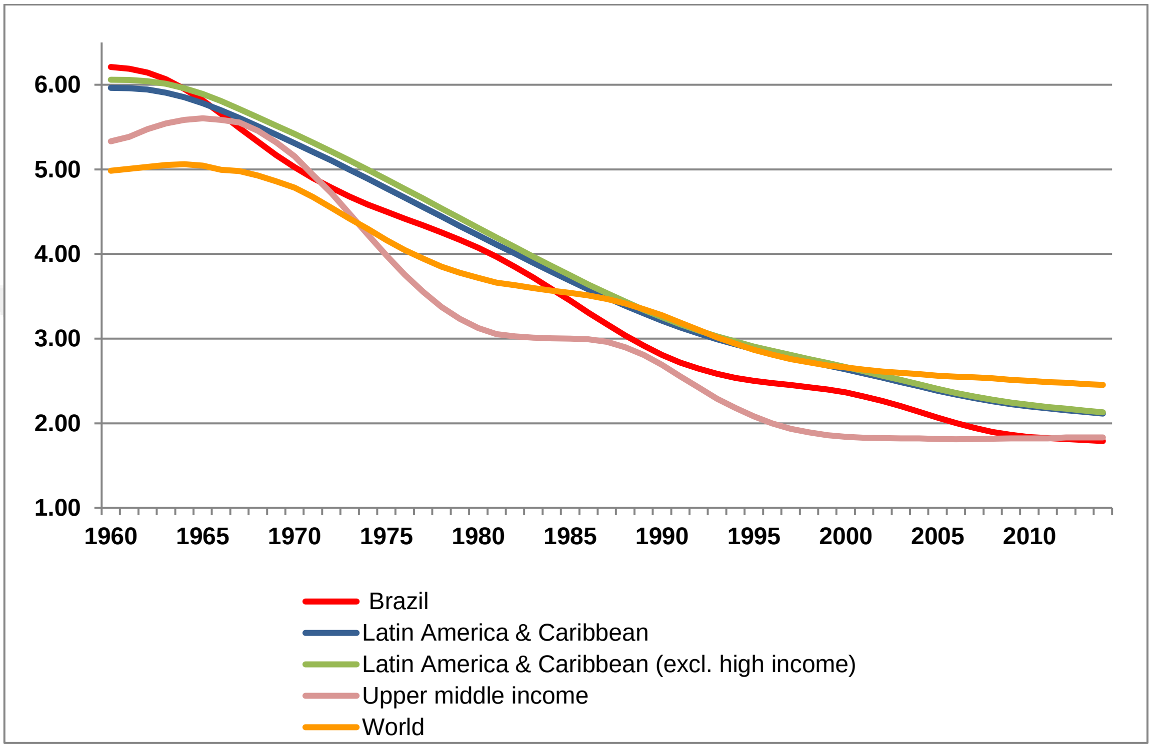
Source: World Bank

In Brazil, the decrease in total fertility rate has been bigger even compared to Latin America and Caribbean region over the last few decades as presented in Figure IV.2.6.2. While the fertility rate in the country was 6.2, almost 0.2 points higher than the region's in 1960, it dropped down to 1.8 in 2014, being below the replacement level. It is appropriate to point out that the fertility rate in the region was 2.1 at that time. Even though the fertility trend has always been downward over the whole period, there had been times when the decrease in fertility rate was faster. From mid-1960's to mid-1970's, the fertility rate fell down 2.6 percent a year on average in Brazil. Similarly, the annual decrease in fertility rate had been 3.3 percent on average from late 1970's to mid-1990's in the country. During the whole period the fertility rate in Latin America and Caribbean region reduced 1.9 percent a year on average.

The transition in the total fertility rate in Brazil has been really fast, despite the delaying effects caused by the regional socio-economic differences in the country where the decline in fertility rate had a late start in less developed regions of Brazil. At this point an increase in total fertility rate in the short-run in Brazil seems to be very unlikely, considering high prevalence of sterilization (Estar Familiar no Brazil-BENFAM, 1997) as a method of contraception (Wong and de Carvalho, 2004).

As a favorable consequence of the fertility decline, considering the reduction in the family size, the birth interval in Brazil widened (Benfam, 1997) over the years in Brazil, creating an opportunity for development in children feeding. During the 1980's, before when the downward trend in fertility had long been stabilized, improvements in the nutrition levels was observed (Peliano, 1990). But it is noteworthy to mention that there is no information available about the nutrition level of the children before the fertility decline occurred (Wong and de Carvalho, 2004). However, it can still be commented that improvement in nutrition status of children, which can be used as an indicator of development, is one of the positive outcomes of fertility decline in the country.

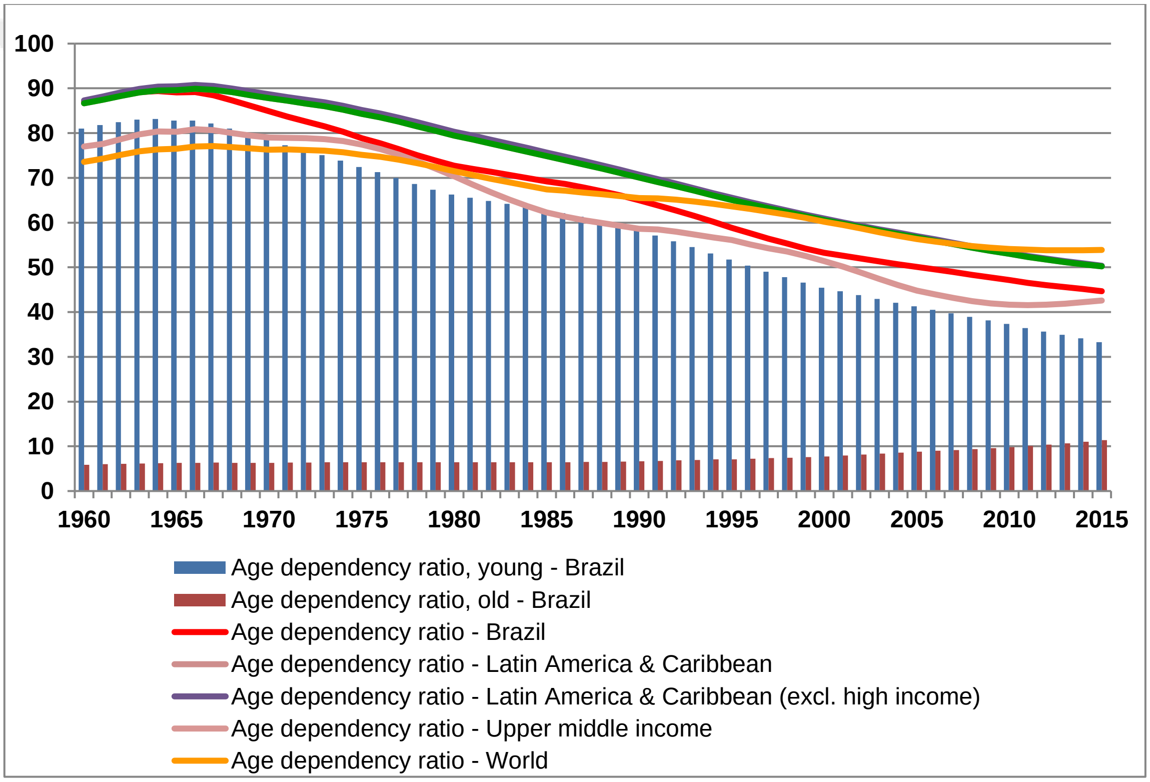
Figure IV.2.6.2. Total Fertility Rates



Source: World Bank

Figure IV.2.6.3 illustrates both age dependency ratios for Brazil and compares total dependency ratio in the country with its counterparts for 1960-2015 time period. Young dependency ratio in Brazil reduced to less than half from 81 percent to 33 percent over 55 years. On the other hand old dependency ratio in the country almost doubled from 6 percent to 11 percent during the same time period. Considering the weighted effects of young and old dependency ratios, total dependency ratio in the country had a downward trend after a short inclining trend in the first half of 1960's. The decrease in total dependency ratio for Brazil was faster after mid-1960's until beginning of 1980's and from late 1980's to beginning of 2000's compared to Latin America and Caribbean region. Total dependency ratio in the country was even higher than the ratio of the world until 1990, which was considerably high as a result of the noticeable share of the young in the population in the past decades. Diminishing effects of fertility decline on young dependency ratio and consecutively on total dependency ratio was observed starting from mid-1960's, leading to a value of less than 45 percent in total dependency ratio in Brazil, which was almost 6 percent lower than the region's in 2015.

Figure IV.2.6.3. Age Dependency Ratios (Young, Old and Total - % of working-age population)

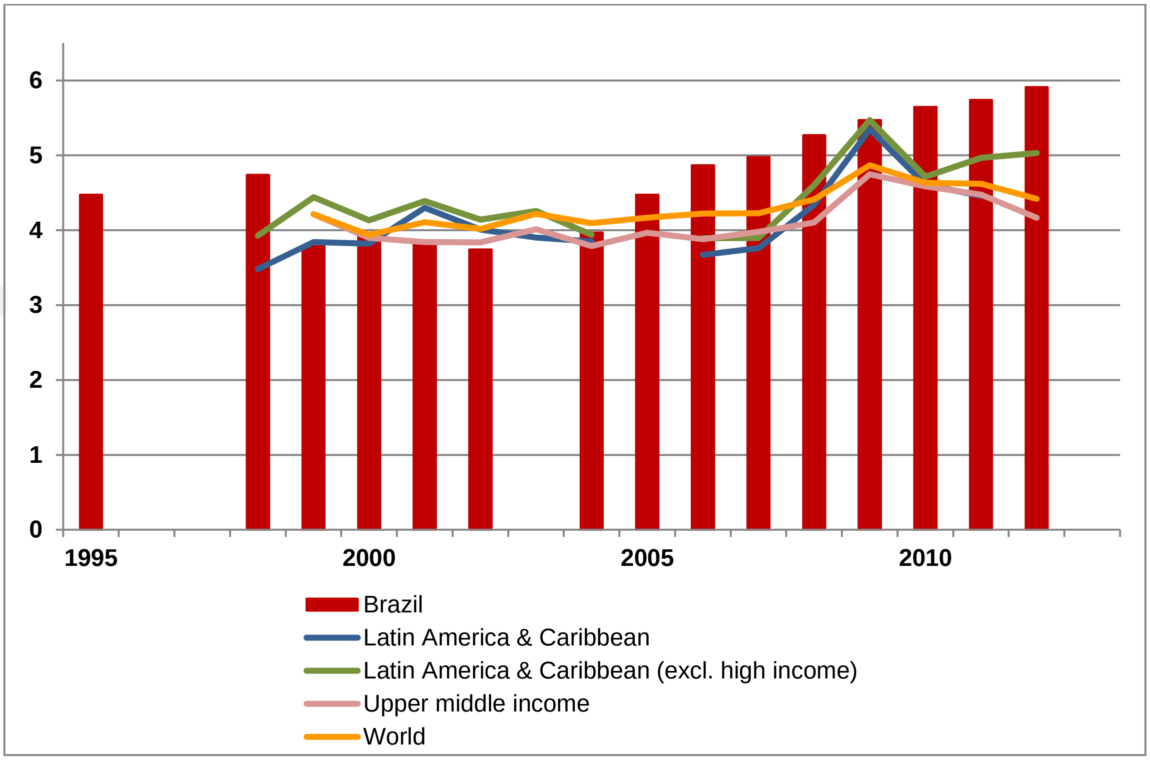


Source: World Bank

The percentage of GDP used for financing public education in Brazil is around the same compared to other Latin American countries. But as a result of the countinuing issues in the education system of the country, the positive contribution of the funds transferred to education is limited and partly effective (Queiroz and Turra, 2010; Sandoval, 2012).

When the whole time period is examined, it can be said that government expenditure on education in Brazil has been higher than the education expenditures made in the counterparts in general as shown in Figure IV.2.6.4. Moreover, after mid-2000’s, the positive gap between Brazil and the comparison groups has been increasing in general. In 2012, while the government expenditures on education as percentage of GDP in Brazil were almost 6 percent, it was hardly over 5 percent in Latin America and Caribbean region (excluding high income). The education expenditures in upper middle income countries and the world were around 4 percent at the same year. Since 1995, Brazilian government’s investments on education have been almost 5 percent of its GDP per year on average. This value is not insufficient compared the general trends in the region and the world. However, various issues in the education system such as teacher absenteeism, mismanagement of classroom time, undeveloped cognitive skills of students, high dropout and repetition rates point out the low quality in education in Brazil (Sandoval, 2012). So it can be concluded that the problems in the education system of Brazil result from mismanagement of financial resources, rather than insufficient resources.

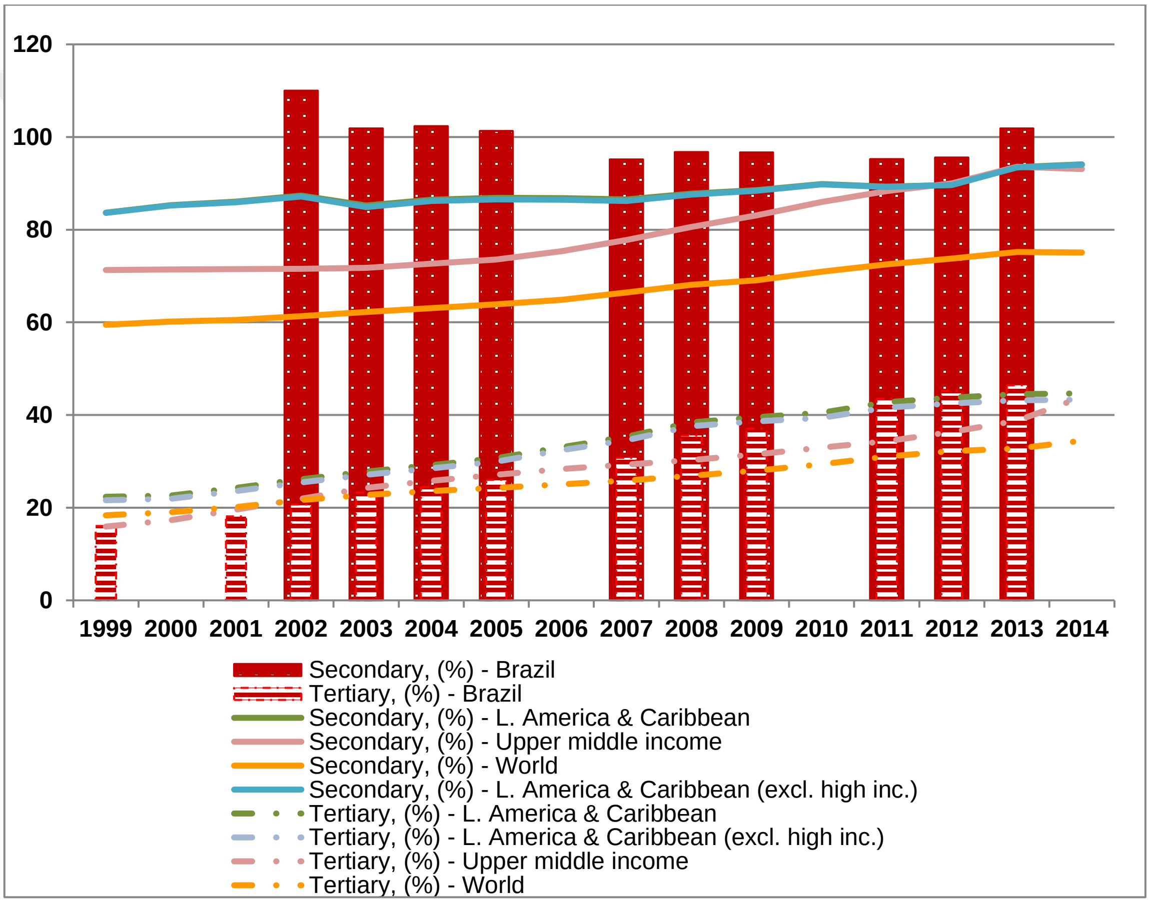
Figure IV.2.6.4. Government expenditure on education, total (% of GDP)



Source: World Bank

Gross enrolment ratios for secondary and tertiary education for Brazil, Latin America and Caribbean region, upper-middle income countries and the world are demonstrated in Figure IV.2.6.5. Even though the gross enrolment ratios for both secondary and tertiary education in Brazil seem higher than the ratios in compared regions and income group, it is necessary to remind that as gross enrolment ratio includes the proportion of children regardless of their age who are enrolled in education, the increase in prevalence of repetition at school raises gross enrolment ratios. In other words, neutralizing the effects of repetition at school would result in lesser and consequently more accurate gross enrolment ratios in Brazil. While recently there has been some reduction in enrolment ratios for secondary education in Brazil compared to first half of 2000's, enrolment ratios for tertiary education in Brazil followed a linear trend with a mild positive slope. In 2013 enrolment ratios for secondary and tertiary education in the country were noted as almost 102 percent and 47 percent respectively.

Figure IV.2.6.5. Gross Enrolment Ratio, Secondary and Tertiary Education, Both Sexes (%)



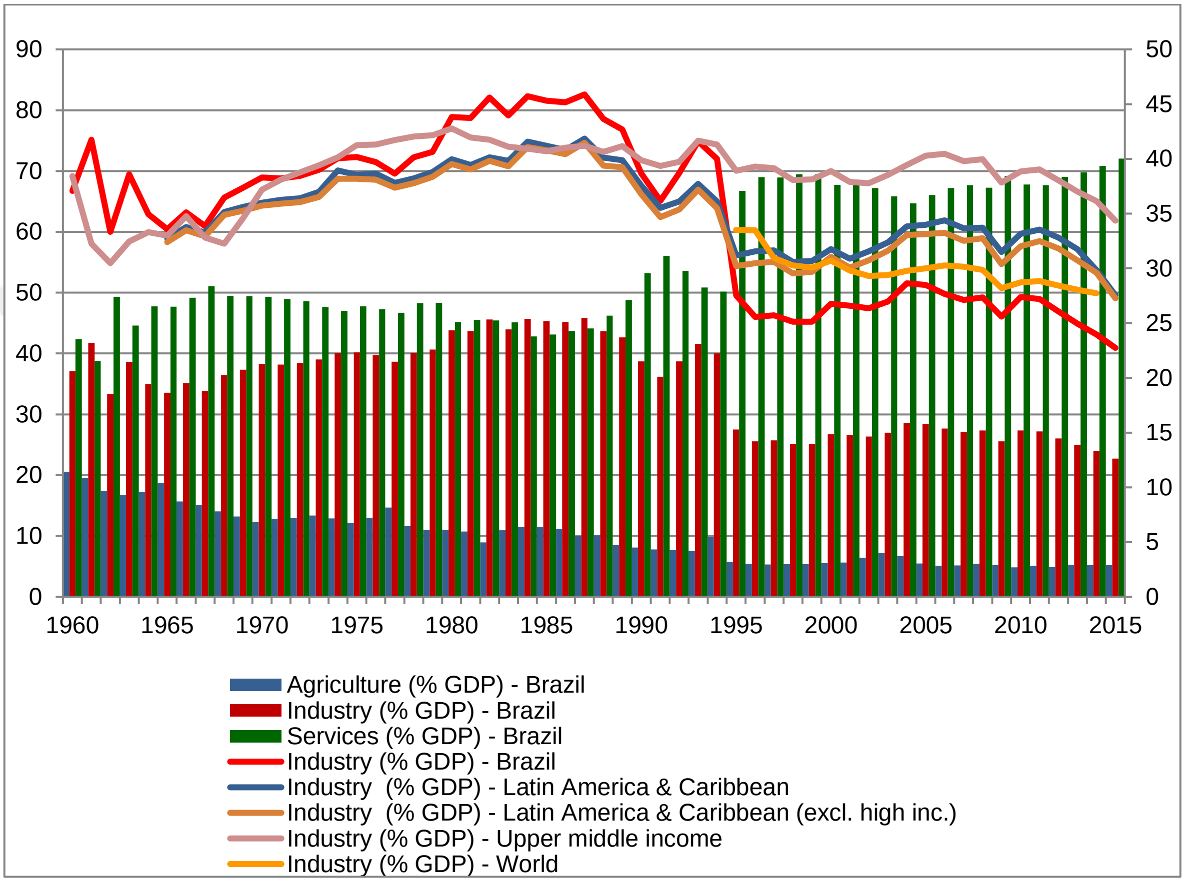
Source: World Bank

Following a period of high GDP growth between 1961-1980, with an average growth rate of around 7 percent, the Brazilian economy entered a slow-down period in terms of economic development. From 1980's until mid-1990's, the public debt of the country raised remarkably and resulted in a decrease in investments (Queiroz and Turra, 2010). In addition, inequality in the country increased in 1980's. However, during

1995-2010 time period, Brazil managed to curb inflation and consequently maintained financial stability to a great extent. Economic growth stemmed from not only the diversifications in the industry sector but also the enhancements in the agriculture sector. In the light of these developments, the volume of international trade expanded and foreign investment influx increased parallel to the establishment of a confident environment in the country (Sandoval, 2012).

The structural composition of the Brazilian economy and comparison of its industry sector with the related income group and the region over time is presented in Figure IV.2.6.6. As in many other countries going through modernization, the share of the agriculture sector fell down gradually over 55 years, from around 20 percent to 5 percent. However, the industry sector in the country did not follow a linear trend, fluctuating in a range of 33 percent to 46 percent until 1995 and staying in a corridor of 22 -29 percent afterwards. While the share of the industry sector in Brazil was in general over its counterparts until 1995, after that it continuously stayed below till the end of the period. Oppositely the share of the services sector increased in general after 1995, from around 48 percent to 68 percent on average.

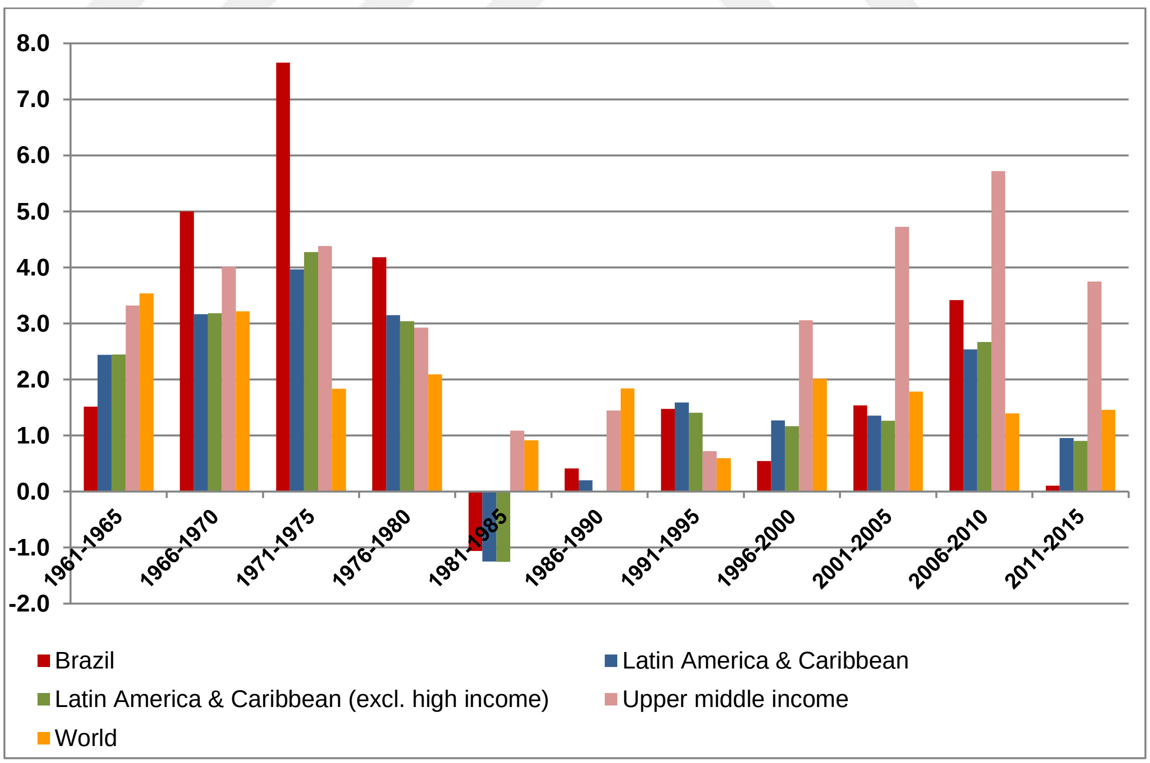
Figure IV.2.6.6. Agriculture, Industry and Services (% GDP)



Source: World Bank

In terms of poverty, big steps were taken after the beginning of 2000's. While in 1980's poverty gap at $1.90 a day (2011 PPP) in Brazil was bigger than in Latin America and Caribbean region, the gap reduced almost 10 percent annually on average and dropped down to 1.7 percent in 2014. Also some solid improvement were achieved regarding gender inequality. Female literacy rate went up to 93 percent in 2015 from 73 percent in 1980. Moreover, ratio of female to male labor force participation rate raised 22 percent in 24 years and reached 74 percent in 2014. In recent years female labor force participation rate was around 65 percent which was higher than the region's and upper-middle income countries's. So in general, it can be derived that despite the adverse effects of low quality of education in the country on economic growth, considering the positive socio-economic developments mentioned; Brazilian economy started to recovery after the beginning of 1990's, growing annually 1.5 percent in 2001-2005 and 3.4 percent in 2006-2010 on average, after years of poor economic activity during 1980's. It is noteworthy to mention that the Brazilian economy had maintained high growth rates in the previous decades, especialy after mid-1960's until 1980. Figure IV.2.6.7, illustrates the changes in GDP per capita growth as 5 year averages for the 1961-2015 period for Brazil and compares it with the comparison groups. In 1971-1975 period, the growth rate of Brazilian economy was almost two times bigger than the region's and the upper-middle income group's. While recoverying after the bad performance of 1980's, the country managed to grow higher than the region during 2000's.

Figure IV.2.6.7. GDP per capita growth (5 year average %)

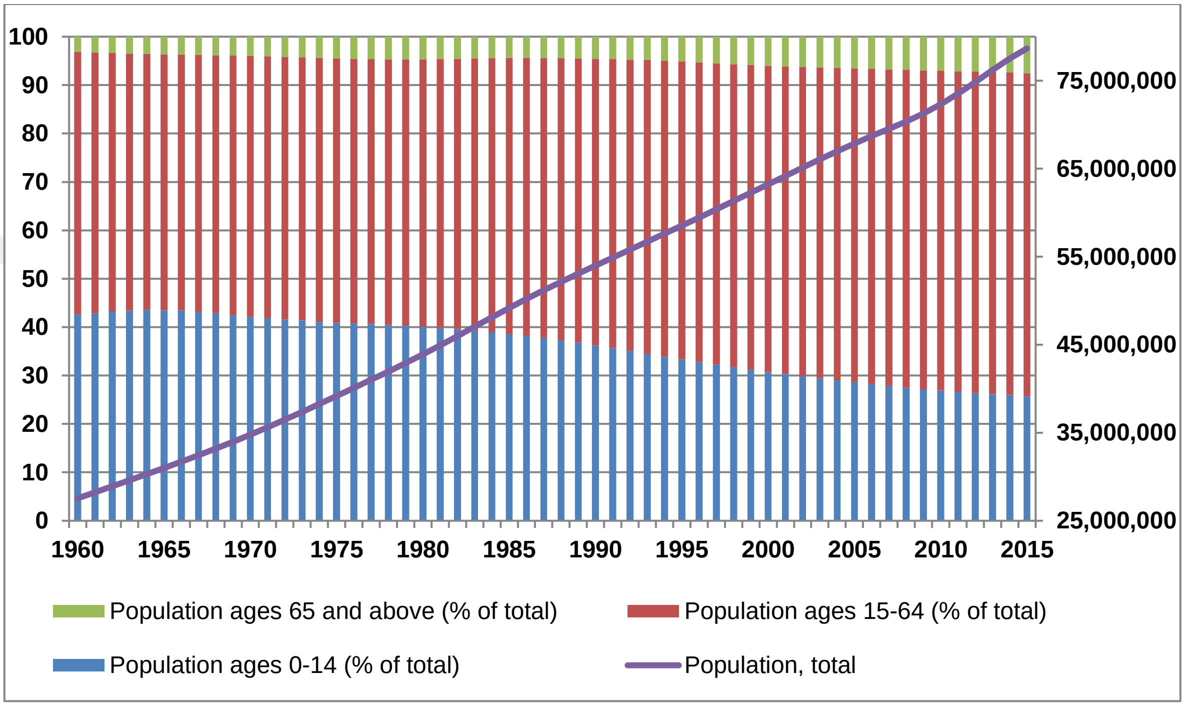


Source: World Bank

IV.2.7. Turkey

From 1960 to 1980, young population group, aged 0-14, had been over 40 percent of the whole population in Turkey as presented in Figure IV.2.7.1. Starting from beginning of 1980'S until beginning of 2000's, the share of this age group displayed a decrease trend of 1.3 percent annually on average and reached to a value of slightly over 30 percent in the beginning of 2000's and approximately 26 percent in 2015. Older people in the population, aged 65 and over, had a small share of around 3 percent in 1960 and gradually increased 2.4 percent on average annually until mid-1970's. After then, old age population in the country entered a less increasing and even a decreasing period until beginning of 1990's. This period was followed by a period, during which a gradual increase first with an increasing and then a decreasing annual growth rate. Still in 2015 the share of older people was less than 8 percent. On the other hand Turkish population had been increasing more than 2 percent each year until mid-1980's. Between mid-1980's and mid-2000's, the population in the country rose from around 51 million to 69 million, with a decreasing annual growth rate less than 2 percent a year. In the last 10 years, the population entered period of increasing growth rate in general and reach to a value of 78.7 million in 2015. In the last 55 years Turkish population increased more than 51 million from an initial value of 27.6 million in 1960. According to the changes in the share of the age groups over time, it can be derived that, Turkey entered the demographic window of opportunity in the beginning of 2000's and the window is expected to be open until the end of 2030's.

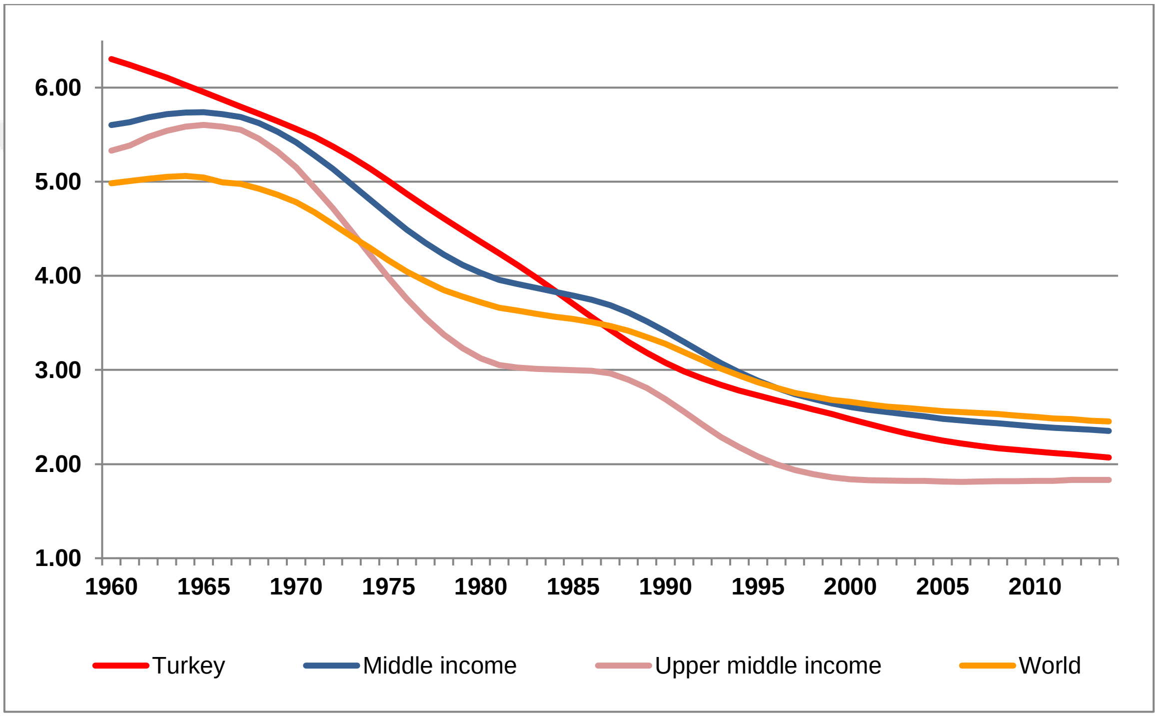
Figure IV.2.7.1. Population Distribution for the Specific Age Groups and the Total Population



Source: World Bank

Total fertility rate in Turkey had been going through a rapid decrease between mid-1970’s to mid-1990’s, keeping over an annual decrease rate of 2 percent each year, which was faster than in 1960’s as shown in Figure IV.2.7.2. Afterwards, continuing to decrease slightly less for a decade, total fertility rate went through a period, during which the annual decrease rate started to lessen gradually until 2014. While the total fertility rate was very high with a value of more than 6 births per woman in 1960, over 55 years it dropped down to a value of slightly over 2 births per woman in 2014. The rapid fall in fertility rate in Turkey has been remarkable. While in 1960 the fertility rate in Turkey was higher than it was in upper middle income countries, middle income countries and the world by around 1 points, 0.7 points and 1.3 points respectively, in 2014 the fertility rate in the country was lower than the rate in middle income countries and the world, by around 0.3 and 0.4 points respectively. Shortly in other words, Turkey's total fertility rate had been higher than it was in its counterparts until mid-1980's and then has been lower until present.

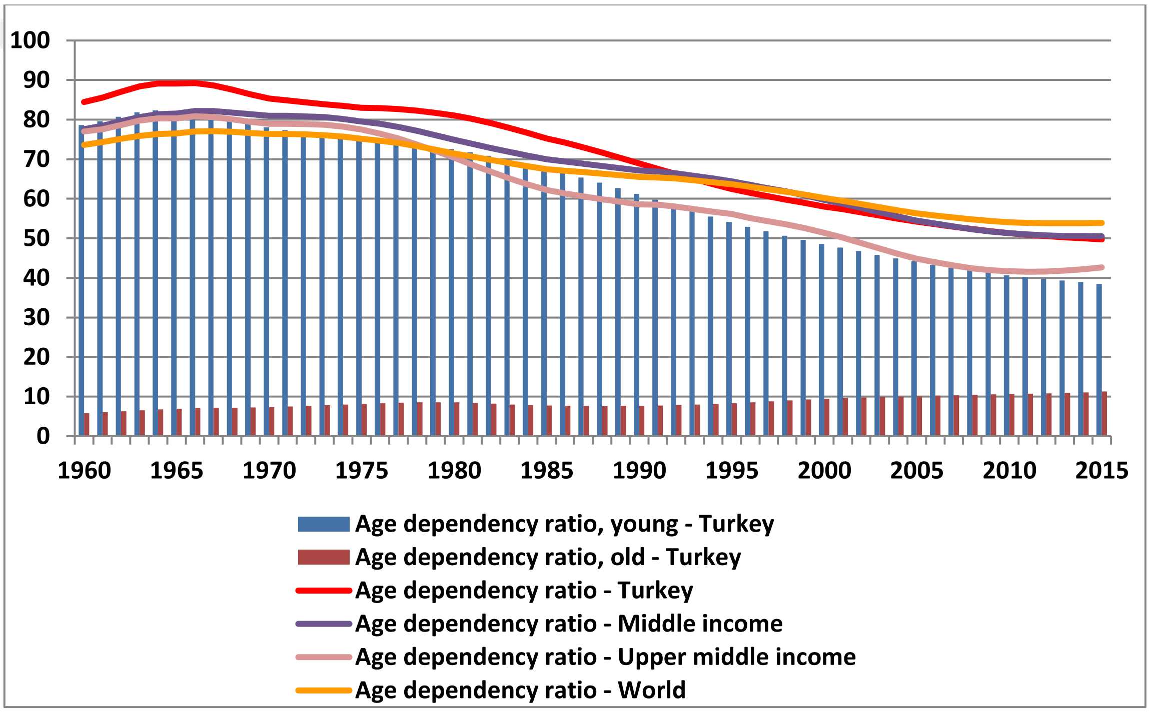
Figure IV.2.7.2. Total Fertility Rates



Source: World Bank

As a result of the high fertility rates and consequently large number of youth in Turkey in the previous decades until beginning of 1990's, age dependency ratio in Turkey had been higher than it was in the world and the compared income level countries during this period. Afterwards, the dependency ratio has followed a quite similar path with middle income countries and the world. It is important to mention that during the whole period dependency ratio in Turkey has been higher compared to the ratio in upper middle income countries. This expected outcome is as a result of the high share of young population in the country, even though the share of this age group has been decreasing gradually for the last a few decades from around 80 percent In the beginning of 1960's to around 38 percent in 2015. Young, old and total age dependency ratios for Turkey are presented in Figure IV.2.7.3, including comparison of total age dependency ratio in Turkey with middle and upper middle income countries and the world.

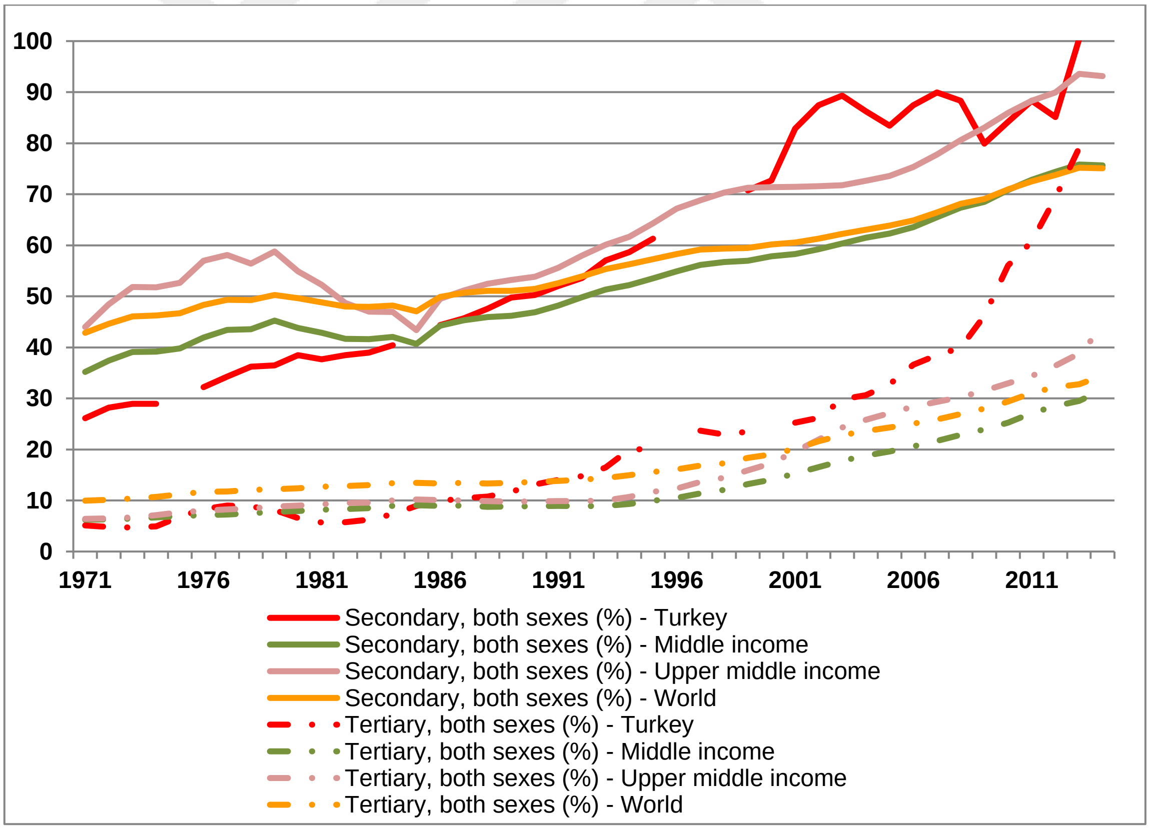
Figure IV.2.7.3. Age Dependency Ratios (Young, Old and Total - % of working-age population)



Source: World Bank

Gross enrolment ratio for secondary education in Turkey had been following and upward trend with a similar slope in general since 1960 until the beginning of 2000's, during which the gap between Turkey and upper middle income group had been diminishing. Afterwards even though the upward trend has been continuing the pattern has been erratic, the ratio being higher than even it was in upper middle countries. The increase in gross enrolment ratio for secondary education has been more than the ones in any other country groups or the world that are compared here in Figure IV.2.7.4. Similarly, while the gross enrolment ratio for tertiary education in Turkey had been lower than it was in the compared groups and the world in the past, starting from beginning of 1990's Turkey made a significant improvement and the gross enrolment ratio, having an annual increase rate of more than 10 percent on average till present. Compared to secondary education, the improvement in tertiary education in Turkey has been remarkable in terms of gross enrolment ratios. Presently gross enrolment ratios for secondary and tertiary education in Turkey are slightly over 100 percent and around 79 percent respectively.

Figure IV.2.7.4. Gross Enrolment Ratio, Secondary and Tertiary Education, Both Sexes (%)

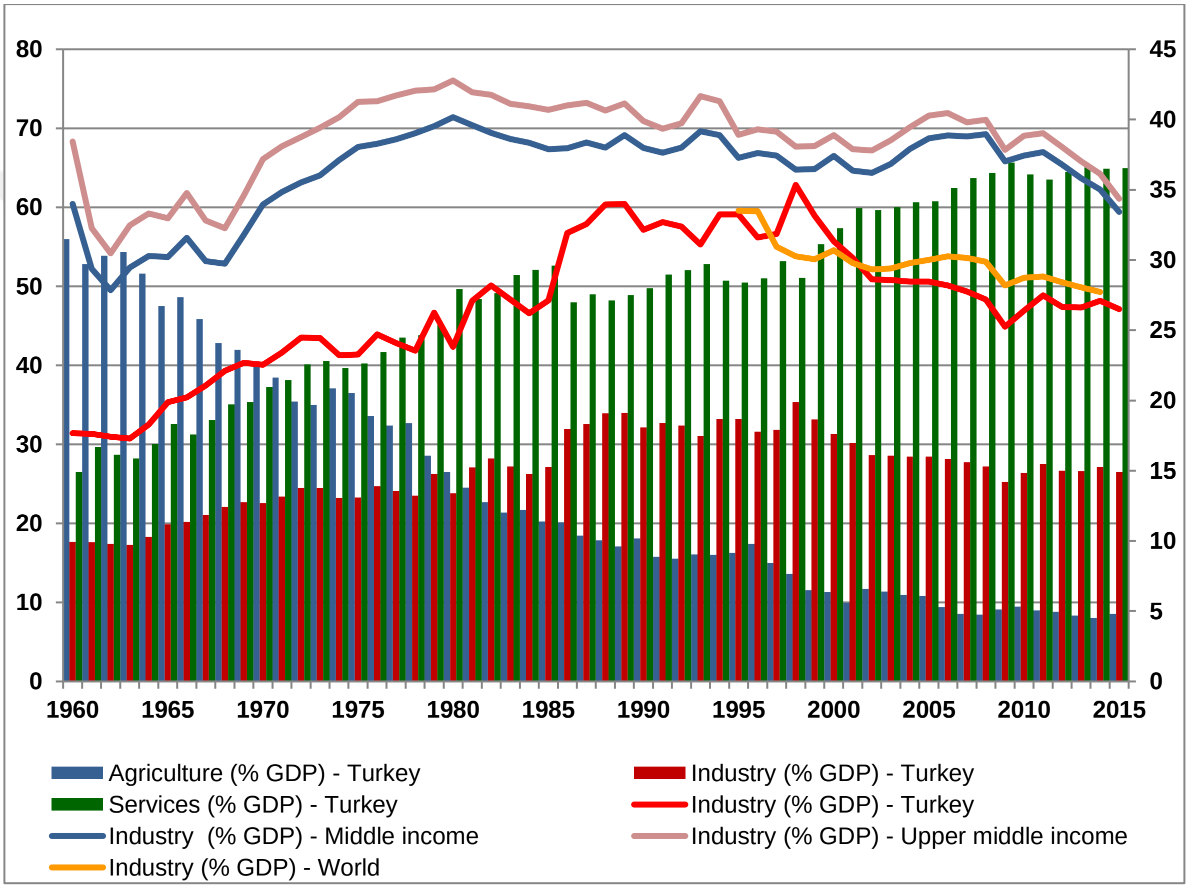


Source: World Bank

From the start of 1980's Turkey had been going through a transition from an inward-oriented industrialization to an export-led industrialization, following the recovery from its debt crisis in the late 1970's. 1990's was accepted as the second phase of the liberalization process of Turkish economy. After full currency convertibility at the end of 1980's, financial system in Turkey was going into an era, where it would be in direct exposure to the global financial risks. During 1990's, Turkey's major economic problems could be summarized by big amounts of budget deficits, weakness against short-term capital inflows and high inflation rates continuing for decades. The economic crisis in 1994 was followed by 2000 and 2001 crisis both of which were after the stand-by agreement made with the IMF in 1999. After 2001 crisis, which was unique in terms of having severe effects on all of the income groups, profound reforms were made especially in banking sector, in order to make is stronger against financial shocks. Post-2001 period, the reforms mainly focused on establishing a solid banking sector, where new rules were brought in and strictly applied. Also new regulations were made to attract foreign investors and earn their trust. In this period, the government credibility increased, as a result of the commitment to the reforms made. Decreasing inflation rates to even one digit values and falling real interest rates also contributed to the foreign direct investment coming into the country. Both domestic and foreign, private investment played a key role in the recovery of the economy in Turkey (Öniş, 2009; Arslan and van Wijnbergen, 1993). In the light of these entire financial crises, industrial transitions and economic reforms occurred in the previous decades, examining the structural transformation of the Turkish economy over time might be more meaningful.

In Figure IV.2.7.5, the changes in the share of the sectors in Turkish economy are illustrated and the changes in share of the industry sector in the country are compared with related income group countries and the world. Firstly to mention is the share of agriculture sector in Turkey that had been continuously decreasing over the whole time, as in many other developing countries during the process of modernization. In 1960, agriculture made up around 56 percent of the whole economy. However, the high amount of share of agriculture sector fell down rapidly for the next decade, having an annual decrease rate of 3.7 percent on average. Also from the mid-1970's until the first years of 1980's agriculture sector shrunk again and this time around 36 percent, with a decrease rate of around 6.4 percent a year on average. The rate of decrease slowed down over time and the agriculture sector has an 8.5 percent share in the whole economy currently. On the other hand, industry sector in Turkey had been growing in general, even if there had been some years of sharp decrease as the share in the economy until late 1980's. Following this period, after having a decade of horizontally fluctuating pattern, the industry sector in the country entered a decreasing era until present. Since the beginning of 2000's, the decrease both in the share of agriculture and industry sectors have been compensated by the increase in the share of services sector. It is noteworthy that the share of the industry sector in Turkey has always been dramatically below those of upper middle income countries and even middle income countries. The gap in-between had been decreasing after 1980's until the end of 1990's. However, the situation reversed afterwards for a decade and recently a period has been entered where the gap started to close again, mainly due to the sharp decrease in the share of the industry sector in middle income and upper middle income countries.

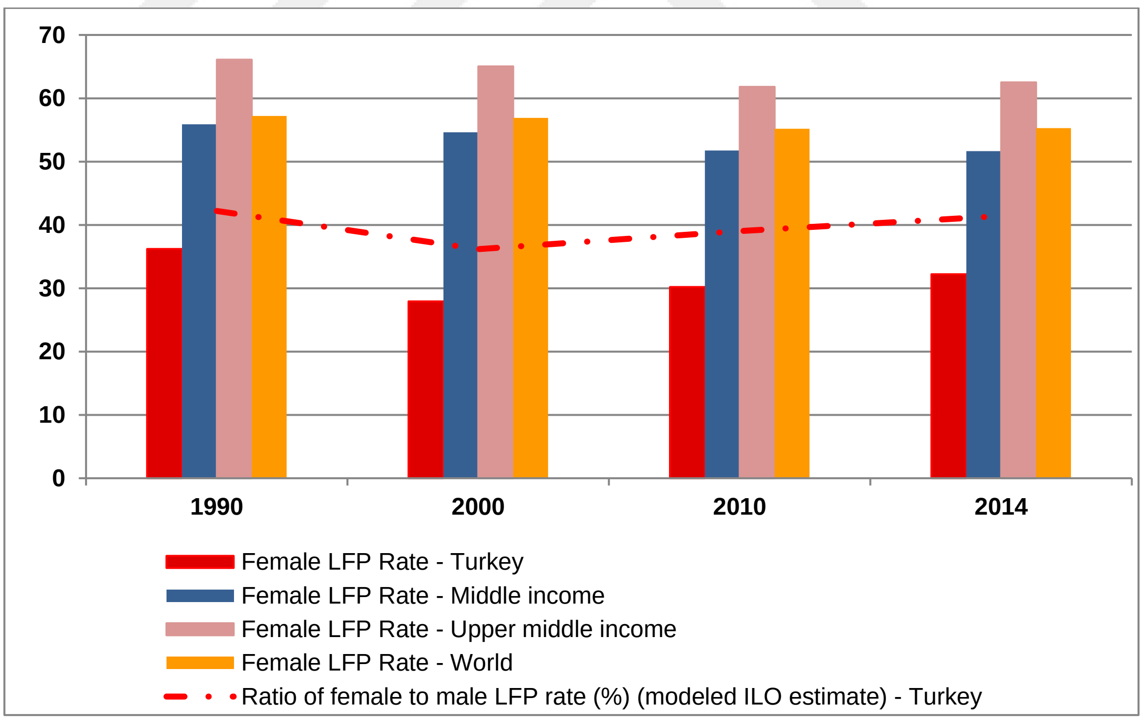
Figure IV.2.7.5. Agriculture, Industry and Services (% GDP)



Source: World Bank

One of the main inhibiting factors against economic development in Turkey has been the low rates of female labor force participation in the country. Compared to male labor force participation rates, female labor force participation rates have been considerably low compared to European Union region and OECD countries. In Figure IV.2.7.6, changes in female labor force participation rates in Turkey is compared with those in middle income and upper middle income countries and the world from 1990 till present day. In 2000, female labor force participation rate experienced a decrease compared to 1990 and dropped down to a value of 27 percent which was half of the rate in middle income countries. Following 2000, the rate in Turkey has been going through a mild increase trend, which was insufficient to pull up the female labor force participation rate to a decent value in comparison with similar income level countries. In accordance, the ratio of female to male labor force participation rate decreased from 1990 to 2000 and increased slightly afterwards. In 2014, the female labor force participation rate in Turkey was 32.2 percent, while it was 51.7 percent, 62.5 percent and 55.3 percent in middle income countries, upper middle income countries and the world respectively.

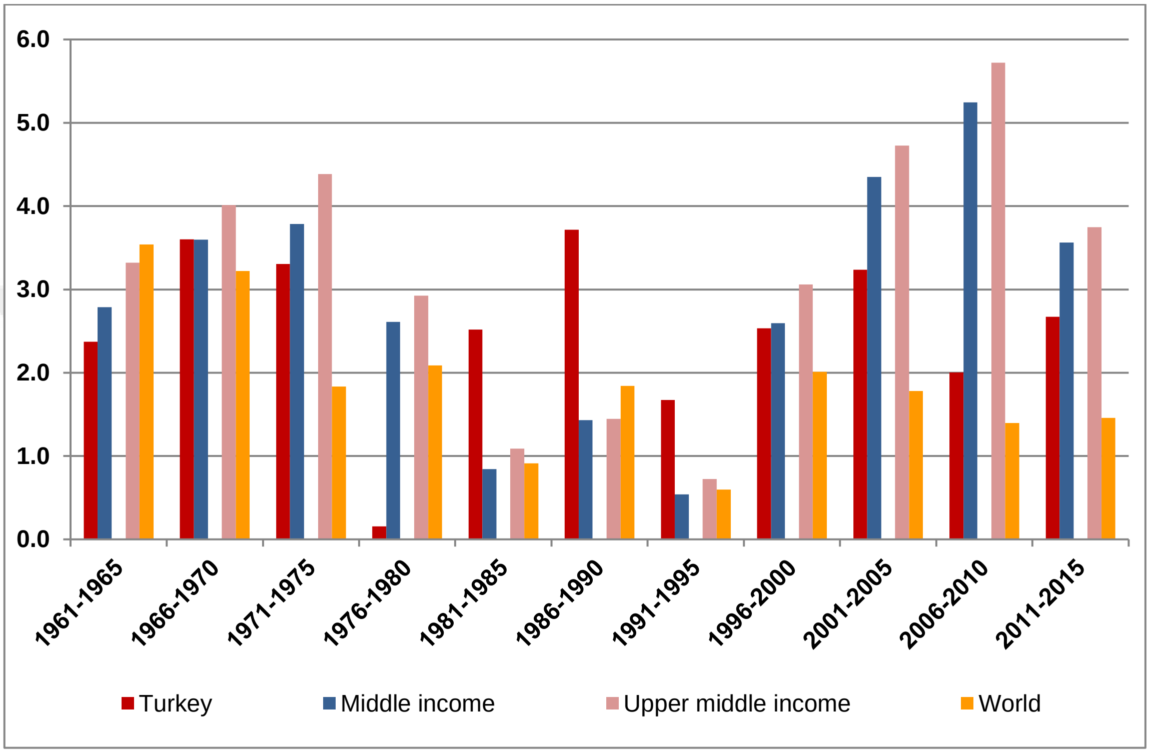
Figure IV.2.7.6. Female Labor Force Participation Rate and Ratio of Female to Male Labor Force Participation Rate (%) in Turkey



Source: World Bank

Considering the harsh period of times since mid-1970’s that the country has been through, including more than half a dozen global and domestic crises, Turkish economy maintained a short term capital inflow dependent economic growth, which was bigger in magnitude on average compared to middle income and upper middle income countries but could not be defined as sustainable, in 1980’s. Including the negative effects of domestic financial crisis in 1994, Turkish economy grew considerably less, compared to 1980’s, with a value of 1.7 percent and 2.5 percent during the 1991-1995 and 1996-2000 periods respectively. After 2000, economic growth in Turkey has been varying in a range of 2 percent to 3.2 percent as five year averages. After mid-1990’s, Turkish economic growth has fallen behind the growth in middle and upper middle income countries with varying gaps. In general it can be said that over the whole period the economic growth in Turkey has been highly volatile with periods of high economic growth as well as low and even zero economic growth. Figure IV.2.7.7 illustrates the 5-year average GDP per capita growth rates for Turkey between the years 1961 and 2015 as follows.

Figure IV.2.7.7. GDP per capita growth (5 year average, %)



Source: World Bank

It is undeniable that decreasing young age dependency ratios and slowly increasing old age dependency ratios, resulting in a decreasing total age dependency ratios have a potential to contribute to sustainable economic growth in Turkey. However, as there is not an automatic mechanism creating economic growth solely based on the diminishing share of the dependent population; boosting effects demographic factors in Turkey need to be supported by socio-economic reforms and developments, such as maintaining necessary enrolment ratios at school in line with high quality education, developing a health system embracing the whole population regardless of the age groups, implementing required sectoral transformations in the economy enabling a shift from low return to high return industries, opening new jobs to absorb growing working age population and etc.

In order to have a better evaluation, in the next section, these supporting factors in Turkey so far will be compared with the ones of the previously examined countries from different regions and income levels, which are South Korea, Vietnam, China, Ireland, Spain and Brazil. All of these countries have been commonly accepted in the literature as having used and/or still using the demographic advantages in terms of economic growth, based on the past studies that used econometric models and statistical methods in reaching conclusions.

IV.3. Socio-Economic Comparison of the Selected Countries

In this sub-section, selected countries presented in Table IV.1.1 are compared with each other and Turkey with the help of major socio-economic indicators chosen among the list of variables given in Figure IV.1.1. The chosen indicators can be grouped under the categories of demography, education, labor force participation, gender and inequality and finally economy. However, it is noteworthy to mention that the direct comparison of the selected countries with each other in terms of the chosen socio-economic indicators is not straight forward because of two main reasons. First, the beginnings, the ends and the durations of the demographic window and first demographic dividend vary from country to country, as a result of the differences in the share of the age groups, initial fertility rates, the speed of decline in the fertility rates and labor income and consumption profiles of the countries. In addition, the demographic window and first demographic dividend for some of the countries still continue, while for the others they are already over. Second, some of the indicators tend to increase or decrease over time such as gross enrolment ratios for secondary and tertiary education, the share of the agriculture sector in the economy and etc. All these factors make the comparison more complex for the countries with different beginning and end dates of demographic window and first demographic dividend. So instead, the changes in their socio-economic indicators are compared for a standard period of time, which is between 1960 and 2015 for this study.

The timing of first demographic dividend for each country is also shown below the graphs as supplementary information. (The reason of preferring first demographic dividend over demographic window is explained in Demography sub-section). The main reason in comparing these chosen socio-economic indicators, which believed to have a positive impact in economic growth with the demographic contribution coming from the changes in age structure of the population, is to find out the improvements made in the selected countries regarding these indicators over time and to see how Turkey is doing so far compared to these countries. For the indicators, which Turkey has lagged behind, policy suggestions can be derived for Turkey, examining the experiences of these countries.

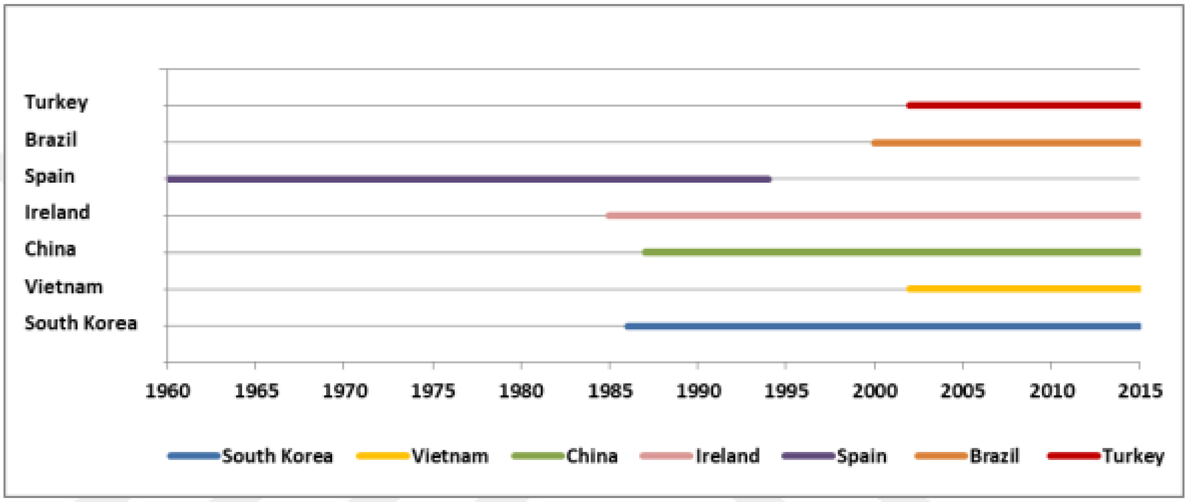
IV.3.1. Demography

Turkey has recently entered demographic window of opportunity in 2002, whose timing was similar to the ones of Brazil and Vietnam. On the other hand, while Spain has already left the demographic window in 1994; Ireland, China and South Korea entered the window in the second half of 1980’s and still in the window. At this point, it is vital to reemphasize that timing of demographic window should not be treated as the timing of first dividend, where the support ratio increases by time. First dividend can be gained, even though demographic window is not open yet or already closed. On the other hand, although demographic window is open, there might be no first dividend gained. Figure IV.3.1.1 presents timings of both demographic window and first dividend and clearly illustrates what is just explained.

For all of the countries except Spain, timing of first dividend is a few decades earlier than the timing of demographic window. Looking at the Figure IV.3.1.1.a and Figure IV.3.1.1.b it can be seen that Turkey started to have first dividend 33 years before it entered the demographic window. On the other hand, it is not totally possible to compare the duration of the demographic window and the first dividend, as for most of the selected countries the start or the end years for the demographic window and/or the first dividend are out of the time period taken here, which is 1960-2015.

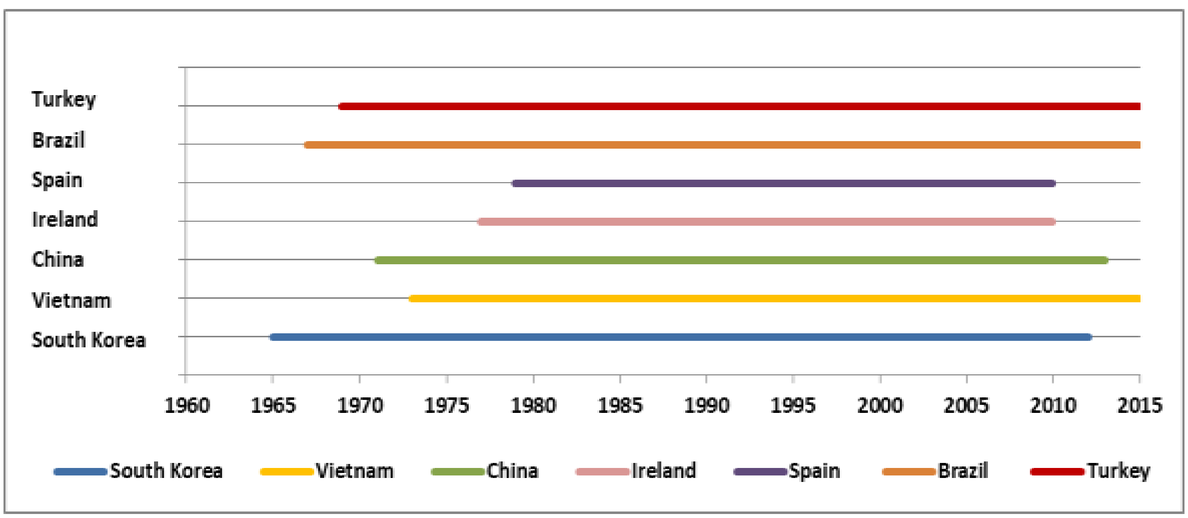
Figure IV.3.1.1. Timing of Demographic Window of Opportunity versus Timing of First Dividend

Figure IV.3.1.1.a. Timing of Demographic Window of Opportunity



Source: World Bank, author's calculations

Figure IV.3.1.1.b. Timing of First Dividend



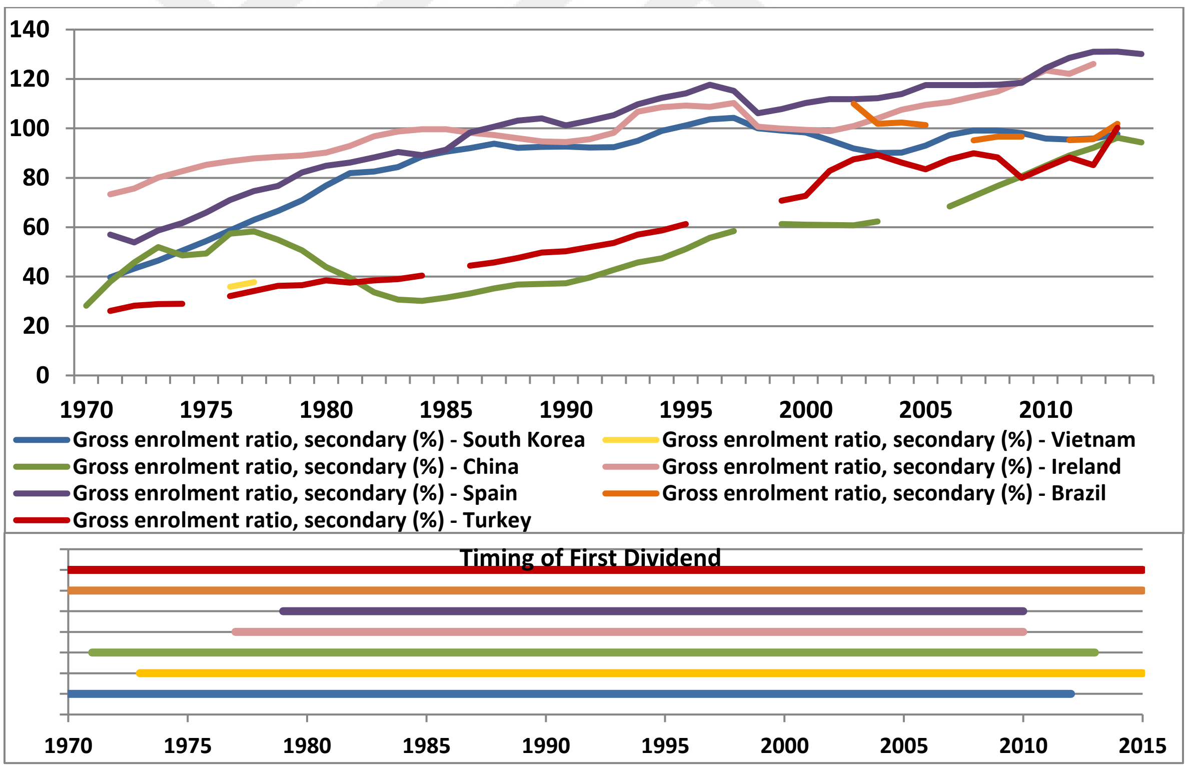
Source: NTA

Although it is not totally possible to make a full comparison, two main demographic indicators regarding change in age structure, demographic window and first demographic dividend, are compared to some extent and examined to find out which one of them can be taken as a catalyst for economic growth. In order to do this analysis the periods of demographic window and first dividend for these 7 countries are compared with the average values of economic growth for 5-year periods starting from 1960 until 2015. It is seen that most of the 5 year periods of considerably high economic growth coincide with the period of first demographic dividend rather than the period of demographic window. This outcome can be commented as first demographic dividend being a superior demographic indicator compared to demographic window in terms of contribution to the economic growth. Moreover, when compared with demographic window, the timing of first dividend is more meaningful in terms of economic growth and development as it indicates an increase in number of producers per number of consumers. So it might be more useful to compare the changes in socio-economic indicators of the selected countries with their timings of first dividend in the following figures.

IV.3.2. Education

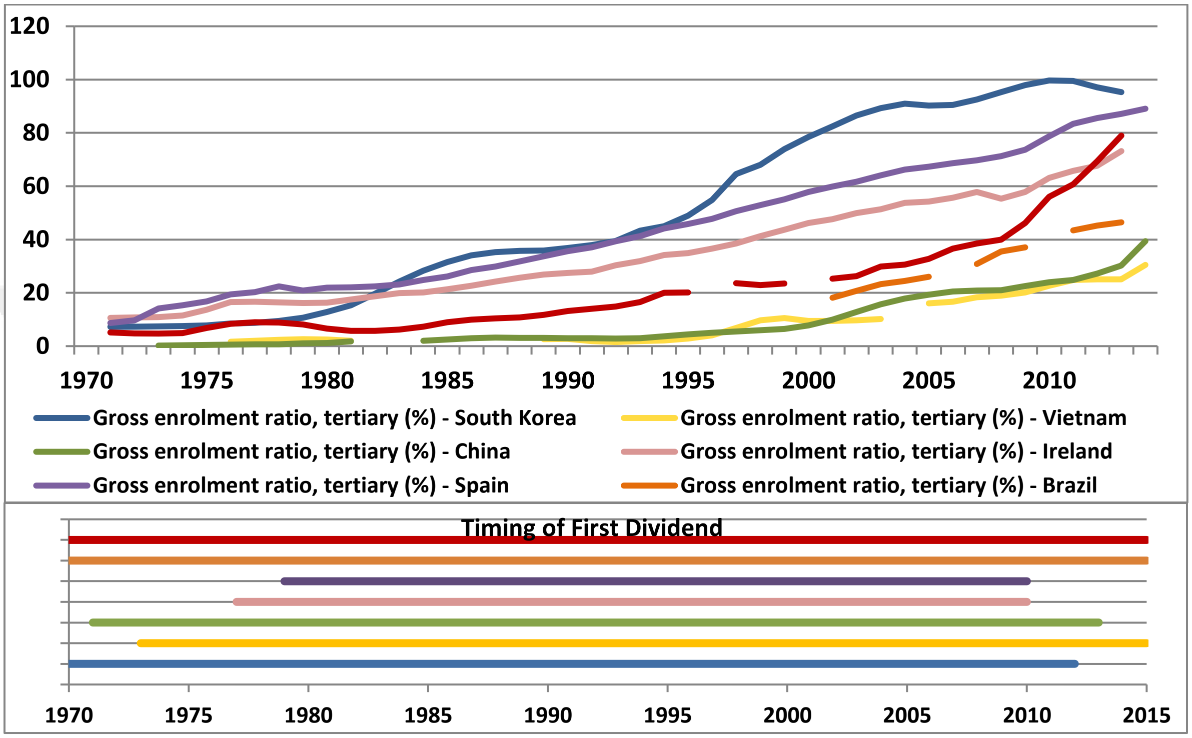
In literature, South Korea is known as to have accomplished a noteworthy success in changing country's education system towards a more production-oriented and a more efficient one. For the 1960-1990 time period, educational quality of the nation was significantly improved with the contribution of both government policies and demographic factors such as decrease in fertility, in other words number children in the family. Similarly with half a decade time lag, for the 1966-1990 time period, 5 year average GDP per capita growth was around 8 percent which was almost two times the average value of the preceding and the following years. From the beginning of 1970's until the beginning of 1990's gross enrolment ratio in South Korea increased from almost 40 percent to 93 percent in secondary education and from around 7 percent to 37 percent in tertiary education. In Turkey, these enrolment values were reached not until 2006 which was only a decade ago. Similar to the development in South Korea, enrolment ratios for secondary and tertiary education in Spain, with the contribution of the increase in government expenditures on education in terms of percent of GDP, and in Ireland, mainly due to the introduction of free secondary education in mid-1960's, showed remarkable increase. The gross enrolment ratios for secondary and tertiary education are given in Figure IV.3.2.1 and Figure IV.3.2.2. Both in enrolments for secondary and tertiary education, Turkey seems to be following the developments with a time lag of a few decades. Although Turkey has made significant improvement since 1970's, there seems to be still enhancements to make.

Figure IV.3.2.1. Gross Enrolment Ratio – Secondary Education



Source: World Bank, NTA

Figure IV.3.2.2. Gross Enrolment Ratio – Tertiary Education



Source: World Bank, NTA

IV.3.3. Labor Force Participation

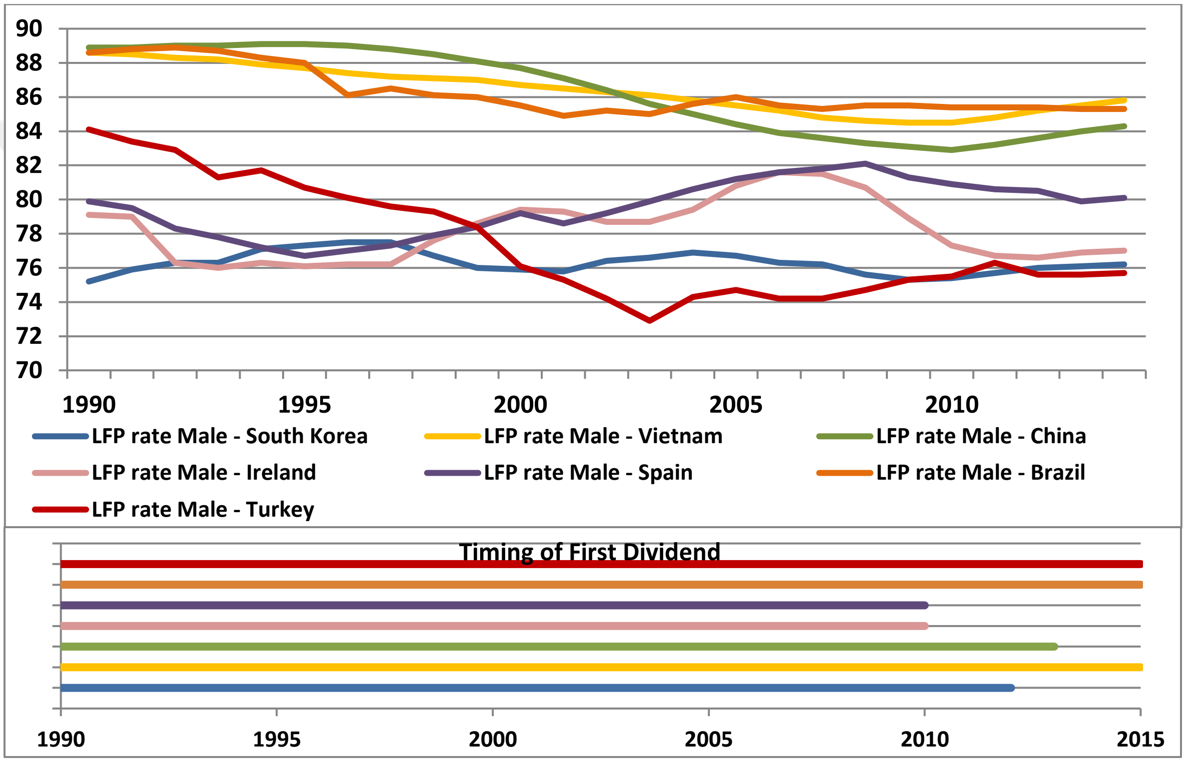
In World Bank databank, data sets of labor force participation rate for 15-64 age group exits after 1990, which coincides with the end of remarkable economic growth period for some of the countries such as South Korea. Because of the lack of data availability for the pre-1990 period, comparison of labor force participation could be made only after 1990 until present in terms of male and female participation rates. In this respect, the male and female labor force participation rates for the 1990-2014 time period for the selected countries including Turkey are presented in Figure IV.3.3.1 and Figure IV.3.3.2.

Male labor force participation rates of Brazil, Vietnam and China has been considerably higher than the rates of other selected countries lying between 83-89 percentage range since the beginning of 1990's until present, despite a slightly decrease trend in general over the whole period. While Spain and Ireland made a good improvement between second half of 1990's and 2000's, the male labor force participation rates in both countries stayed behind Brazil, Vietnam and China with an increasing gap after the second half of 2000's. South Korea followed a horizontal trend for the whole period with a value of ranging from 75 percent to 77 percent. Turkey diversifies from these 6 selected countries in a negative way. Between 1990 and 2003, male labor force participation rate in Turkey decreased severely from 84 percent to almost 73 percent. After this period the rate increased only slightly until present day and stayed below all of the selected countries with a value of almost 76 percent. The numbers point out that male labor force participation is one of the main areas that an improvement is needed to be done in Turkey.

Female labor force participation rates for China and especially Vietnam, where agriculture had a significant share in the economy until beginning of 2000's, have been relatively higher compared to other selected countries. Brazil, South Korea, Spain and Ireland followed an increasing pattern throughout the whole period, among which South Korea had the least increasing trend. However, it is noteworthy to mention that during 1960 to 1990 time period when South Korea gained a remarkable economic growth, female labor force participation rate in the country almost doubled from a value of 25 percent to a value of 47 percent. Unfortunately, Turkey once again stayed below all of the selected countries in terms of female labor force participation. However this time, the negative diversification with the selected countries is greatly higher compared to male labor force participation. In general, female labor force participation rate in Turkey followed a decreasing trend from a value of 36 to in 1990 to a value of 32 in 2014. In 2014, female labor force participation rate for Turkey was around 23 percent points less compared to South Korea which had the lowest value among selected countries and 47 percent points less compared to Vietnam which had the highest value among selected countries. In this respect, Figure 6 points out the severeness of the labor force participation issue for females in Turkey, despite the low fertility levels in the country.

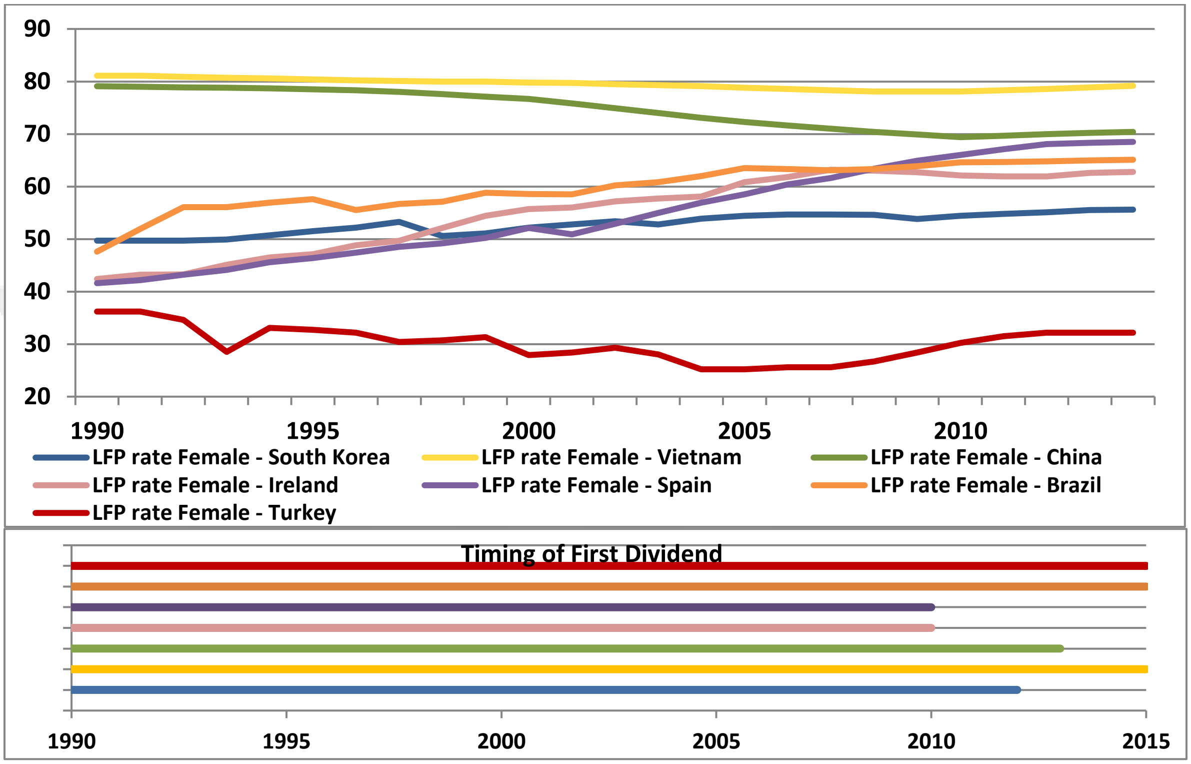
The numbers underline the necessity of a solid policy that has to be carried out to improve participation rates for the females in Turkey.

Figure IV.3.3.1. Labor Force Participation Rate – Male



Source: World Bank, NTA

Figure IV.3.3.2. Labor Force Participation Rate – Female



Source: World Bank, NTA

IV.3.4. Gender and Inequality

In order to compare gender and inequality, the gender related variables from World Bank dataset are grouped into two sections. The first section includes data about the law and regulations protecting women-rights in social and business life. There are eight variables in the first section and all of them are in binary form as presented in Table IV.3.4.1. According to the table, while in Spain currently all of the eight laws and regulations are effective, in Turkey three of the eight laws and regulations are still missing. After maternity leave, mothers are not guaranteed to have an equivalent position. In addition, during the hiring process there is no law in force against gender discrimination. Moreover, laws and regulations stating that nonpregnant and nonnursing women can do the same jobs as men are still missing. Comparing the seven countries, it can be stated that Turkey is second last following China, indicating that Turkey needs to make some progress in terms of gender inequality by implementing new laws and regulations in order to improve status of women in social and business life.

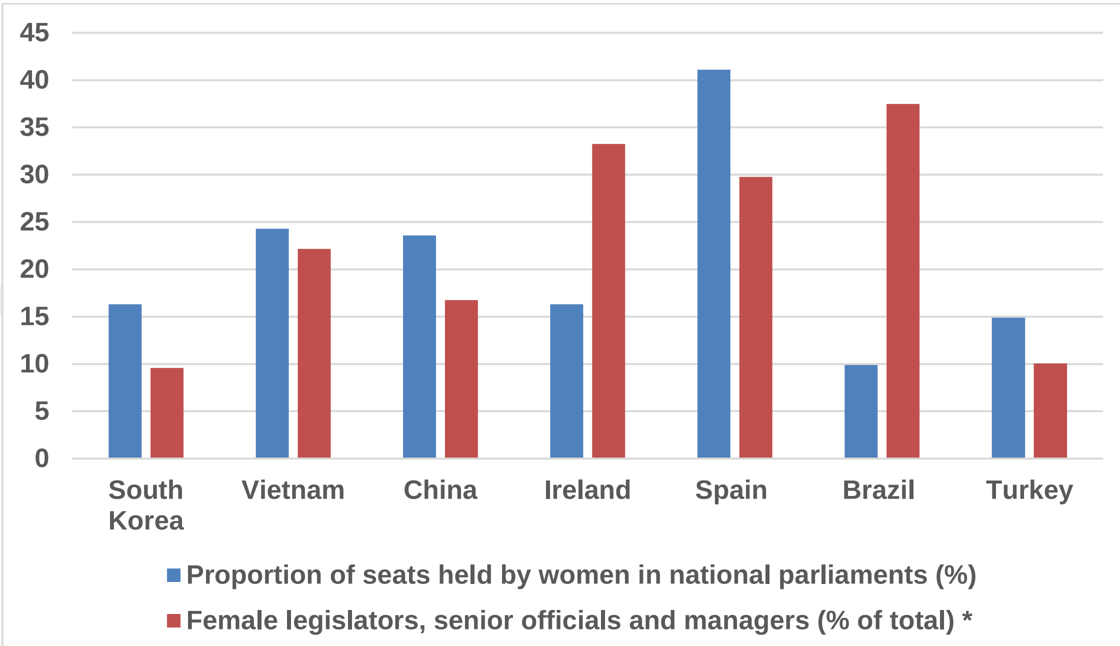
The status of women in top management positions are compared among countries by using two indicators, which are the proportion of seats held by women in national parliaments and female legislators, senior officials and managers as percentages of the total. For both of the indicators, Turkey is the second last country. When the values for proportion of seats held by women in national parliaments are compared, Turkey is a few percentage points better than Brazil and has a value of 14.90 percent. On the other hand, according to the female legislators, senior officials and managers as percentages of the total, Turkey has a value of 10.04 percent, which is slightly higher than the value of South Korea. The most recent values of both indicators for seven of the countries are presented in Figure IV.3.4.1.

Table IV.3.4.1. Gender Equality Indicators

Some Chosen Gender Equality Indicators (2015)	South Korea	Vietnam	China	Ireland	Spain	Brazil	Turkey
Nondiscrimination clause mentions gender in the constitution	✓	✓	✗	✗	✓	✓	✓
Mothers are guaranteed an equivalent position after maternity leave	✓	✓	✗	✓	✓	✓	✗
Legislation exists on domestic violence	✓	✓	✓	✓	✓	✓	✓
Law mandates nondiscrimination based on gender in hiring	✓	✓	✓	✓	✓	✓	✗
Law mandates paid or unpaid maternity leave	✓	✓	✓	✓	✓	✓	✓
Law mandates equal remuneration for females and males for work of equal value	✗	✓	✗	✓	✓	✗	✓
Law prohibits or invalidates child or early marriage	✓	✓	✗	✓	✓	✓	✓
Non-pregnant and non-nursing women can do the same jobs as men	✗	✗	✗	✓	✓	✗	✗

Source: World Bank

Figure IV.3.4.1. Status of Women in Management Positions[7]



Source: World Bank

IV.3.5. Industry

The share of the industry sector in Turkey has been one of the lowest among 7 countries selected as presented in Figure IV.3.5.1. Even though there had been some improvement in the industry sector in Turkey since 1960 until the end of 1980's, the share of the sector was only higher than the share in Vietnam, where agriculture had been the leading sector since the beginning of 1990's. After following a horizontal trend until the beginning of 2000's, the share of the industry sector in Turkey has been decreasing since then, falling back to a value of around 26 percent in 2015. In the same year, the share of the industry sector was 33 percent in Vietnam, 38 percent in South Korea, 41 percent in China and 42 percent in Ireland.

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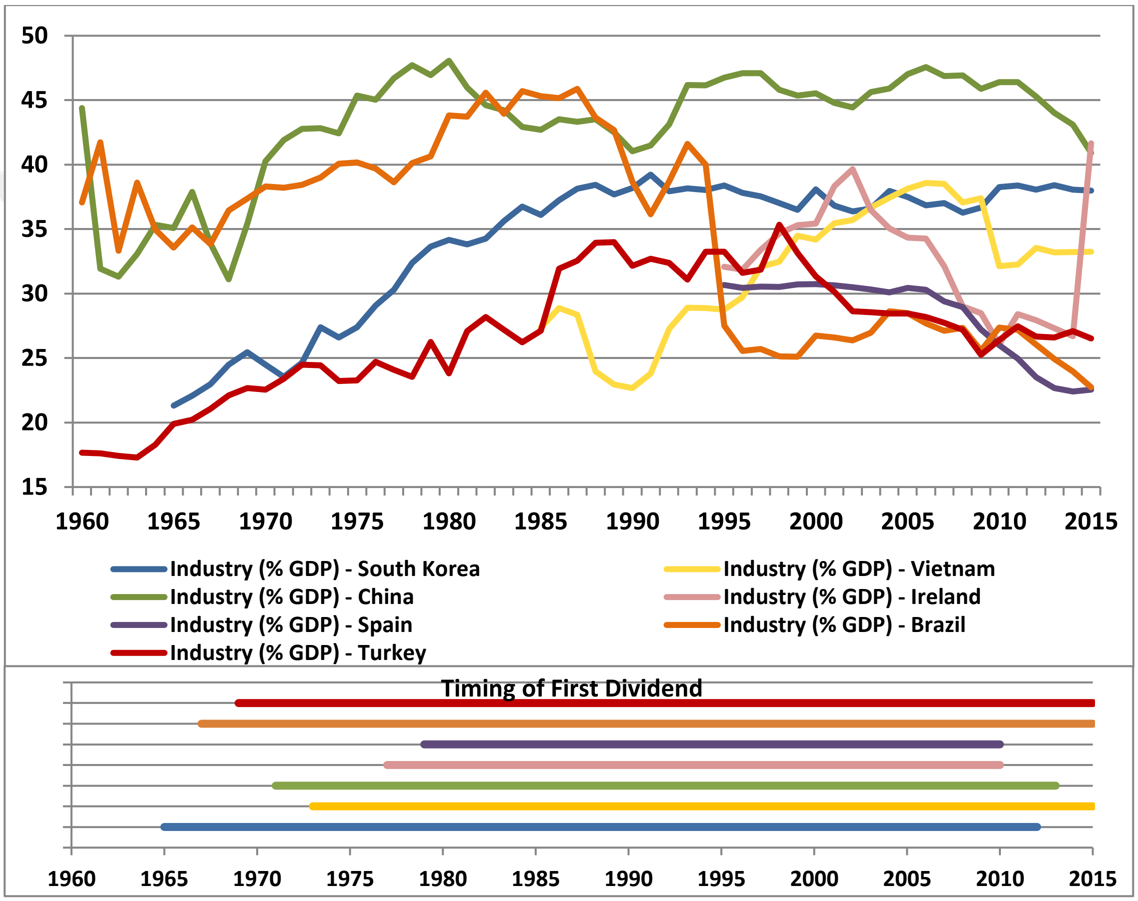
[7] Due to the prevalence of the missing data over the time period, only the current situation in gender issue is taken into account using the most recent data for the countries.

Figure IV.3.5.1. The Share of Industry Sector in the Economy (% GDP)

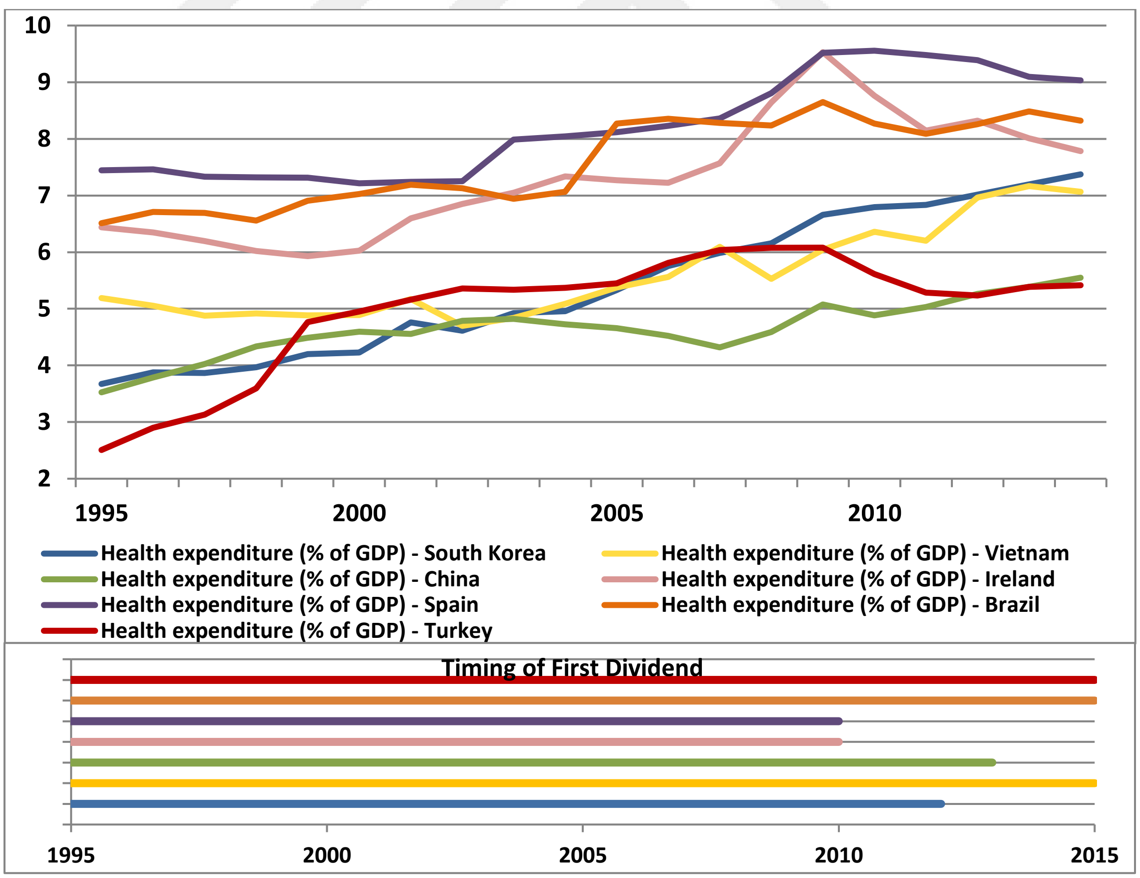


Source: World Bank, NTA

IV.3.6. Health

Although it can be stated that there has been an increasing trend in health expenditures as GDP percentages in all of the selected countries; Spain, Brazil and Ireland diversify from the rest of the countries by around 2 to 3 percent in general as shown in Figure IV.3.6.1. Especially in the recent years, Turkey has been spending the least on health as share of its GDP compared to other selected countries. In 2015 Turkey spent 5.4 percent of its GDP on health, while it was 7.8 percent, 8.3 percent and 9 percent in Ireland, Brazil and Spain respectively.

Figure IV.3.6.1. Health Expenditure (% GDP)

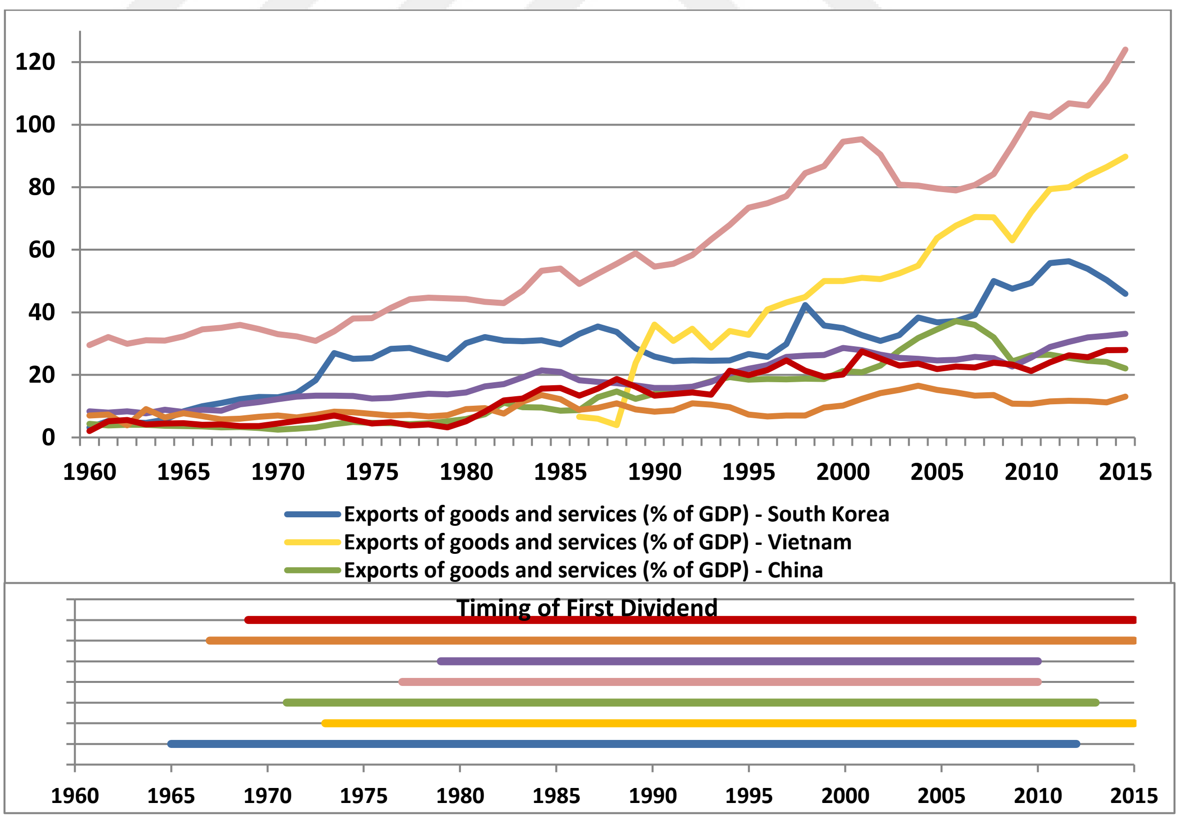


Source: World Bank, NTA

IV.3.7. Exports of Goods and Services

Throughout the whole period, the exports of goods and services as percentage of GDP in Turkey have made little progress in 55 years, despite some improvement in the 1980's. The general trend in exports in Turkey has been similar to the ones of Brazil and China. On the other hand, the increase in exports in Ireland has been remarkable especially after 1990, despite some decrease in the middle of 2000's. In 2015 the exports were 124 percent of GDP in Ireland, which was almost 4.5 times of the value in Turkey. Exports of goods and services for the selected countries are illustrated in Figure IV.3.7.1.

Figure IV.3.7.1. Exports of goods and services (% GDP)



Source: World Bank, NTA

IV.3.8. Foreign Direct Investment

The development of foreign direct investment in Turkey has been considerably poor, following a pattern similar to South Korea and Brazil until the second half of 1990's. On the other hand, Spain, China and While Vietnam has been outperforming Turkey since mid-1990's in terms of foreign direct investment as percent of its GDP; Spain, China, Vietnam and especially Ireland have been performing better than Turkey the whole time. Foreign direct investment in Ireland has been remarkable especially since the second half of 1990's, reaching a value of almost 31 percent of its GDP in 2015, which was more than 17 times of the value in Turkey in the same year. Foreign investment in Turkey has been the lowest as average for the whole period with a value of almost 0.8 percent after South Korea. The values for foreign investment are given in Table IV.3.8.1 as 5 year averages since the beginning of 1970's.

Table IV.3.8.1. Foreign Direct Investment (% GDP - 5 year average)

	South Korea	Vietnam	China	Ireland	Spain	Brazil	Turkey
1971-1975	N/A	N/A	N/A	1,16	0,47	N/A	0,22
1976-1980	0,14	N/A	N/A	1,75	0,58	N/A	0,05
1981-1985	0,13	0,00	0,38	0,86	0,97	0,95	0,13
1986-1990	0,40	0,58	0,89	0,37	1,87	0,37	0,35
1991-1995	0,24	7,25	4,16	2,20	1,84	0,43	0,48
1996-2000	1,26	6,58	4,10	12,62	3,01	3,41	0,37
2001-2005	1,28	3,48	3,73	12,40	3,65	2,74	1,10
2006-2010	0,94	7,20	3,91	16,02	3,25	2,76	2,51
2011-2015	0,72	5,42	2,87	30,89	2,50	3,69	1,84

Source: World Bank

Additional tables and figures regarding socio-economic comparison of the selected countries and Turkey are presented in Appendix A.

IV.3.9. GDP per capita growth

Economic growth in Turkey over the whole period has been considerably low with a growth rate of 2.5 percent on average compared to other selected countries except Brazil and Spain. On the other hand; China, South Korea and Vietnam have been growing substantially with growth rates of 6.9 percent, 5.9 percent and 5.0 percent on average during 1961- 2015 period. It is noteworthy to mention that China had a growth rate of 7.8 percent on average during the years in which first dividend was positive. Similarly, South Korea had been growing almost 7.0 percent on average for the years with first dividend and the growth rates during the first dividend period had been comparably higher than the years before and after the first dividend. Looking at the pattern of the changes of 5-year growth rates of these countries during the years of first dividend, it can be stated that there was not a unique linear pattern of increase or decrease from the beginning until the end of the first dividend period. In other words, it was not possible to make a generalization for the pattern of the 5-year average GDP per capita growth such as linearly increasing, linearly decreasing, slightly U-shaped or slightly upside-down U-shaped. However, it has to be taken into account that the years of economic growth and first dividend do not always coincide or has the same timing as it was the situation in Brazil. Starting from late 1960’s until present, first dividend in Brazil has been positive, while only for the year 1966-1980 and 2006-2010 the economic growth in the country could be considered as high.

In Figure IV.3.9.1, not only timing of first dividend but also timing of demographic window is also included, in order to detect to which extent these two demographic indicators are in line with the years of high economic growth. Looking at the figure, it can be concluded that, timing of first demographic dividend fits better to the years of high economic growth as mentioned earlier. In other words, for most of the years, in which economic growth is higher than 3 percent per year, it is observed that first demographic dividend is also experienced. On the contrary, it is not the same when timing of demographic window is compared with the years of high economic growth. For a considerably high percentage of the 5-year periods with high economic growth, demographic window is not occurred yet.

Although Figure IV.3.9.1 enables a good visualization regarding the timings of both demographic indicators versus 5-year average economic growths for the selected 7 countries, analyzing the subject for each individual country will give a better perspective.

For Turkey years of economic growth coincides with the years of first demographic dividend in general. Only the years of economic growth for the periods of 1961-1965 and partially 1966-1970 are out of the timing of first demographic dividend, which started in 1969. On the other hand, the timing of demographic window, which started in 2002, does not include the periods of 1966-1970, 1971-1975, 1981-1985, 1986-1990 and 1996-2000, during which the average economic growth was over 2.5 percent.

Brazil gained high economic growth for the period of 1966-1970, 1971-1975 and 1976-1980, all of which are in the timing first demographic dividend for the country. The only high economic growth period of 2006-2010 is in the timing of demographic window, which started in 2000.

Only for Spain the situation is just the opposite. The periods of high economic growth, which are 1961-1965, 1966-1970, 1971-1975 occurred before first demographic dividend started. However, all of these periods are in the timing of demographic window of the country. While 1986-1990 period with an average growth rate of 4.27 is in both timings of first demographic dividend and demographic window; 1996-2000 period, in which the average economic growth rate was 3.63, is only in the years of first demographic dividend (Demographic window ended in 1994 for Spain).

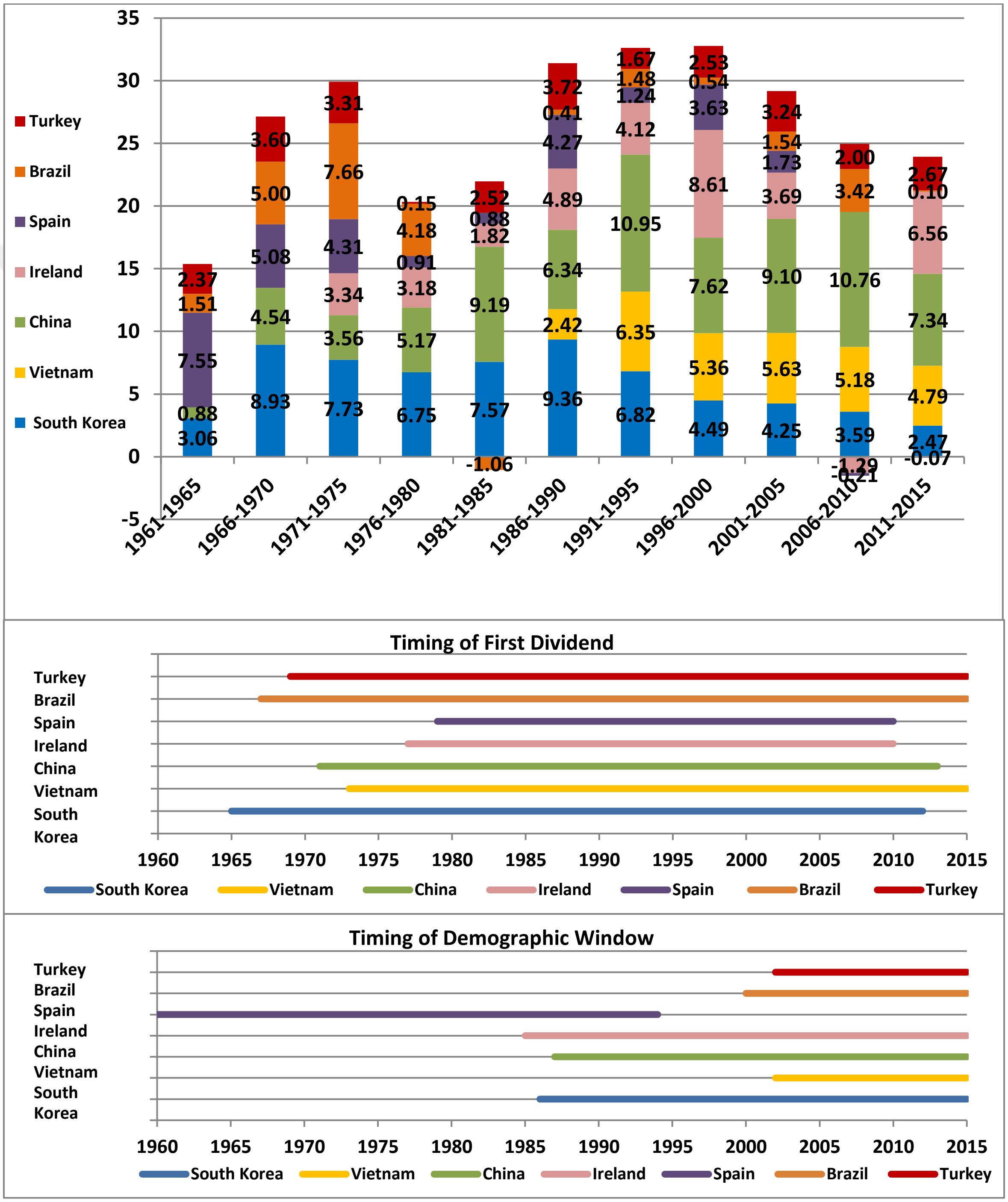
In Ireland, both first demographic dividend and demographic window have similar the timings, making it difficult to detect which indicator fits better to the years of high economic growth for the country. While 1976-1980 period with high economic growth of 3.18 percent is only in the timing of first demographic dividend, 2011-2015 period with a very high growth rate of 6.56 percent stands in the years, in which only demographic window is observed. Moreover, when the 5-year average economic growth rate was 3.34 percent in 1971-1975, the timing for neither first demographic dividend nor demographic window started.

China's economy has been growing with substantial amounts with an annual average value of 7.46 percent since 1965. Compared to demographic window, timing of first demographic dividend, which lies between 1971 and 2013, covers more periods with high economic growth. Only 1966-1970 period which had an average growth rate of 4.54 was out of timings of both the first demographic dividend and the demographic window.

Economic growth data of Vietnam is limited as it is available only after 1986 in World Bank datasets. In this case, the analysis on Vietnam cannot be as sufficient as for the other selected countries. Anyway, it can still be commented that during the years of high economic growth which existed for all of the 5-year periods from 1991 to 2015, first demographic dividend is present. Actually the start year of first demographic dividend in the country is 1973, after which significant economic growth could be present, but cannot be checked because of the missing data for those years. However, it is for sure that demographic window starts in 2002 for the country, which does not cover the two decades of high economic growth.

South Korea, is a good supportive example of the argument that first demographic dividend is a better indicator of demographic advantage with respect to demographic window. With the start year of first demographic dividend, the country starts to have high economic growth rates relative to the previous period. In other words, the first high economic growth rate with a value of 8.93 is observed for the period 1966-1970, which is also the beginning year of first demographic dividend in the country. Moreover, high economic growth rates continue throughout the years of first demographic dividend and decrease remarkably by the end of first demographic dividend. For the period of 2011-2015, in between which the first demographic dividend period ended, the economic growth rate is relatively small with a value of 2.47 percent (5-year average annual growth rate) compared to the previous periods. On the other hand demographic window for South Korea starts in 1986, which is after three 5-year periods of high economic growth with an average annual value of 7.8 percent.

Figure IV.3.9.1. GDP per Capita Growth (%) (5 year average)



Source: World Bank, NTA, author's calculations

V.1. Findings from the Socio-economic Analyses of the Selected Countries

In this sub-section the economic growth rates and timings of first demographic dividend and demographic window are examined for 7 seven countries for 55 years from 1960 to 2015. Looking at the whole picture, it can be inferred that first demographic dividend is more related to the years of high economic growth, indicating that it has a more meaningful contribution to the economic growth with respect to demographic window.

It is also important to underline that a country can have a high economic growth rate for the years without demographic contribution. However, a country has an opportunity to grow relatively more for the years, in which demographic contribution is present. It is not a must to attain significant economic growth in the existence of demographic factors. In other words, there is not an automatic mechanism that creates high economic growth in the presence of demographic advantage. Not all of the countries can manage to use the advantage of demographic contribution resulting from shifts in age structure.

According to the results of this section so far; for the following comparison table, first demographic dividend will be taken as the indicator of demographic advantage, while determining periods, during which high economic growth and demographic contribution are present at the same time. Just for these determined periods, the changes in trends of major socio-economic indicators will be examined for all of the 7 selected countries. The major socio-economic indicators are chosen among the ones which were highlighted in the literature review made for these 7 countries. Among these indicators, the ones whose data denote high improvement in general for the overall period are taken for the Table IV.4.2.

Four major socio-economic indicator groups and their sub-indicators which are chosen for Table IV.4.2 are listed as;

- Education
  - Gross Enrolment Ratio Secondary Education – 10 years lagged
  - Gross Enrolment Ratio Tertiary Education – 5 years lagged
- Labor
  - Labor Force Participation Rate – Male
  - Labor Force Participation Rate - Female
- Health
  - Health Expenditure (% GDP)
- Economy
  - The Share of Industry Sector in the Economy (% GDP)
  - Exports and Imports of goods and services (% GDP)

Even though, gross capital formation, gross domestic savings and foreign direct investment are also important economic indicators which are highly related to economic growth of a country, because of high volatility in their patterns, which makes it very difficult to describe by notations used, they are not included in Table IV.4.2.

The main target of the table is to reveal the trends in the chosen socio-economic indicators throughout the periods, during which the demographic indicator regarding the change in age structure (first demographic dividend) contributed to the economic growth of the country. To be more precise, the table is aiming to present the changes in the indicators referring to education, labor, health and economy only for the years in which demographic advantage coming from the changes in age structure could be sufficiently used for the growth in the economy.

It is not simple to determine the periods during which, first demographic dividend contributed to the economic growth and to what extent. As it requires complex techniques and measurements, a simpler assumption is chosen to determine these periods. For the years, in which first demographic dividend is present, if the 5-year average annual economic growth is considerably high (which is more than 3 percent for this study), then the periods with first demographic dividend are determined as shown in Stage 1 in Table IV.4.2.

For Stage 2, which is also shown in the same table, a more detailed process is applied. Firstly, same as in Stage 1, high economic growth rate is accepted to be the values with more than 3 percent annually (considering 5-year average values, meaning for a selected 5 year period, annual growth rate is taken to be constant). Secondly, considerable first demographic dividend contribution is accepted to be more than 0.14408, which is the average first demographic dividend value for 61 countries, all of which have country estimates (more reliable than model estimates). In other words, first demographic dividend values higher than the average value of country estimate countries are accepted to be significant and their contribution in economic growth should be taken into account. This limitation is explained Stage 2 of Table IV.4.2. The periods stated in Stage 1 and Stage 2 rows of the table are composed of 5-year periods which satisfies the related criteria for each country. In this analysis Stage 2 is taken into consideration, as it has a more detailed method to capture successful years with high economic growth and considerable first demographic dividend. So, while examining the changes in the socio-economic indicators for each country, the periods stated in Stage 2 are taken into consideration. During the decision process for determining the 5-year periods satisfying the criteria of Stage 2, Table IV.4.1 is used.

Table IV.4.1 presents 5-year average annual first demographic dividend values for each 5-year periods, in which the economic growth rate for the related country is higher than 3 percent. So, the periods with first demographic dividend values presented varies from country to country for the time period between the years 1961-2015. The average first dividend values for 7 seven selected countries are also given for informative purposes and it is seen that the 55-yearaverage values for these countries are considerably higher than the average values of all of the countries (61 countries) with country estimates. In Table IV.4.1 the first demographic dividend values that are taken into consideration are given in red, while the other values are neglected as they fall below the threshold of 0.14408.

Table IV.4.1. First Demographic Dividend Values for the Periods of High Economic Growth [8]

	South Korea	Vietnam	China	Ireland	Spain	Brazil	Turkey	
1961-1965								
1966-1970	0.13097					0.08762		
1971-1975	0.63575		0.52460			0.35474	0.12250	
1976-1980	1.39623		1.12731	0.16767		0.53076		
1981-1985	1.67726		1.34206					
1986-1990	1.76818		1.36431	0.85013	0.61736		0.50162	
1991-1995	1.44517	0.77541	1.23824	1.17430				
1996-2000	0.92167	0.95912	0.63542	1.24709	1.05761			
2001-2005	0.46364	0.94284	0.33154	0.90643			0.57225	
2006-2010	0.30578	0.76259	0.43505			0.49585		
2011-2015		0.33537	-0.00974					
1960-2015 ave	0.73866	0.31163	0.48807	0.29621	0.24382	0.43110	0.31433	**0.40340**
1960-2015 ave								**0.14408**

Source: World Bank, NTA, author's calculations

It is noteworthy to mention that Table IV.4.2 indicates the changes in the indicators with respect to previous periods. It is also important to examine the values of the indicators for each country, while observing their progress and evaluating how Turkey has been doing so far with respect to these selected countries. Comparison of the values was made previously in this section.

[8] The term "high economic growth rate" is used for growth rates, which are greater than 3 percent.

So in the following assessment, by using Table IV.4.2 the changes in the indicators are considered. In the final part of this section, while pointing out the findings of the overall section; not only the improvements in the indicators, but also the data values of the indicators will be summarized and the performance of Turkey will be analyzed. An analysis without considering the values might be misleading, as in this case only the changes in the indicators could be captured. A good analysis should cover both the variations and the data levels. For example, for a given country there might be no change and so no improvement in a socio-economic indicator, but the value of the indicator might already be considerably high compared to other countries.

While including enrolment ratios in the analysis, 10 years lagged values for gross enrolment ratios for secondary education are used in line with the literature. It is argued that current secondary educational attainment levels contributes to economic growth and development 10 years later on average by effecting labor quality of the work force. Similarly, taken into consideration the same argument; 5 year lagged values of gross enrolment ratio for tertiary education is used for this analysis.

When 10 years lagged secondary enrolment ratios are checked for the years of high economic growth, it is seen that in general this indicator improved with moderate or high levels. Only in China a rapid decrease is observed for 1975-1985 period. But for the rest of the periods under consideration, secondary enrolment ratios also increased in China. Secondary enrolment ratio for Turkey has been increasing in moderate levels for the whole time under consideration. Compared to secondary education, the improvement in tertiary education is more visible. No decrease in the enrolment rate for tertiary education is observed. The main reason lying behind the considerably high increase in tertiary education might be the low initial values observed in this indicator. As the initial valued of secondary enrolment ratios were already high compared to tertiary education, high positive change was less likely to occur. However, even though the enrolment ratio for tertiary education has been rising more compared to secondary education in general for the countries, the situation was slightly different for Turkey.

Enrolment ratios for tertiary education in the country showed no progress during the years of high economic growth accompanied with significant first demographic dividend.

The changes in labor force participation rates for males exhibited differentiations among selected countries for the periods stated in Stage 2 row of the table. However, it is very important to underline that the data for labor force enrolment ratios are available starting from 1990 and so cannot cover some of the periods with high economic growth and first demographic dividend, which is between 1970 and 1990. Under these circumstances it is not totally possible to make solid comments regarding the changes in the labor force participation rates for the periods presented in Stage 2 section of the table. For example, the period with high economic growth and substantial first demographic dividend starts in 1971 for South Korea and lasts until 2010. So the first 20 years of this period cannot be evaluated in terms of labor force participation. During this period, South Korea achieved high labor force participation rates according to the previous studies in literature. However, after this period, labor force participation rates for males in South Korea almost remain constant until 2010. In Vietnam, China and Ireland, there have been periods with moderate decreases in labor force participation rates for male during years of economic growth and first demographic dividend. However, in Turkey for some of the years, rapid decreases in male labor force participation rates are observed, besides years of increase in this indicator. Compared to male labor force participation rate, female labor force participation rate showed better performance in terms of change with respect to previous terms. Years with decrease in female labor force participation rates are only observed in China and Turkey. In rest of the countries this indicator either increased or stayed in the same levels.

Regarding health expenditures as percentage of GDP, it can be stated that in general this indicator has been increasing for the periods with special characteristics described in Stage 2 section of the table. South Korea, Vietnam, China and Ireland had years with rapid increase in health expenditures. While this indicator for Spain remained constant, it increased moderately for Brazil. In Turkey, health expenditures followed a moderate increase pattern. It needs to be pointed out that because of the limited availability of data (available only after 1995), the changes in this variable could not be captured for the years before 1995. All of the selected countries had periods of high economic growth and substantial first demographic dividend before 1995. So the evaluations regarding this indicator are somewhat incomplete as it cannot cover the whole period under consideration.

It is hard to make generalizations about the changes in indicators regarding economy, as they usually have very erratic patterns. The share of industry sector is one of them. In Vietnam, China and Ireland, the share of industry sector has been changing fast, including years of rapid increase and decrease. Despite the volatility in the share of industry sector, in general it is seen that this indicator had years of increase, except Spain, where it remained constant. It should also be noted that South Korea, which gained remarkable economic growth during the year of significant demographic contribution, had no decrease in the share of industry sector throughout the years from 1966 until 2010. Countries except South Korea and Spain, experienced years of decrease in the share of industry sector for some of the years of the overall period under consideration as stated in Table 3. Turkey is one of these countries, as the share of its industry sector first had a rapid increase but then it was followed by a first moderate and then a rapid decrease during the years of high economic growth and considerable first demographic dividend. Considering the changes in the share of the industry sector during the periods under examination (1986-1990, 2001-2005, which are the years stated in Stage 2 section of Table IV.4.2), it can be said that Turkey could not do a good job in terms of structural change.

Exports and imports, which are a good sign of openness of the economy, play an important role in economic growth of a country. Even though this indicator had followed patterns with mild volatility including years with increase for the selected countries; for Turkey the pattern had in general a downward trend, indicating a moderate decrease. In Vietnam, China and Ireland there has been years with rapid increase for exports and imports, which is believed to have a high contribution to their economic growth according to the previous studies. For the years of high economic growth and sufficient demographic dividend, Turkey could not get any support from exports and imports. If there could be significant gains from this indicator, the growth in the economy could be bigger.

Table IV.4.2. Comparison of Major Socio-economic Indicators for the Years of High Economic Growth and First Demographic Dividend

		South Korea	Vietnam	China	Ireland	Spain	Brazil	Turkey
Stage 1	5 year ave. GDP growth rate > 3 percent & First demographic dividend is present	1966-2010	1991-2015	1971-2015	1976-1980, 1986-2005	1986-1990, 1996-2000	1966-1980, 2006-2010	1971-1975, 1986-1990, 2001-2005
Stage 2	5 year ave. GDP growth rate > 3 percent & First demographic dividend is over 0.14408	1971-2010	1991-2015	1971-2010	1976-1980, 1986-2005	1986-1990, 1996-2000	1971-1980, 2006-2010	1986-1990, 2001-2005
Education	Gross Enrolment Ratio - Secondary Education - 10 years lagged	↑	N/A	↑ ↓ ↑	↑	↑	N/A	↑
Education	Gross Enrolment Ratio - Tertiary Education - 5 years lagged	↑	↑	↔ ↑	↔ ↑ ↑	↑ ↑	↑	↔
Labor	Labor Force Participation Rate – Male (1990+)	↔	↓ ↓ ↑	↔ ↓	↓ ↔ ↑	↑	↔	↓ ↓ ↑ ↑
Labor	Labor Force Participation Rate – Female (1990+)	↑	↑ ↑ ↔	↔ ↓	↑	↔	↔	↔ ↓
Health	Health Expenditure (% GDP) (1995+)	↑	↔ ↑	↑ ↓ ↑	↓ ↑	↔	↔ ↑	↑
Economy	The Share of Industry Sector in the Economy (% GDP)	↑ ↔	↑ ↑ ↓ ↔	↑ ↓ ↑ ↔	↑ ↓	↔	↑ ↓	↑ ↓ ↓
Economy	Exports and Imports of goods and services (% GDP)	↔ ↔ ↑	↔ ↑ ↑	↔ ↑ ↑ ↓	↑ ↑ ↑ ↓	↔ ↑	↔ ↓	↓
Explanations	↑ indicates pattern with moderate increase				↓ indicates pattern with moderate decrease			
Explanations	↑ indicates pattern with high increase				↓ indicates pattern with moderate increase			
Explanations	↔ indicates a horizontal pattern				N/A indicates data is not available			

Source: Author's calculations

Combining outcomes of two comparisons made in this section, one looking at the levels of indicators throughout the whole period of time between 1960-2015, the other one examining the changes in the indicators just for the periods of high economic growth supported by considerably amount of first demographic dividend, following deductions can be made about how Turkey has been doing in terms of socio-economic indicators taken into account in this section:

- Even though secondary enrolment ratios are rising in general for these 7 countries, the enrolment ratios for Turkey remain significantly below most of the other selected countries during the years of high economic growth in the presence of considerable first demographic dividend. In terms of tertiary education, not only no progress was observed, but also the initial values were considerably low for Turkey. It could be commented that the economic growth in Turkey for the years with first demographic dividend could be more; if the quality of labor force, regarding educational attainment, had been higher.

- In terms of labor force participation rate for males and females, Turkey exhibited a poor performance during the years of high economic growth, experienced in the presence of first demographic dividend also. Even though the initial male labor force participation rates in Turkey (84.1 percent in 1990) were good and above the rates in South Korea, Spain and Ireland; because of a decreasing pattern in general, these rates could not be kept. The situation for female labor force participation rates in Turkey has been worse. Not only the initial rates (36.2 percent in 1990) were far below the rest of the selected countries, but also as a result of a continuous decreasing pattern; this indicator stayed remarkably below the rates of other selected countries. Labor force participation rates seem to be one of the major problems in front of Turkey’s economic growth and development. Considering the continuous contribution of the first demographic dividend for the following years, arising from the shifts in age structure; weak labor force participation rates have to be improved in order to acquire sustainable economic growth. This improvement requires new job openings which can be accomplished by more structural changes from less value added sectors such as agriculture to more value added sectors such as industry. The sub-sections of the industry sector in which investments are made also play an important role.

- Even though health expenditures increased moderately in Turkey, because of the low initial values (2.51 percent in 1995); this indicator did not improve much. Health expenditures might be a good proxy for the availability of health services and consequently health status of the population, including the working age. High values in this indicator can relate to healthy workforce and consequently higher labor quality when combined with high levels of education. So an improvement in availability of health services in the future might lead to increase in economic growth by increasing labor quality in Turkey.

- In 1985 the share of the industry sector in Turkey was 27.13 percent, which increased to 34 percent in 1989, denoting a rapid increase in the share of the industry sector in the overall economy in the country. However, the share of industry sector first decreased from 31.33 percent in 2000 to 28.62 percent in 2002, which was a significant decrease for a 2-year period. After then, the share of the industry decreased with a moderate pace to 28.46 percent in 2005. It is of high importance to note that initial values of the share of industry sector in Turkey was already low. Throughout the year of first increase and then decrease, the share of industry sector remained considerably low especially with respect to China, South Korea, Ireland and Vietnam. It can be commented that if the structural change could be better managed, resulting in a more share of industry sector, the growth in the economy could be more considering the contribution of the first demographic dividend for these years.

- The exports and imports as percentage of GDP was 15.86 percent in 1985 and it decreased to 13.37 percent in 5 years. Also in 2001 the value of the indicator was 27.44 percent, which dropped down to 21.86 in 2005. Taking into account both the low initial values of exports and imports and the decrease trends for the periods of high economic growth and significant first demographic dividend at the same time; it can be commented that in the presence of improvement in exports and imports, the economic growth values could be higher than the actual values. So in other words, Turkey could not develop an opportunity that could come from this indicator.

In addition to the indicator by indicator comparison; one of the simplest ways to make an overall economic development comparison is to look at the initial and current income levels of the countries to visualize the possible income level shifts from the start year of first demographic dividend to present. While initial income levels of the countries are presented in Table IV.4.3, present situation is represented in Table IV.4.4 as follows:

Table IV.4.3. Selected Countries with First Demographic Dividend

(First Demographic Dividend Start Year Income Levels)

	Low Income	Lower Middle Income	Upper Middle Income	High Income
East Asia & Pacific	Vietnam, China	South Korea		
Latin America		Brazil		
Europe			Turkey	Ireland, Spain

Source: World Bank (determined using GNI per capita values and income group lower and upper limits [9]stated in World Bank list of economies - March 2017)

Table IV.4.4. Selected Countries with First Demographic Dividend

(Present Income Levels)

	Lower Middle Income	Upper Middle Income	High Income
East Asia & Pacific	Vietnam	China	South Korea
Latin America		Brazil	
Europe		Turkey	Ireland, Spain

***Source:** World Bank (determined using GNI per capita values and income group lower and upper limits [10] stated in World Bank list of economies - March 2017)*

[9] Income groups are calculated using the World Bank Atlas method. The groups are: low income, USD 1,025 or less; lower middle income, USD 1,026–4,035; upper middle income, USD 4,036–12,475; and high income, USD 12,476 or more.

Comparing both tables it can be inferred that;

- Vietnam moved from low income to lower middle income group,
- China moved from low income to upper middle income group,
- South Korea moved from lower middle income to high income group,
- Brazil moved from lower middle income to upper middle income group,
- Ireland and Spain were already in high income group,
- Turkey remained in upper middle income group.

All of the countries except Turkey moved to upper levels, South Korea making the biggest move from lower middle income group to high income group. However, it is noteworthy to mention that even though Turkey is still in the same income group; GNI per capita value made a significant increase and reached to the value of 11,370.70 US dollars, which is very close to the lower limit of high income group.

One last analysis in this section is a table format presentation of the socio-economic indicators which is stated to have contributed to economic growth of the countries according to the previous studies in literature. While presenting these socio-economic indicators; not only factors causing the change in the indicators, but also reasons lying behind these factors to occur are also shown for each selected country in Table IV.4.5 as follows:

[10] The same calculation method used for Table IV.4.3 is applied.

Table IV.4.5. Indicators and Their Causes Contributed to Economic Growth for the Selected Countries

Country	Indicator Contributing to Economic Growth and its Change	Factors Causing the change in the Indicator	Reasons of the Factors to Occur
South Korea	Increase in female labor force participation rate	Decrease in total fertility rates	Population control policies by government (1962)
			Increase in age of marriage for women
			Increase in child raising costs as a result of rapid urbanization
			Rise in standards of living
	Increase in school enrolment ratios	Increase in expenditure per student by the government	Fewer children of school age as a result of decrease in fertility
		More disposable income in household level	
	Increase in quality of education	Strategy shift in the country's education system focusing on skills and knowledge (1960's)	Need for production-oriented education system
	Structural change and development in the economy	Development in farming and fishing industries	Increase in capital investment as a result of improving relations with Japan
		Formation of manufacturing and shipping industries	
		Foundation and gradual development of chemical, iron and steel industries	Improving relations with neighbor countries
		Take part in infrastructure projects in Vietnam	The Vietnam War
		Improvement of export of goods and services	Adoption of capital market economy
			Development of shipping industry

Country	Indicator Contributing to Economic Growth and its Change	Factors Causing the change in the Indicator	Reasons of the Factors to Occur
Vietnam	Structural change and development in the economy	Levels and types of production and the prices of the goods are set free	Abandonment of socialist policies
		Household farms replaced with big state farms	Policy reforms in agriculture and farming
		Encouragement of foreign direct investment and foreign trade	Elimination of barriers regarding imports and exports
		Economic integration with the world	Trade agreements with Eurasian Economic Union, European Union, South Korea, the Trans-Pacific Partnership, and etc.
	Increase in school enrolment ratios especially in tertiary education for females	Decrease in total fertility rates	Family planning programs implemented by the government
			Discontinuance of the foreign aid and investments after the end of Vietnam War in 1975
Spain	Increase in school enrolment ratios	Increase in Government expenditures on education (1970's-1990's)	Policy reforms in education
	Structural change and development in the economy	Public sector reforms	Moving into a democratic system following the end of military government in 1975.
		Investments in public services and infrastructure	Increase tax revenues as a result of deep tax policy and tax administration reforms
		Starting implementing Value Added Tax (VAT)	Harmonization with European Economic Community (EEC) after joining in 1986
		Foreign direct investment coming from France and Germany after 1986	The accession of Spain in the European Union

<table>
<tr><th>Country</th><th>Indicator Contributing to Economic Growth and its Change</th><th>Factors Causing the change in the Indicator</th><th>Reasons of the Factors to Occur</th></tr>
<tr><td rowspan="15">China</td><td rowspan="10">Structural change and development in the economy</td><td>The end of collective farming in the rural areas</td><td>The shift from a socialist planned economy to an emerging market economy</td></tr>
<tr><td>Market liberalization</td><td>Beginning of economic reforms in the late 1970's</td></tr>
<tr><td rowspan="2">The tremendous increase in export of manufacturing goods</td><td>Low labor cost</td></tr>
<tr><td>Transformation to open economy</td></tr>
<tr><td rowspan="3">Turning into a platform for international production</td><td>Open-door policy</td></tr>
<tr><td>Low labor costs</td></tr>
<tr><td>Establishment of economic zones with special regulations</td></tr>
<tr><td>Focusing on labor intensive industries</td><td>Surplus in the labor market</td></tr>
<tr><td rowspan="2">Increase in savings rates</td><td>Decrease in old and young dependency ratios</td></tr>
<tr><td>Changing individual saving behavior</td></tr>
<tr><td rowspan="3">Increase in school enrolment ratios</td><td>Increasing importance of human capital</td><td rowspan="2">Changing structure of the labor market in the country during socio-economic transformations</td></tr>
<tr><td>Rise in the return on educational attainment</td></tr>
<tr><td>The increase in the government’s expenditures on education</td><td>Government’s emphasis on education</td></tr>
<tr><td rowspan="2">Increase in labor force participation rates</td><td>Expanding labor-intensive industries</td><td rowspan="2">Significant labor surplus in rural areas</td></tr>
<tr><td>Relieved restrictions on in-migration</td></tr>
</table>

Country	Indicator Contributing to Economic Growth and its Change	Factors Causing the change in the Indicator	Reasons of the Factors to Occur
Ireland	Outstanding increase in female labor force participation rates (Especially 25-40 age group)	Decrease in total fertility rates	Family planning programs
			The release of limitations on birth control in 1970's
			The legalization (1979), availability and prevalence of the contraception
	Increase in school enrolment ratios (secondary and tertiary)	The introduction of free secondary education in the mid-1960's	Reforms in education
	Structural change and development in the economy	The transformation of manufacturing sector which started in the 1970's	Leaving low technology and traditional industries, focusing on high technology industries (electronics and pharmaceuticals)
		Increase in Foreign Investment	Reduction of the corporate tax rate
			Maintaining a secure environment for foreign investment
			Accumulation of skilled labor force
		Reversing out-migration of skilled labor	Increasing demand for skilled labor force by multinational firms
		Implementation of new management skills and modern technologies which were new to the country	Establishment of multinational firms in the country
		Moving towards export oriented and open economy (Tremendous rise in export of goods and services starting from the beginning of 1970's)	Foreign direct investment in the manufacturing sector

Country	Indicator Contributing to Economic Growth and its Change	Factors Causing the change in the Indicator	Reasons of the Factors to Occur
Brazil	Increase in female labor force participation rate	Increase in female literacy rate	Improvement in gender inequality
	Structural change and development in the economy	Enhancements in the agriculture sector	Implementations regarding improvement of the structural composition of the economy
		Diversifications in the industry sector	
		Increase in international trade and foreign investment	Establishment of a confident environment in the country
	Improvements in major economic indicators	Maintaining financial stability (1995-2010)	Curbing inflation
			Reducing public debt
Turkey	Structural change and development in the economy	Transition from an inward-oriented industrialization to an export-led industrialization	1st phase of the liberalization process of Turkish economy (1980's)
		Full currency convertibility	2nd phase of the liberalization process of Turkish economy (1990's)
		Increase in foreign direct investment	Profound reforms especially in banking sector after 2001 crisis
			Decreasing inflation rates to one digit values

While in general, not only the indicator related to structural change, but also the ones related to education and labor force participation contributed to the economic growth for the selected countries; for Turkey the only major contribution came from the indicator related to structural change. In other words, the changes in labor force participation and school enrolment ratios does not seem to have contributed to the economic growth for the past decades in general. However, this should not be understood as labor force participation or school enrolments are not important for economic growth and development in Turkey. It should be commented as even though small contributions from labor force participation and school enrolment, Turkey had years of sufficient economic growth in the past decades. In addition it can be argued that with more contribution from these two indicators, economic growth in Turkey could be higher than it occurred.

For a more detailed and quantitative evaluation, the significance and relative importance of major socio-economic indicators regarding economic growth in Turkey for 1960-2015 period will be considered in an econometric analysis in the following chapters.

V. THEORETICAL ANALYSIS ABOUT THE DECOMPOSITION OF THE ECONOMIC GROWTH

In this section, a set of well-known growth equations are examined in order to analyze which factors are contributing to economic growth[11]. In addition, the inclusion of the socio-economic factors in these growth equations are also studied. These socio-economic factors are commonly mentioned in the literature review section and include but not limited to indicators related to education, labor force participation, health and etc.

Before conducting an empirical analysis, which is suggested in this thesis as a further study, an overview to the basics of the set of equations commonly used in previous studies is considered to be useful and informative, while examining sources of economic growth including especially the socio-economic components. In literature, different models are developed by using various equations about economic growth. Most commonly used ones are included and explained in this section.

So it can be stated that this section has two major roles. The first one is to examine the effects of these socio-economic factors on economic growth and the way these factors contribute in the growth equations. The second one is to determine which variables to choose as the representatives of these socio-economic indicators for a further empirical study including regression analysis.

V.1. The Review of the Equations on Economic Growth

The conventional version Solow-Swan economic growth model (Barro and Sala-i-Martin, 1995), which is a special case of the Ramsey model with fixed saving rates, is taken into account in various models including Bloom and Williamson's. Their economic analysis (1998) included 78 countries for a time period of 25 years from 1965 to 1990.

[11] Economic growth is taken into account by considering both the level of output and income per capita.

In their study, while developing the regression model, production per worker is formulated as;

$$y = A * k^{\alpha} \quad \text{[Equation 1]}$$

where;

y: output per worker,

A: index for total factor productivity,

α: output elasticity of capital,

k: capital stock per worker

The equation for growth rate of output per worker which is denoted as “y”, can be written as;

$$g_y = \frac{1}{t2-t1} \ln [\frac{y(t2)}{y(t1)}] = \alpha \ln [\frac{ys}{y(t1)}] \quad \text{[Equation 2]}$$

where;

g_y: growth rate of output per worker,

t_1: beginning time of the period,

t_2: end time of the period,

$y_{(t1)}$: output per worker at time t_1,

$y_{(t2)}$: output per worker at time t_2,

y^s: outcome per worker in the steady state.

Equation 2 is also in line with empirical growth definition in the literature (Barro, 1991; Mankiw, Romer and Weil 1992; Barro and Lee, 1994; Sachs and Warner, 1995).

In Asian Development Bank (ADB) 1997, steady-state output per worker is derived by;

$y^s = X * \beta$ [Equation 3]

where;

y^s: outcome per worker in the steady state,

X: Variable matrix with k determinants for the steady state.

The variables included in the matrix, which are taken from ADB, 1997, can be listed as;

- Initial life expectancy (in log form),
- Initial average years of schooling (in log form),
- Natural resource abundance,
- Openness,
- Quality of Institutions,
- Access to ports (dummy),
- Average government savings,

- Tropics (dummy)
- Ratio of coastline to land area.

Also output per worker is transformed into output per capita by multiplying the numerator and the denominator of the equation with N and leaving Y/N in the one side of the equation as follows;

$$y = \frac{Y}{L} = \frac{Y}{L} * \frac{N}{N} = \frac{Y}{N} * \frac{N}{L} \qquad \text{[Equation 4]}$$

$$\tilde{y} = \frac{Y}{N} = y * \frac{L}{N} \qquad \text{[Equation 5]}$$

where;

y: output per worker,

Y: total output,

L: total labor force,

N: total population,

ỹ: output per capita.

Equation 5 is transformed from levels to growth rates by taking natural logarithms and derivatives with respect to time of both sides.

$$g_{\tilde{y}} = g_y + g_{workers} - g_{total\ population} \qquad \text{[Equation 6]}$$

Substituting Equation 2 and Equation 3 in Equation 6, following equation is derived.

$$g_{\tilde{y}} = \alpha \ \ln\left[\frac{X\beta}{y(t1)}\right] + g_{\text{ workers}} - g_{\text{ total population}} \qquad \text{[Equation 7]}$$

Using Equation 7, equation for estimation can be written as;

$$g_{\tilde{y}} = \beta_1 X + \beta_2 y(t_1) + \beta_3 g_{\text{ workers}} + \beta_4 g_{\text{ total population}} + \varepsilon \qquad \text{[Equation 8]}$$

In equation 8, β_3 and β_4 are expected to be equal with opposite signs, pointing out a stable population with the same growth rates of working population and whole population. Equal growth rates are expected to result in diminishing demographic effects. On the other hand, in an unstable population, which is going through demographic transition, it is predicted that demographic influence on economic dynamics lasts. In Equation 8, both working age population and total population are taken into account denoting age structure of the population is also taken into account. Furthermore; a more comprehensive approach from Bloom, Canning and Malaney is developed, in which even the age structure of the working age population is included. The importance of the age structure of the working age population arises from the idea that productivity of the working age population ranges by age.

According to their theoretical framework, not only labor force growth but also total population growth might play a role in steady state rate of income growth. In Solow Swan model, rate of growth workers are considered as exogenous. This assumption is considered to have a diminishing effect on the steady state income per worker by decreasing the ratio of capital to labor and consequently on growth rate of income per worker. On the other hand, the increase in rate of growth of workers leads to a decrease in dependency ratios. Coale and Hoover, 1958 argued that decreasing dependency ratios resulted in an increase in savings per capita, compensating the adverse effects of growth of labor on the ratio of capital to labor. The difference in the increase in saving rates and growth in labor determines the direction of rate of growth in steady state. To be more precise, an increase in steady state growth rate occurs when the increase in savings outstrips growth of workers. Similarly, a decrease steady state growth rate arises when growth of workers surpasses increase in savings. In Bloom and Williamson's model effects emerging from increasing working age and growing savings are not separately introduced. Instead, these effects on economic growth are included in the coefficients of g_{workers} and $g_{\text{total population}}$.

As used in growth accounting[12], according to neoclassical production function, output at time t, which is denoted as Y_t, is a function of capital stock at time t (K_t), labor force at time t (L_t) and total factor productivity at time t (A_t). In Coub-Douglas form of the production function, the equation can be written as;

$$Y_t = A_t * K_t^{\alpha} * L_t^{(1-\alpha)} \quad \text{[Equation 9]}$$

where;

Y_t: real GDP at time t,

A_t: total factor productivity (TFP) at time t,

K_t: the stock of capital at time t,

L_t: the total employment[13] at time t,

α: the share of capital of income.

[12] "Growth accounting is an empirical tool and specific assumptions need to be made to provide a framework for interpretation of economic data. In the most basic version, an aggregate production function serves as a framework" (Vincelette, 2010).

[13] In case employment is not available, the labor force can be used as a substitute.

According to Equation 9, the changes in output is assumed to be as a result of the changes in the stock of capital, labor force and total factor productivity. Taking natural logarithms and differentiating both sides of Equation 9, the Cobb-Douglas function can be converted into Equation 10.

$\ln (Y_t) - \ln (Y_{t-1}) = \ln (A_t) - \ln (A_{t-1}) + \alpha * [\ln (K_t) - \ln (K_{t-1})] + (1-\alpha) * [\ln (L_t) - \ln (L_{t-1})]$

[Equation 10]

Equation 10 can also be rewritten as shown in Equation 11, which is explained in Growth Accounting presentation (Vincelette, 2010).

GDP growth = TFP growth + α * Capital growth + (1 - α) * Labor growth

[Equation 11]

The change in output can be decomposed into the changes in its inputs, which are shown in Equation 11.

- A change in total factor productivity between time t-1 and t, which can be denoted as ΔA, will result in a value of sum of A_{t-1} and ΔA at time t. The growth in output caused by the growth in total factor productivity between time t-1 and t can be formulized as in Equation 12.

$$\frac{\Delta Y}{Y_{t-1}} = \frac{\Delta A}{A_{t-1}} \qquad \text{[Equation 12]}$$

- A change in capital stock between time t-1 and t, which can be denoted as ΔK, will result in a value of sum of Kt-1 and ΔK at time t. The growth in output caused by the growth in capital stock between time t-1 and t can be formulized as in Equation 13.

$$\frac{\Delta Y}{Y_{t-1}} = \alpha * \frac{\Delta \mathrm{K}}{K_{t-1}} \qquad \text{[Equation 13]}$$

- A change in labor force between time t-1 and t, which can be denoted as ΔL, will result in a value of sum of Lt-1 and ΔL at time t. The growth in output caused by the growth in labor force between time t-1 and t can be formulized as in Equation 14.

$$\frac{\Delta Y}{Y_{t-1}} = (1 - \alpha) * \frac{\Delta \mathrm{L}}{AL_{t-1}} \qquad \text{[Equation 14]}$$

- Combining these three equations (Equation 12, Equation 13 and Equation 14), the growth in output caused by the growths in total factor productivity, capital stock and labor force between time t-1 and t can be formulized as in Equation 15.

$$\frac{\Delta Y}{Y_{t-1}} = \frac{\Delta \mathrm{A}}{A_{t-1}} + \alpha * \frac{\Delta \mathrm{K}}{K_{t-1}} + (1 - \alpha) * \frac{\Delta \mathrm{L}}{AL_{t-1}} \qquad \text{[Equation 15]}$$ [14]

Similarly, in IMF Working Paper WP/99/77, output growth is decomposed into three main inputs: physical capital, productivity and labor considering the skills of the labor force. By using the production function formulized in the following way, the contributions of these three factors are implied mathematically:

[14] This equation is a similar version of the formulation presented in Growth Accounting presentation Vincelette, 2010.

$Y_t = A_t * K_t^{\alpha} * (L_t * H_t)^{(1-\alpha)}$ [Equation 16]

where;

Y_t: real GDP,

A_t: total factor productivity (TFP),

K_t: the stock of capital,

L_t: the total employment[15],

H_t: the index of human capital,

α: the share of capital of income.

In Equation 16, the term derived by multiplying employment and human capital ($L_t * H_t$) is a version of labor input which takes into account the skills of the labor force.

Taking natural logarithm and differentiating both sides of Equation 16, growth rates are determined as shown in Equation 17.

$\hat{y}_t = \hat{a}_t + \alpha * \hat{k}_t + (1-\alpha) * (l_t + \hat{h}_t)$ [Equation 17]

In Equation 17, the growth rate of the production is decomposed into the growth rate of total factor productivity and the growth rates of physical capital and skill-adjusted labor in terms of weighted averages. In this formulation, constant returns to scale is accepted and the weights are taken according to the shares of capital and labor in total output. One important issue regarding the capital K_t is that, in general the required information related to the initial capital stock and the rate of depreciation is not reliable or not complete.

[15] In case employment is not available, the labor force can be used as a substitute.

The human capital index H_t, which is included in Equation 16 is created by implementing the methodology regarding educational attainment in Barro and Lee's (1994) study. In its general form the human capital index can be formulized as presented in Equation 18.

$$H_t = \sum_{j=1}^{7} Wjt \, * \, Pjt \qquad \text{[Equation 18]}$$

where;

P_{jt}: the share of population with the level of education "j"[16]

W_{jt}: the weights based on the relative earnings of each educational group.

In many of the equations formulized to measure total output or the growth in total output, total factor productivity might have an important role, especially in cases where inputs of the equations such as physical capital, employment and human capital are not sufficient to explain a significant part of the change in the level of the growth of total output. Total factor productivity points out the efficiency and the intensity of the inputs that are included in the production process. It can be referred to many factors including level of technology, financial crisis, political aspects and etc.

In addition to the accumulation of the inputs such as capital and labor, the growth of total factor productivity has also taken as one of the major sources of economic growth. Even though the productivity can also be measured by the growth in labor productivity[17], the growth in total factor productivity is accepted as a better indicator of productivity, as it also includes the changes in production efficiency by evaluating the contribution coming from all of the factors of production, which are included.

[16] The level of education varies from 1 to 7, where 1 corresponds to no schooling and 7 corresponds to a level higher than secondary education.
[17] The increase in amount of output produced per worker.

The growth in total factor productivity can be measured by using a neoclassical production function, which has two inputs and constant returns to scale. The related formulation can be shown as in Equation 19[18].

$$\Delta\ln(TFP) = \Delta\ln(Y) - (1 - \alpha_L)^* \Delta\ln(K) - \alpha_L * \Delta\ln(L) \qquad \text{[Equation 19]}$$

where;

Y: the gross domestic product,

K: the capital stock,

L: the labor,

α_L: the output elasticity with respect to labor.

The differences in the quality of human capital can also be included in Equation 19, as labor is usually considered to be growing in line with the improvements in human capital. The primary source of improvements in human capital (h) is taken as the formal education. Therefore, average years of educational attainment can be included in the labor input of the equation. Making the necessary adjustments Equation 19 can be converted into Equation 2019 in the following way:

$$\Delta\ln(TFP) = \Delta\ln(Y) - (1 - \alpha_L) * \Delta\ln(K) - \alpha_L * [\Delta\ln(L) + \Delta\ln(h)] \qquad \text{[Equation 20]}$$

In neoclassical production functions, which is used to explain the growth in output, total factor productivity is considered as a residual term. Therefore, any measurement errors belonging to variables included as the indicators of capital and labor are automatically included in total factor productivity term. Moreover, growth

[18] In this equation, the labor is not adjusted according to the quality differences in human capital.
[19] The labor is adjusted linearly by using human capital.

accounting method is a descriptive instrument, which does not provide any detailed information regarding the factors causing total factor productivity growth. The changes in total factor productivity are caused by the changes in technology, structure of the economy and institutions and etc. So in general, it can be stated that; when using growth accounting method, it might be useful to make cross-checks with other methods and formulations (Vincelette, 2010).

In most of the empirical studies about economic growth, the growth in income per capita, which is a significant indicator of living standards and the level of economic development, is taken into account. On the other hand, as presented previously in this chapter, in studies focusing on theoretical analysis, equations used to explain economic growth usually based on a production function. In production functions, output is linked with total factor productivity and factor inputs (Bloom and Canning, 2003). In addition, considering the caveats and limitations of the production function explained previously, using a growth accounting model, which associates income per capita (Y/N) with income per worker (Y/L), might be more suitable in an empirical study. An equation, which is similar to Equation 5, can be used as formulized in Equation 9. Consequently, a new growth equation can be developed as shown in Equation 21. In this equation, instead of transforming growth of labor to total population ratio ($g_{(L/N)}$) into growth of worker minus growth of population, it is decomposed into L/WA, which is labor force divided by working age population, and WA/N, which is the ratio of working age population to total population. This decomposition enabled the inclusion of the working age group, whose impact on economic growth is aimed to be examined, in the economic growth equation.

In this respect, while creating the structure of the models for a further study focusing on empirical analysis, accounting identity, which defines GDP per capita by using labor productivity, labor force participation and ratio of working age population to total population, can be used. This formula is in fact a detailed version of the formula described in defining first demographic dividend by Mason, 2005. The extension of the model is made by adding working age population in the formula which is parallel to the formula mentioned in Bloom 2003. The economic growth equation can be written as;

$$\frac{Y}{N} = \frac{Y}{L}\ \frac{L}{WA}\ \frac{WA}{N} \qquad \text{[Equation 21]}$$

where;

Y: total output,

N: total population,

L: total labor force,

WA: working age population.

So, the ratios in the right hand side of the equation denotes labor productivity, labor force participation rate and the share of working age population in the total population respectively. When the natural logarithms and then derivatives with respect to time of both sided of the equation is taken, growth rates are derived, whose steps are shown in Equation 22, Equation 23 and Equation 24 as follows.

$$\ln\left[\frac{Y}{N}\right] = \ln\left[\frac{Y}{L}\right] + \ln\left[\frac{L}{WA}\right] + \ln\left[\frac{WA}{N}\right] \qquad \text{[Equation 22]}$$

$$\left[\frac{d(\ln[\frac{Y}{N}])}{dt}\right] = \left[\frac{d(\ln[\frac{Y}{L}])}{dt}\right] + \left[\frac{d(\ln[\frac{L}{WA}])}{dt}\right] + \left[\frac{d(\ln[\frac{WA}{N}])}{dt}\right] \qquad \text{[Equation 23]}$$

$$g_{(Y/N)} = g_{(Y/L)} + g_{(L/WA)} + g_{(WA/N)} \qquad \text{[Equation 24]}$$

At this point, it is important to mention that it might be useful to express the growth in income per worker as in Equation 25 as explained in Bloom and Canning, 2003.

$g_{(Y/L)} = \lambda * [\ln(Y/L)^s - \ln(Y/L)_0]$ [Equation 25]

where;

λ: the speed of convergence,

$(Y/L)^s$: income per worker at the steady state,

$(Y/L)_0$: the initial level of income per worker.

The level of income per worker at steady state can be expressed by various factors which contribute to labor productivity. These factors include total factor productivity levels, education levels of the workers, capital stock and etc. All of these factors can be shown in the vector form (X) and expressed in the growth rate of income per worker as presented in Equation 26.

$\ln(Y/L)^s = X * \beta$ [Equation 26]

Accordingly, the growth in income per worker can be rewritten using Equation 26 in Equation 25 and can be presented as in Equation 27.

$g_{(Y/L)} = \lambda * [X * \beta - \ln(Y/L)_0]$ [Equation 27]

As Equation 22 also holds for the initial values of each term, Equation 24 can be reformulated by using Equation 27 as in Equation 28.

$$g_{(Y/N)} = \lambda * [X * \beta + \ln [\frac{L}{WA}]o + \ln \left[\frac{WA}{N}\right] o - \ln [\frac{Y}{N}]o] + g_{(L/WA)} + g_{(WA/N)}$$

[Equation 28][20]

Equation 28 is a detailed form of the growth equation expressed previously in this chapter. It is noteworthy to mention that, labor force participation rate and the share of working age population in the total population are included in the equation both in initial levels and the growth rates. Therefore, the growth in income per capita depends on a range on variables included in the matrix X, initial level of income per capita, initial levels of labor force participation rate and the share of working age population and the growth rates of both of these two indicators.

V.2. Evaluations Regarding Further Study Using Empirical Methods

As stated in the first part of this section, the set of growth equations commonly used in the previous studies can be a good guide on how to develop a solid empirical cross-country analysis about economic growth for a panel of countries including Turkey. However, it might be very helpful to go through the findings of the previous studies, before developing an empirical analysis based on the commonly used growth equations.

[20] See Bloom and Canning, 2003 for a similar interpretation of the equation.

V.2.1. Findings of the Previous Empirical Studies

In studies including a panel of countries, labor productivity might show differentiations among countries because of various reasons. In order to detect these reasons, it might be useful to look at the indicators used for labor productivity. Schooling and life expectancy at birth are two main indicators used to measure the quality of labor. Schooling is usually measured by the average value of total years of schooling for the population group aged 15 years and older[21]. On the other hand, life expectancy at birth is used as a measure of health status of the labor force. It should be noted that life expectancy indicates mortality not morbidity. However, increase in life expectancy is usually linked to improvements in health status and decrease in morbidity (Murray and Chen, 1992; Murray and Lopez, 1997). Besides labor productivity, factor productivity is another parameter that needs to be considered. Governance quality of the public institutions, characteristics of the land area, such as the share of the land area in tropics or being landlocked, ethnic and linguistic differentiations in the population and openness of the economy can be named among the factors that need to be determined for each country included in the study[22].

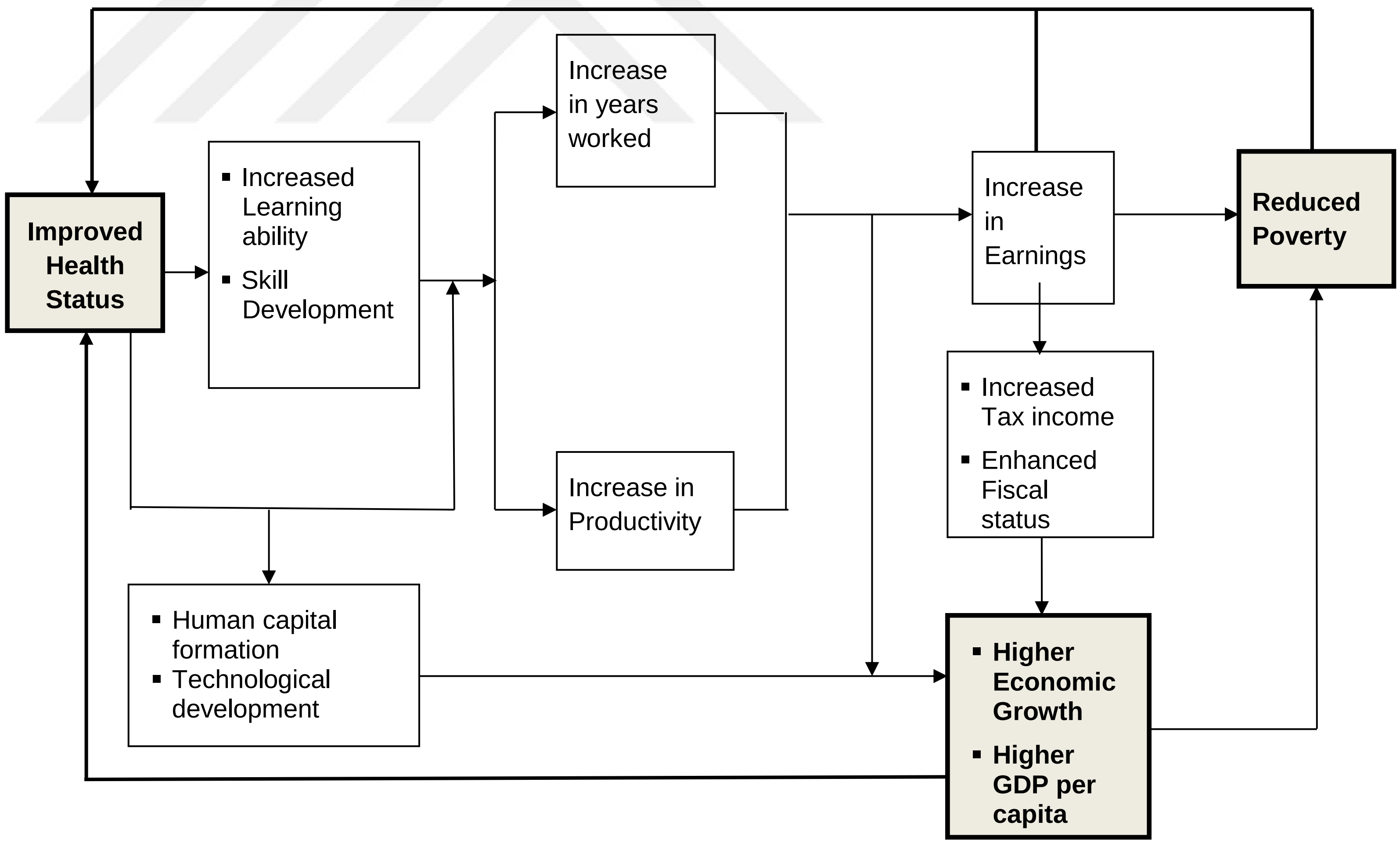
The labor productivity is one of the important factors which is included in the studies focusing on the determinants of economic growth. The ratio of time spent in school and the saving rate has a positive effect on the growth of output per worker, while the increase in fertility has a negative effect. In addition, rising survival rate results in a decrease in fertility level and an increase in schooling time and saving rate. Therefore increase in survival rate has a positive contribution on economic growth (Zhang and Zhang, 2005).

Similarly, health is also one of the important factors effecting economic growth. The bi-directional relationship between health and economic growth has been studied more and more in literature. Increase in life expectancy is associated with increase in

[21] See Barro and Lee, 2000 for details.
[22] See Bloom and Canning, 2003 for details.

both domestic and national savings, resulting in increase in capital accumulation and consequently economic growth (Zhang and Lee, 2003). Increase in life expectancy may also result in increase in investments on education, leading to development in human capital formation (Miguel and Kremer, 2004; Jayachandran and Lleras-Muney, 2009). Enhancements in human capital formation is also stated to contribute to economic growth. Decrease in child mortality is accepted as one of the reasons in decrease in the fertility level (Murtin, 2009). Lowering fertility hinders population growth, which might lead to an increase in income per capita. An improvement in the health status of the population contributes to learning abilities and skill development and consequently results in human capital formation. In a healthier population, not only labor productivity but also years worked increases. Increase in earnings is also expected to be experienced. Technological development is also one of the positive outcomes of the improvement in the health status of the population. All of these developments contribute to poverty alleviation and higher economic growth (Babatude, 2012). The relationship between health, economic growth and poverty is explained in Figure V.2.1.

Figure V.2.1. The relationship between Health, Economic Growth and Poverty



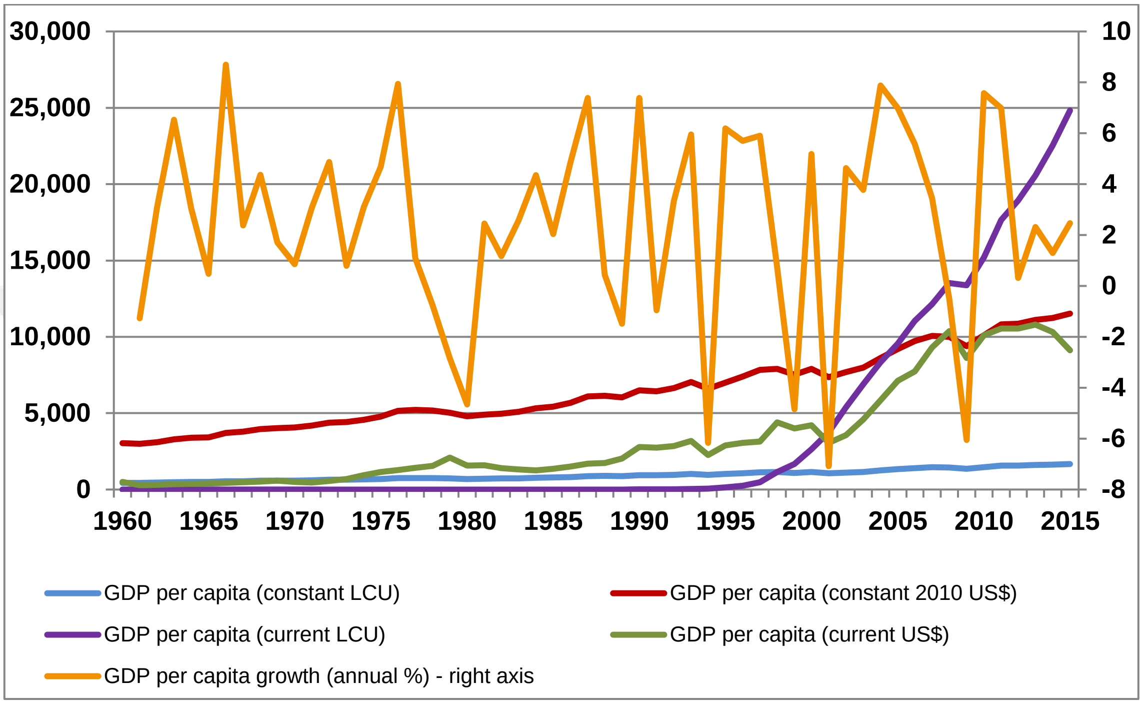
Source: A modified version of Babatude, 2012

V.2.2. Caveats and Suggestions Regarding Further Empirical Study

Considering the previous empirical studies, there might be some problems to overcome during the analysis. The long-run relationships between the economic growth and the input variables, such as physical capital, productivity and labor are easier to determine than the short-run relationships. In a time series analysis, which is conducted to determine the relationship between the economic growth and the selected input variables indicated in the production function used, taking the first differences might be necessary in case of the existence of serial correlation. However, it must be noted that this procedure results in the loss of necessary information, including the low frequencies in the data (IMF Working Paper, 99/77). While taking the first differences only the changes in the variables remain, while all the levels are lost. So experiencing serial correlation in the data will lead to loss of necessary information, which is the level of the indicators throughout the whole period.

Another problem that would be encountered while doing a time series analysis is that, GDP growth rates have a very erratic pattern, especially for developing countries, including Turkey. In Figure V.2.2.1 various types of GDP per capita calculations are presented. The volatility in GDP per capita growth can easily be observed. The most common solution to overcome the volatility problem is taking 5 year average values of GDP growth rates. However, applying this solution results in a severe decrease in the number of observations. In other words, for a time period from the year 1970 to the year 2015, 45 observations would drop down to 9 observations by taking 5 year average values. In this case, it would be impossible to make neither a time series nor a multi-linear regression analysis, considering the lack of required number of observations, which is commonly accepted as 30. As a result of this problem, multiple linear regression (MLR) analysis using ordinary least squares (OLS) method can be implemented by including also other countries in the model.

Figure V.2.2.1 GDP per capita Turkey (1960 - 2015)



Source: World Bank

In the further study, which will be focusing on an empirical analysis on economic growth, various variables are need to be included in the regression models. It is essential to include variables associated with demographic factors, labor productivity and factor productivity in the analysis. Moreover, variables representing similar indicators are highly advised to be used to make robustness checks. Also, it is very useful to include dummy variables and interaction variables in the models in terms of explaining the variations in economic growth.

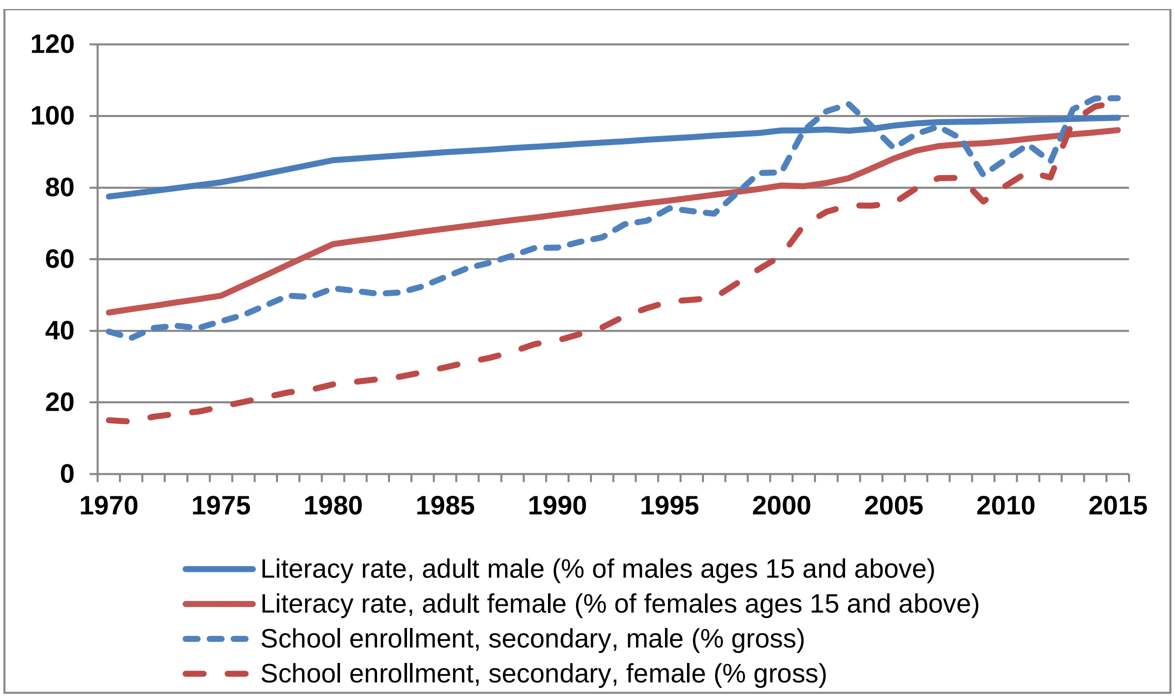
Demographic factors considered should not be limited to working age population, which can expand economic activity, or dependency ratios, which might hinder economic growth. The demographic window and the first demographic dividend, which were defined and studied in the previous chapters, should also be included in this analysis. The years from the beginning year of demographic window, demographic window and the first demographic dividend dummy variables can also be tested for significance in the models. In addition, besides total labor force participation rates, it might be useful to include male and female labor force participation rates in the models.

Regarding labor productivity, the quality of labor is one of the parameters that need to be examined. Schooling and health status are accepted as good proxies of the quality of labor. Schooling can be measured by average years of schooling. In case this data is not available, adult literacy rate can also be used. However, when both data exist, it might be more relevant to choose average years of schooling over adult literacy rate. Variable representing schooling can also be considered for males and females, in addition to the variables for both sexes. Life expectancy at birth variable can be used as a good indicator of health status.

In the regression models, quality of labor proxy variables can be included to robust GDP per person employed, which should be included in the models. While creating the variables which indicate the quality of labor, similar methods in line with the literature can be applied. First of all, lagged values of schooling are to be used in order to indicate the educational level of the working population, which includes 15+ age group. In literature, various lagged years are used, such as 5 year, 10 year and 15 year. So, in case of Turkey; if 10 year lag effect is preferred then education data starting from 1960 is required as the start year of the time period in this study is 1970, which is not available for Turkey in single year. Moreover, if 5 year data is transformed into single year data by using linear interpolation for the missing values; in case the first differences are to be used to overcome potential autocorrelation problem, the data values of the variable will receive the same values for the years of linear interpolation. This situation adversely affects the power of the variable in explaining the variations in the dependent variable, which result in high p-values and less statistical significance and consequently smaller R^2 values for the models. Considering all these issues, instead of lagging variables related to education, adult literacy rates can be used as proxies of educational levels, which are already for the population over 15 years of age.

Comparing the change in start and end year values of both adult literacy rates and secondary school enrolment rates, which indicate educational status for males and females, and the overall trends of both variables, it can be observed that in both variables the gender gap in the beginning diminishes by time. Also both variables have similar trends, except the slopes for secondary school enrolments are steeper and the patterns are more erratic especially after the late 1990's as shown in Figure V.2.2.2. Considering all of these, it can be stated that adult literacy rate can also be used as a proxy of enrolment rates. However, it should be noted that using enrolment rates or mean years of schooling as the indicators of educational attainment is a better approach and using adult literacy rates are recommended only for the cases where there are sequential missing values in enrolment rates or mean years of schooling data and an autocorrelation problem exists.

Figure V.2.2.2. Adult Literacy Rates and Secondary School Enrolment Rates for Both Sexes



Source: World Bank

Capital stock, similar to education levels per worker, is one of the factors effecting level of income per worker, which is an indicator of labor productivity (Bloom, Canning, Hu, Liu, Mahal and Yip., 2010). The gross capital formation can be included in the models as a proxy of capital stock. Both of these included variables are related to labor productivity. So the inclusion of these variables also enabled robustness check related to labor productivity which is commonly included in the production equations in economics. Gross domestic savings can be accepted as one of the variables related to labor productivity, so its inclusion in the models can also be tested for statistical significance.

Factor productivity, is also as important as labor productivity and therefore has to be taken into account while developing regression models. The quality of public institutions is one of the major contributors to economic growth in terms of factor productivity. A governance variable can be created using index developed by Knack and Keefer, 1995 in line with Bloom and Canning, 2003. The degree of the openness of the economy, which stands for factor productivity, has also a key role in economic growth. The degree of openness of the economy can be represented by various indicators including openness to trade[23], the share of trade and exports and imports as percentages of GDP. In addition the share of industry sector can also be considered as an indicator of factor productivity. The share of the land area in tropical regions and a dummy variable indicating the status of being landlocked[24] can also be included in the analysis. Variables regarding ethnic and linguistic diversifications[25] in the countries are also among the variables related to factor productivity.

The role of the dummy variables and the interaction variables are also important in explaining the variations in dependent variable, which is the economic growth in the further study. In addition to the dummy variables related to the demographic window and the first demographic dividend, financial crisis dummy and the structural change dummy variables can be created.

[23] A measure of openness to trade is developed by See Sachs and Warner, 1995.
[24] See Gallup, Sachs and Mellinger, 1999 for details.
[25] See Easterly and Levine, 1997 for details.

In literature, while considering the impacts of change in working age on economic growth, it is commented that the increase in working age population definitely contributes to the supply side of the potential increase in output. However, unless they are employed additional workers in the labor market will have a negligible contribution. (Bloom and Canning, 2003). Keeping this perspective, it might be useful to examine the effects of the change in working age on the economic activity under various conditions, such as openness of the economy, structural change, financial crisis, customs union and etc., which might affect the labor demand. Therefore, considering the changes in the percentage of working age group without taking into account the openness of the economy might not be very meaningful. The increase in working age population might not have a considerably effect on economic activity as long as it is not supported by increasing employment opportunities. Also the degree of openness of the economy is also important and was found statistically significant in various studies including Bloom and Canning, 2003. In order to test this argument, in the regression models, interaction variables with working age group and various dummy variables such as trade openness and financial crisis can be included.

3 different dummy variables can be used in the interaction variables with the difference in working age variable. Inverse financial crisis dummy variable indicates the years in which there was no financial crisis happened by taking the value 1 for the years with no financial crisis and the value 0 for the years with financial crisis. In case of Turkey, the structural change dummy variable, which divides the period between 1970 and 2015, into two sections, can be added. The first section, which includes 1970-1979 period, indicates a closed economy in Turkey. On the other hand, the second section, which includes 1980 and after, points out a period of distinct financial structural changes in Turkish economy. Firstly, the value of 0 should be attained to the structural change dummy variable for the years before 1980 considering the closed economy model in Turkey. In that case, the increases in the working age will be disregarded before the structural change had happened. However, it should be kept in mind that it is also possible for a country to gain economic growth even though when the economy is closed. So, in real life the increase in working age group would possibly still have a positive contribution on economic growth during the years of closed economy. But still

using structural change dummy variable seems to be more meaningful and this argument can also be checked statistically. Moreover, while considering which interaction variable with working age variable to use, the different versions can be added in the model separately, holding the other independent variables constant in the models. Looking at the statistical significances, it can be decided which interaction variable to include in the models.

Structural change is accepted to be an important factor which triggers economic growth. The importance of structural change is also stressed in one of the previous chapters, in which countries of different income levels and geographical regions are put under the microscope in terms of economic growth and development. According to the research done, countries achieving economic growth had also made structural changes resulted in increase in the share of industry sector. Therefore, in case where structural change dummy variable is statistically insignificant, other variables such as the share of industry sector can be used as a proxy of the structural change in the economy of the country.

Labor force participation rates might be more meaningful, when they are considered with labor productivity. Therefore, an interaction variable with participation rates and labor productivity can be created and checked for their statistical significance with respect to the significance of participation rates. In case the interaction variables are statistically more significant they can also be included in the regression models. Labor productivity data is in general just for both sexes. However participation rates can be acquired for males and females in addition to both sexes. In that case, it would be assumed that the labor productivity for males and females are the same, which is not true in real life. So it might be necessary to calculate labor productivity by using proxy variables whose data can be gathered for both males and females. Moreover, considering the growth accounting formulas discussed previously in this section, it might be a better idea to use output per worker instead of output per hour as a proxy of labor productivity.

VI. SOCIO-ECONOMIC PROJECTIONS FOR TURKEY (2015-2075)

VI.1. Overview

The future contributions of the demographic factors on economic growth and development of Turkey also depends on to what extent these demographic factors are supported by the improvements in major socio-economic indicators, which are related to labor market, education, health and etc. So in this section, projections regarding these socio-economic indicators will be done in order to see future expectations, which can deliver valuable information for the decision makers. Moreover, evaluations about the current and future values of these indicators for Turkey will be done by making comparisons with the past and current values for high income countries and major developed economies[26] indicated in United Nation's report "World Economic Situation and Prospects 2017". These comparisons will reveal when Turkey can reach the socio-economic levels of today's developed and high income countries. They will also make it possible to determine the corresponding past years of the socio-economic indicator values of developed and high income countries, which show similarities with Turkey's current values of these indicators.

In other words, this section has two major goals:

First one is to prepare datasets for decision makers for their future plans regarding these socio-economic indicators, which are related to education, economy and health. The data set will be composed of outputs of RAPID module.

Second one is to consider Turkey's current situation with respect to developed and high income countries. In addition, Turkey's progress in major socio-economic

[26] United States, Japan, Australia, Canada, United Kingdom, Germany and France.

indicators will be evaluated by comparing the projected values of Turkey with present values of developed and high income countries. While doing these comparisons inputs of RAPID module of Spectrum Software will be used.

It is useful to underline that it is not possible to give an explicit answer to the question "Will Turkey be able to make use of demographic contributions arising from the shifts in age structure and if so to what extent?" However, potential supports coming from socio-economic factors might make it easier to answer this question. It can be commented that under the condition of Turkey making significant progress in major socio-economic indicators, the possibility of the contribution of the demographic advantages, coming from the shifts in age structure, on Turkey's economic growth and development will rise accordingly.

RAPID module of the Spectrum Software examines the socio-economic impacts of population growth by making projections of social and economic indicators for countries and regions. This module requires inputs such as labor force participation rates, number of students per school, annual health expenditure per person, persons per urban household and etc. All these inputs are collected under 5 different sections of RAPID, which are named as economy, education, health, urbanization and agriculture. However, in this study only the first 3 sections will be taken into account. RAPID, combines these inputs coming from 5 sections with population projections created by DemProj module of Spectrum Software to make projections about the future requirements of these socio-economic indicators throughout the projection period. The projections created by RAPID might be evaluated as valuable assets for policy makers not only because of the information supplied but also the way the information is presented to them.

In this module of the Spectrum Software, the projection period is taken between the years 2015 and 2075, parallel to the projection years of DemProj module. Data from TURKSTAT and World Bank are used as inputs for the necessary projections.

As stated previously, the socio-economic projections in this section can be divided in 3 major groups as follows:

1. Education,
2. Economy,
3. Health.

VI.2. Education

Education is accepted to be one of the most important socio-economic factors effecting economic growth and development of the country. Not only primary and secondary education but also tertiary education plays an important role in the development of the country especially in terms of labor quality. However, only primary and secondary education projections are included in this study, as RAPID module has input sections only for primary and secondary education.

VI.2.1. RAPID Input and Methodology Regarding Education

For the projections regarding education below mentioned list of input data is required:

- Age of entry into primary school,
- Number of years of primary schooling,
- Primary school enrollment rate,
- Number of students per primary teacher,
- Number of students per primary school,

- Recurrent expenditure per primary school student,
- Age of entry into secondary school,
- Number of years of secondary schooling,
- Secondary school enrollment rate,
- Number of students per secondary teacher,
- Number of students per secondary school,
- Recurrent expenditure per secondary school student.

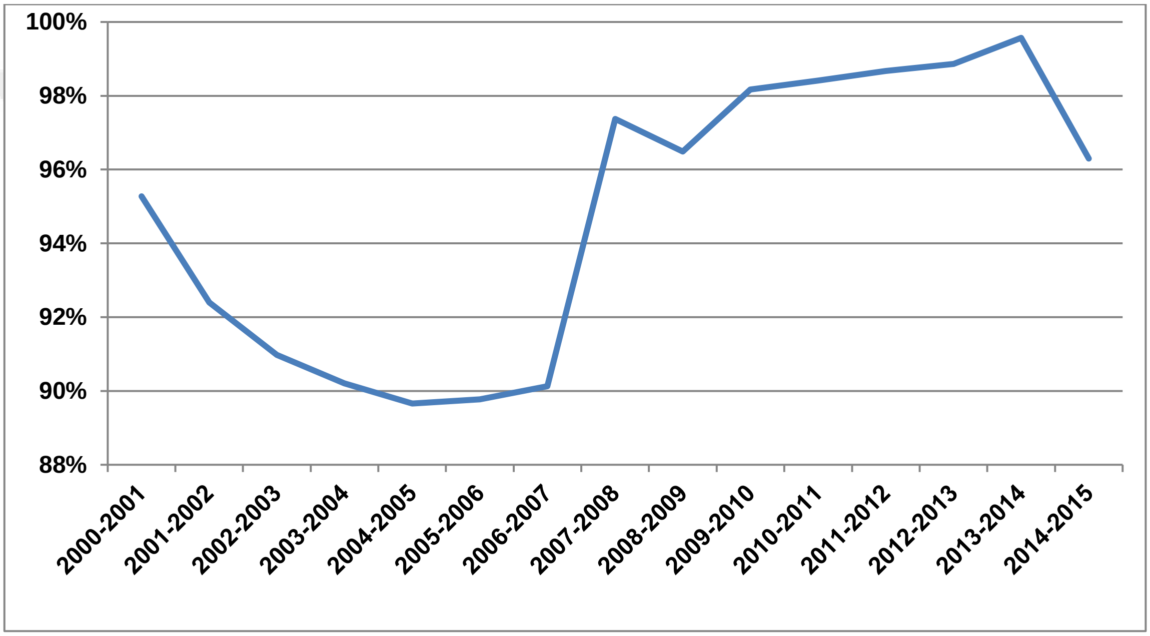
VI.2.1.1. Age of Entry into Primary School and Number of Years of Primary Schooling

Regarding the input calculations of the first group, which is education, age of entry into primary school is taken as 7 and the number of years of primary schooling is taken as 8 years.

VI.2.1.2. Primary School Enrollment Rate

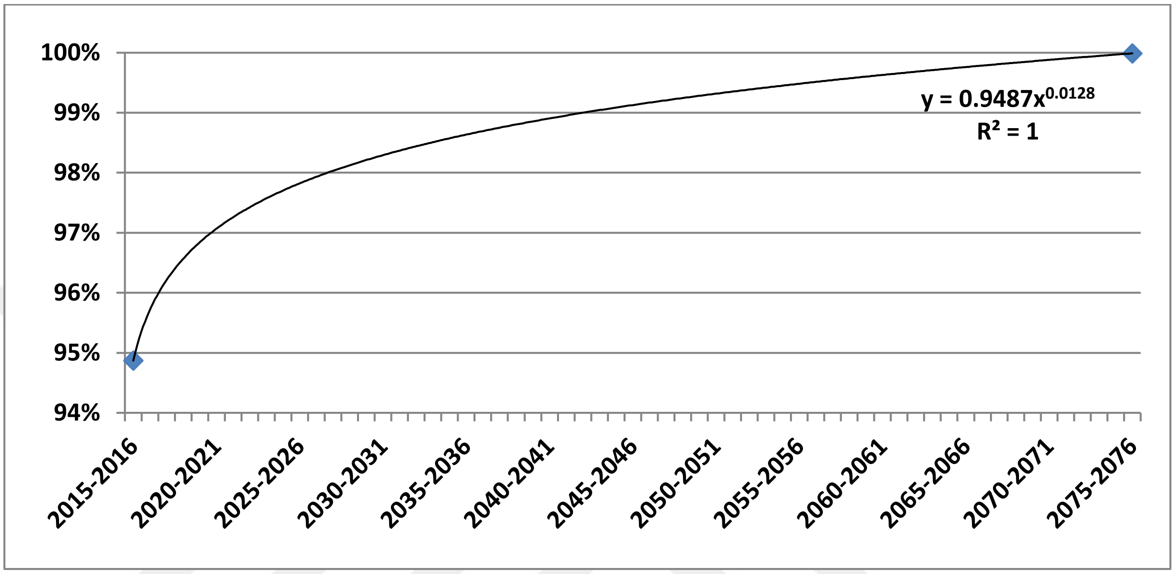
As the first step of calculations in education section, net schooling ratios for primary school data is taken from TURKSTAT starting from 2000-2001 educational year until 2015-2016 educational year. However, regarding the calculation of the projections for net schooling ratios for primary school until 2075-2076 educational year, only the data for 2015-2016 educational year is used, as the data between 2000-2001 and 2015-2016 educational years are remarkably volatile preventing from developing meaningful trendlines as shown in Figure VI.2.1.2.1. The projections for net schooling ratio for primary school developed using a power function $y = 0.9487x^{0.0128}$ is presented in Figure VI.2.1.2.2. While making the projection, net schooling ratio for primary school for the 2075-2076 educational year is taken as 99,99 percent, which is very close to the net schooling ratio in the developed countries such as Belgium, Denmark, Finland, France, Germany, Norway, Spain, Sweden, United Kingdom for the year 2014 according to UNESCO, Institute for Statistics.

Figure VI.2.1.2.1. Net Schooling Ratio (Primary School)



Source: TurkStat

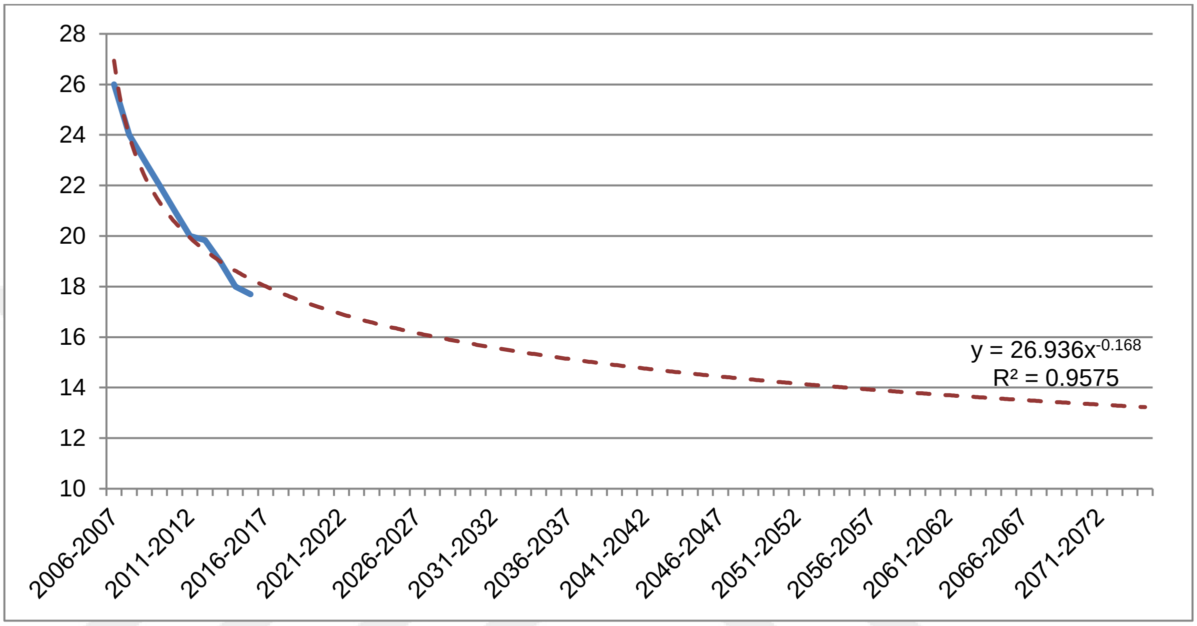
Figure VI.2.1.2.2. Projection for Net Schooling Ratio (Primary School)



VI.2.1.3. Number of Students per Primary Teacher

As the second step, the data for students per primary school teacher between the educational years 2006-2007 and 2015-2016 are taken from TURKSTAT. Although data is available starting from 1997-1998 educational year, because of the volatility of the data, educational year period between 1997-1998 and 2005-2006 is not included as the input for the projection. The projections until 2075-2076 educational years are made by using y = 26,936x-0,168 power function as shown in Figure VI.2.1.3.1.

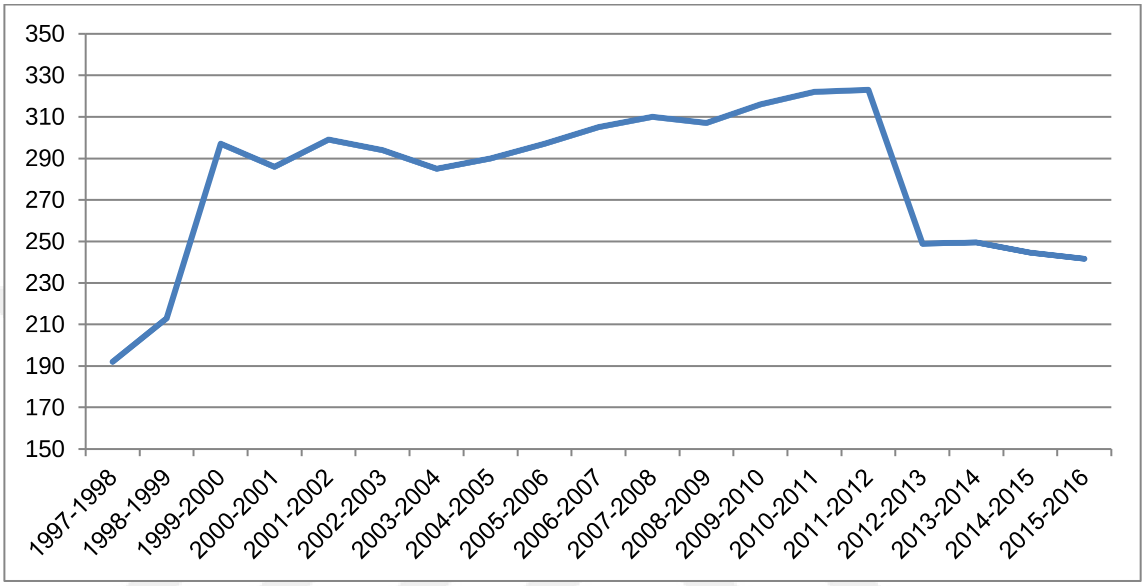
Figure VI.2.1.3.1. Projection for Number of Students per Teacher



VI.2.1.4. Number of Students per Primary School

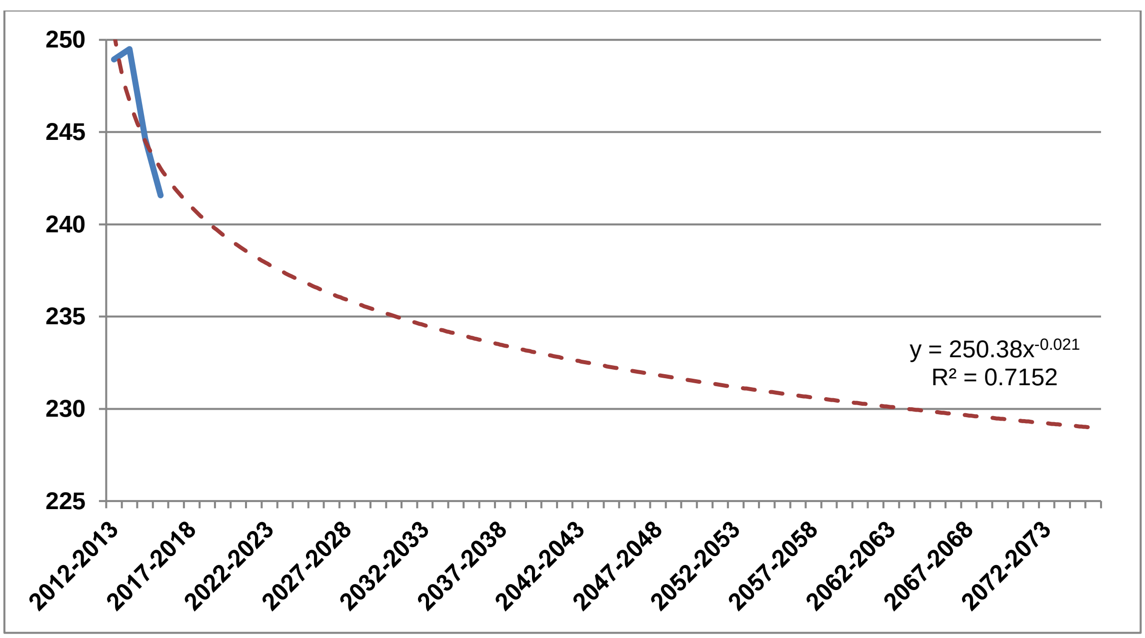
As the third step, number of students per primary school is projected until 2075-2076 educational year using TURKSTAT data between 2012-2013 and 2015-2016 educational years. Although the data is available starting from 1997-1998 educational years, as the volatility of number of students per primary school data disable developing healthy trendlines for the projections only the last four educational years are used as the input for the projections. The main reason for the volatility can be explained by the severe changes in the education system and revisions made. The volatility in number of students per primary school is shown in Figure VI.2.1.4.1. The projection made using $y = 250.38\ x^{-0,021}$ power function is presented in Figure VI.2.1.4.2.

Figure VI.2.1.4.1. Number of Students per Primary School



Source: TurkStat

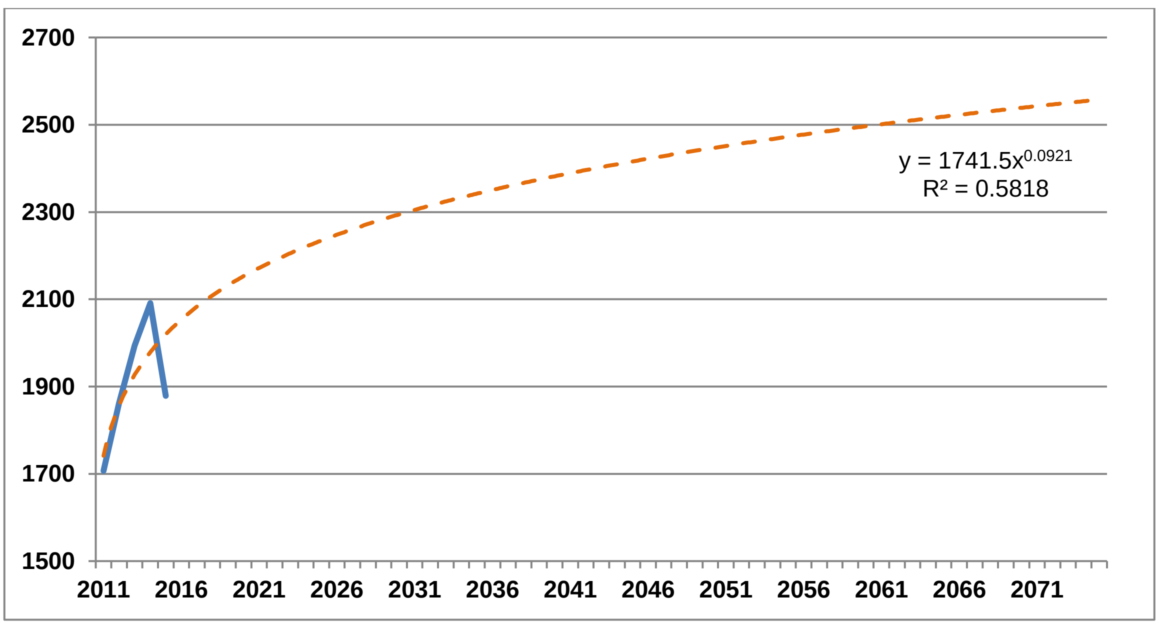
Figure VI.2.1.4.2. Projection for Number of Students per Primary School



VI.2.1.5. Recurrent Expenditure per Primary School Student

As the last step of input calculations for the primary school, expenditure per primary school student is calculated by dividing the related section of total expenditure by level of education data by total number of primary students data. Both data sets are taken from TURKSTAT for the years 2011 and 2015. Projection for expenditure per primary students are made by using $y = 1741.5\ x^{0.0921}$ power function. R^2 for the projection is remarkably low with a value of 0.5818 compared to previous projections for education section. This significant difference can be explained by lack of data for the years earlier than 2011, sudden increases and decreases in the figure caused by the revisions made between the years 2011 and 2014 and volatility in the USD/TL currency ratio for the 2011-2015 period. The projection for expenditure per primary school student is given in Figure VI.2.1.5.1.

Figure VI.2.1.5.1. Projection for Expenditure per Primary School Student (USD)



According to the requirements of RAPID all the calculations made by primary school students are also need to be done for secondary school students too.

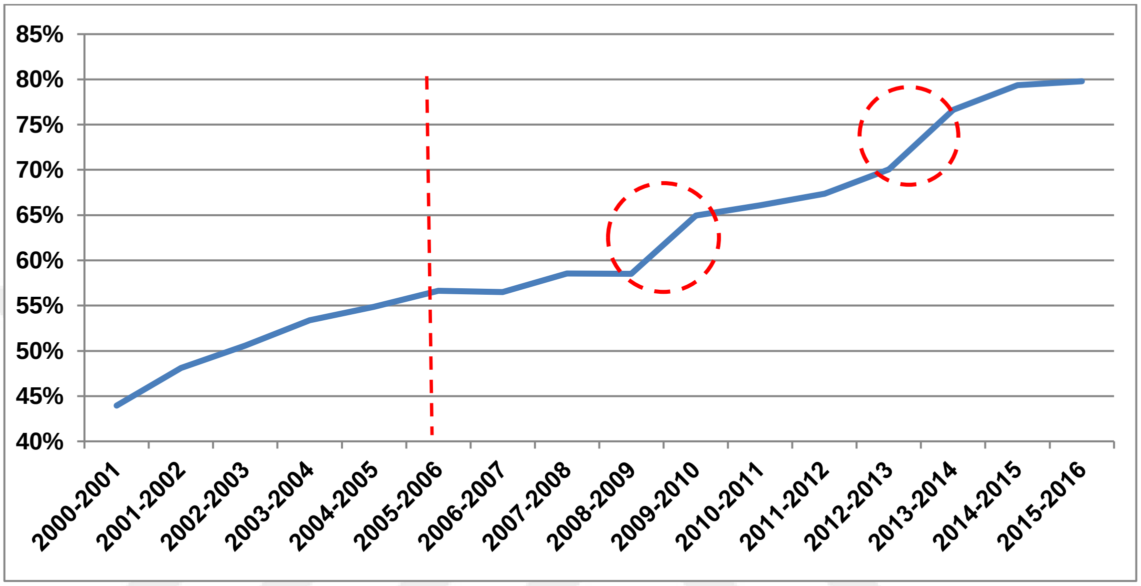
VI.2.1.6. Age of Entry into Secondary School and Number of Years of Secondary Schooling

Age of entry to the secondary school is taken as 15 and number of years of secondary schooling is taken as 4.

VI.2.1.7. Secondary School Enrollment Rate

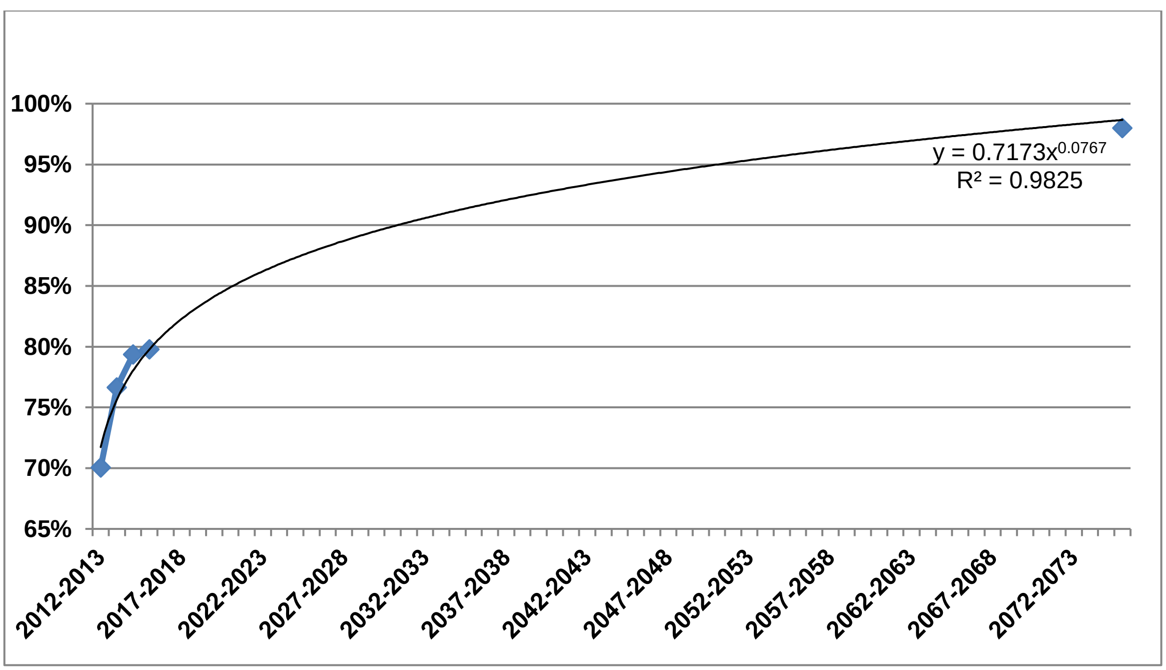
While making projections for net schooling ratio for secondary school, TURKSTAT data for the past period is used. However, data history period is limited between 2012-2013 and 2015-2016 educational years, as the data history show a volatile pattern between 2000-2001 and 2015-2016 educational years as presented in Figure VI.2.1.7.1, especially starting from 2005-2006 educational year. Using most recent data history to avoid volatility helps to build a more solid and meaningful trendline for the projections. The most meaningful projection pattern is obtained by using 2012-2013 and 2015-2016 educational year period. The trendline for the projection, developed by using $y = 0{,}7173x^{0{,}0767}$ power function, is shown in Figure VI.2.1.7.2. Net schooling ratio for 2075-2076 educational year is set to 98 percent aimed to be consistent with the net schooling ratio data of the developed countries such as France, Belarus and United Kingdom for the year 2014 taken from UNESCO, Institute for Statistics.

Figure VI.2.1.7.1. Net Schooling Ratio (Secondary School)



Source: TurkStat

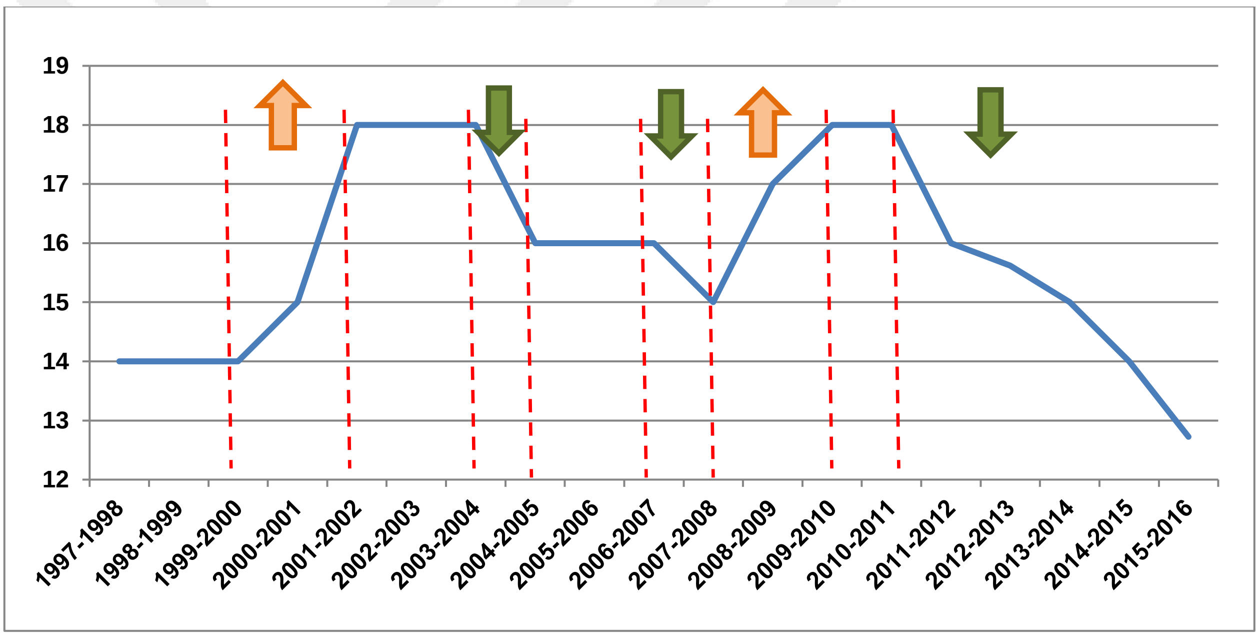
Figure VI.2.1.7.2. Projection for Net Schooling Ratio (Secondary School)



VI.2.1.9. Number of Students per Secondary Teacher

Number of secondary school students per teacher data is highly volatile between 1997-1998 and 2015-2015 educational year period according to TURKSTAT data set as shown in Figure VI.2.1.9.1.

Figure VI.2.1.9.1. Number of Students per Teacher (Secondary School)



While developing projections for number of secondary school students per teacher various time periods are tested as shown in Figures VI.2.1.9.2 - VI.2.1.9.5 to obtain a decreasing trend which is the trend experienced today in most of the developed countries. During these tests best fit which converges to the average of developed countries such as Germany (12) and United Kingdom (16) is found to be caught when the period between 2000-2001 and 2015-2016 educational years is used. So this period is used for calculating input values of RAPID for students per secondary school teacher.

Figure VI.2.1.9.2. Projection for Number of Students per Teacher (Secondary School)

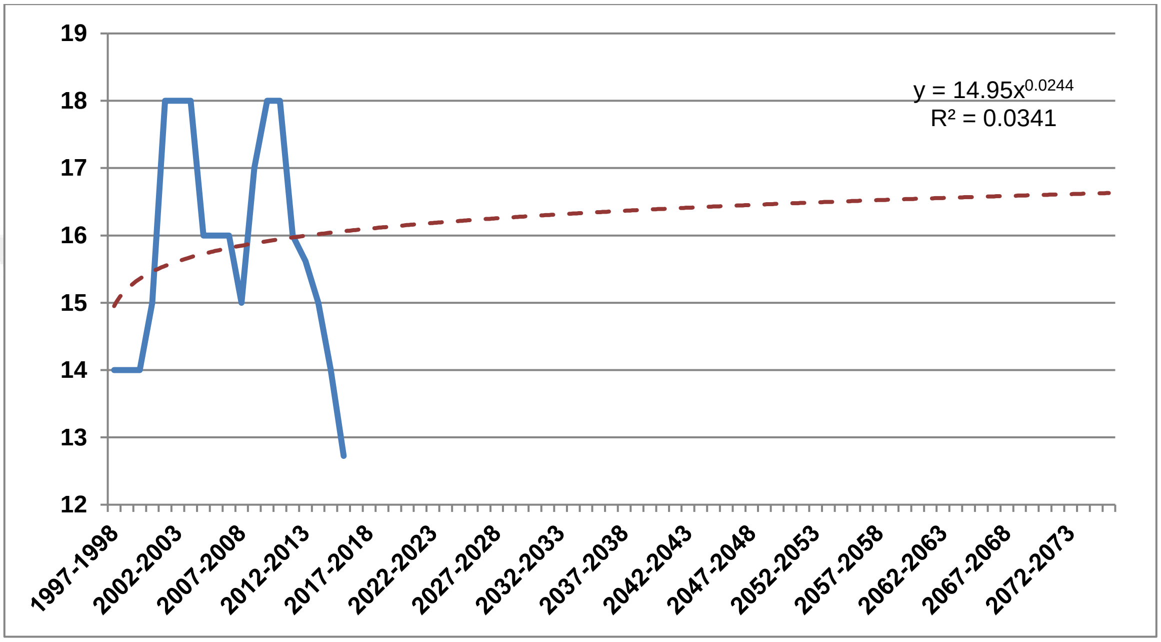


Figure VI.2.1.9.3. Projection for Number of Students per Teacher (Secondary School)

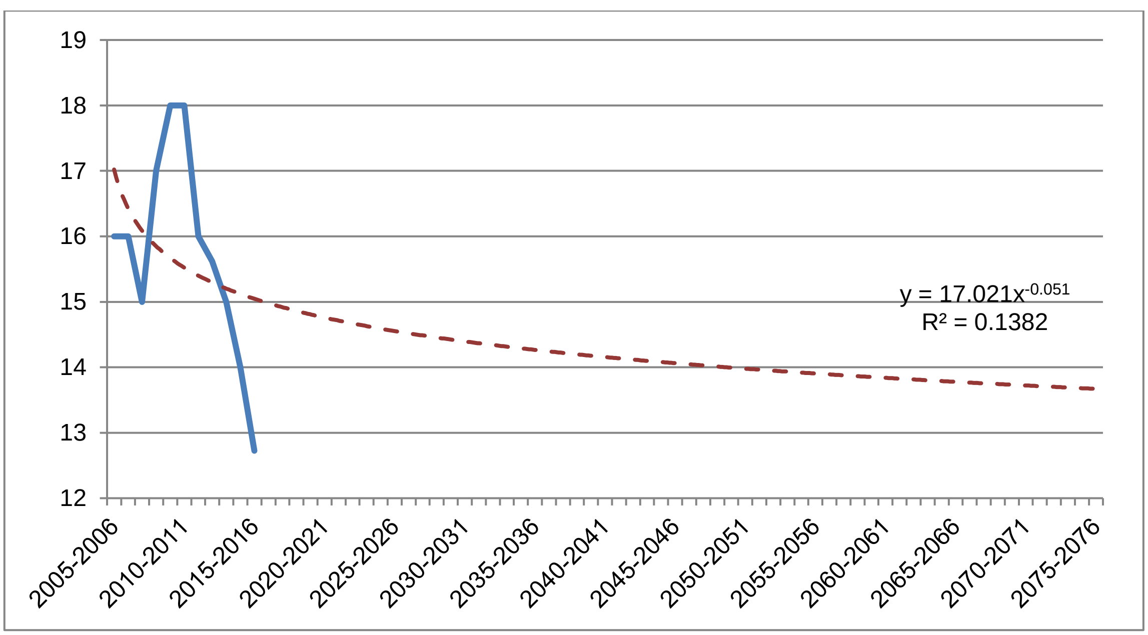


Figure VI.2.1.9.4. Projection for Number of Students per Teacher (Secondary School)

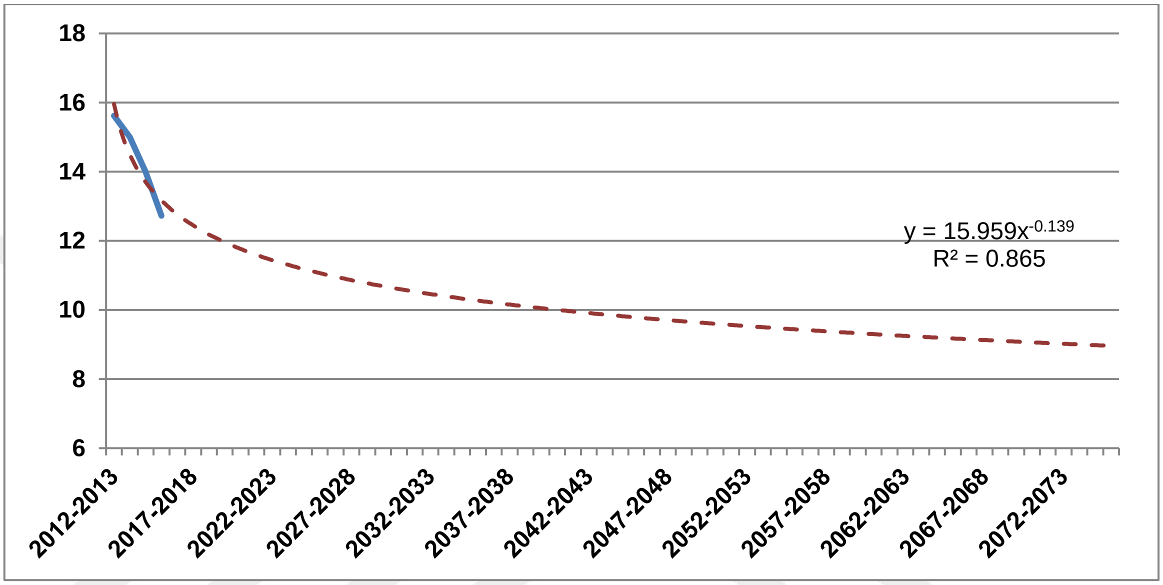
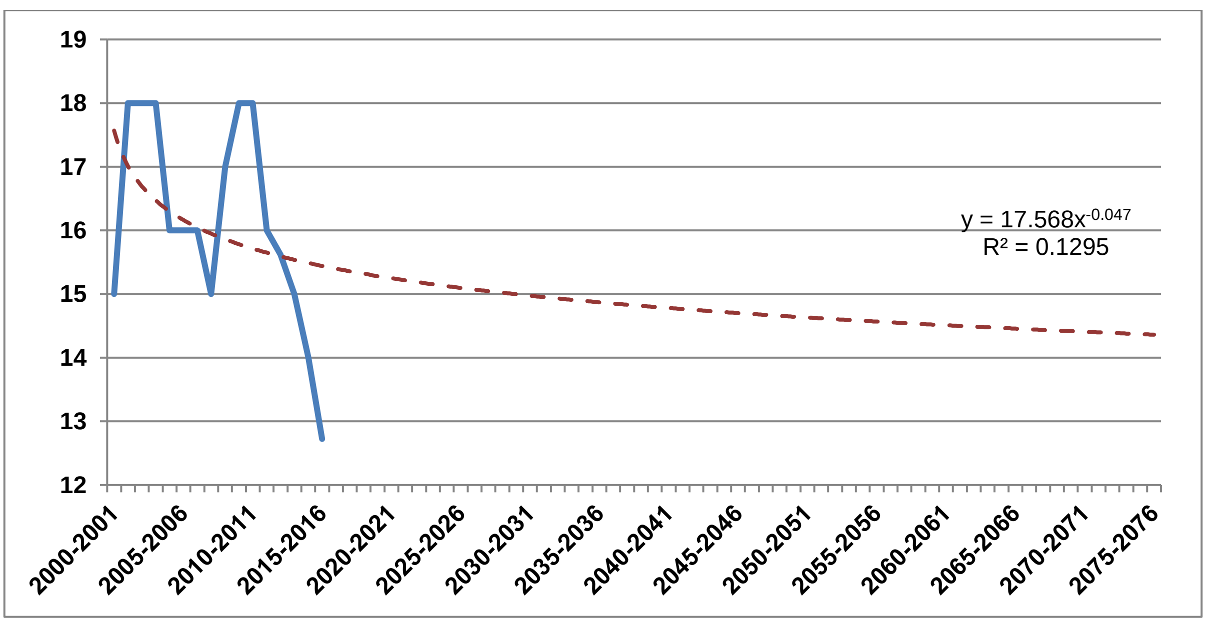


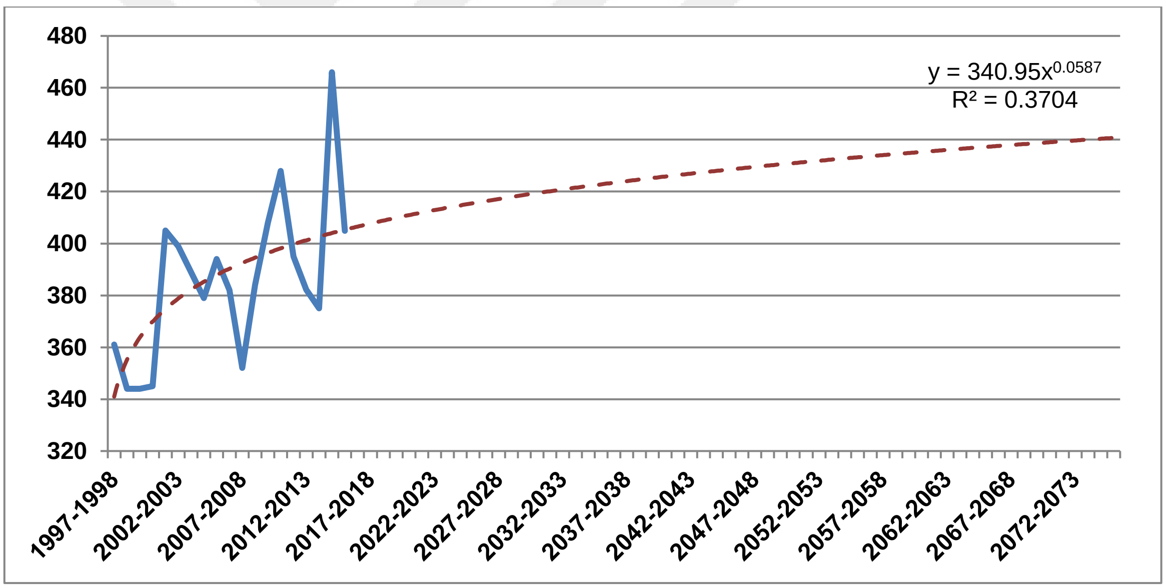
Figure VI.2.1.9.5. Projection for Number of Students per Teacher (Secondary School)



VI.2.1.10. Number of Students per Secondary School

Projection for number of secondary education students per school is made by using TURKSTAT data including the period between 1997-1998 and 2015-2016 educational years as taking the longest period shows a more clear trend in general. Figure VI.2.1.10.1 presents the projection for number of students per secondary school which uses $y = 340.95x^{0,0587}$ power function.

Figure VI.2.1.10.1. Number of Students per School (Secondary School)

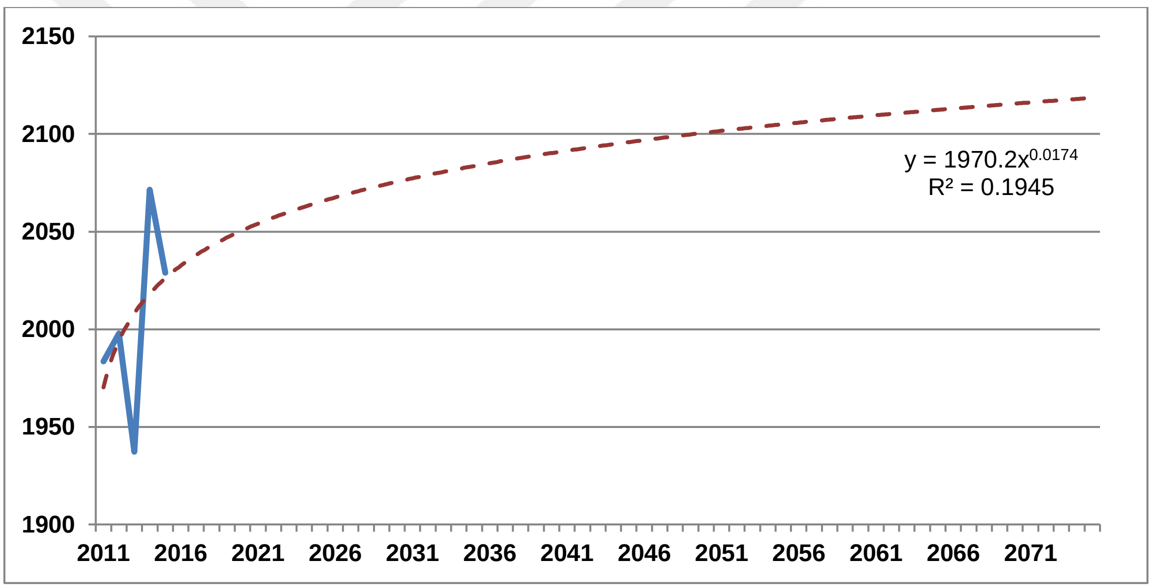


Source: TurkStat

VI.2.1.11. Recurrent Expenditure per Secondary School Student

As the last step of input calculations for the secondary school, expenditure per secondary school student is calculated by dividing the related section of total expenditure by level of education data by total number of secondary students data. Both data sets are taken from TURKSTAT for the years 2011 and 2015. $Y = 1970.2x^{0.0174}$ power function is used for making the projection for expenditure per secondary students. R^2 for the projection is very low with a value of 0.1945 which can be explained by the high volatility of the data history and very short time period as previous data. It is noteworthy to mention that also the volatility in the USD/TL currency ratio for the 2011-2015 period has a negative impact on R^2. The projection for expenditure per secondary school student, used as the last input of education section in RAPID module, is given in Figure VI.2.1.11.1.

Figure VI.2.1.11.1. Projection for Expenditure per Secondary School Student



VI.2.2. RAPID Output, Methodology and Findings Regarding Education

Education is one of the major determinants of a sustainable and solid development. Many countries are aware of the importance of the education in development and including quality education, which is one of the Sustainable Development Goals, into their agenda. In this respect, findings derived from outputs of education section of RAPID module plays an important role in determining future status and needs of education for the 2015-2075 time period.

Observing the change in number of teachers for primary and secondary education is also a good and a simple way of measuring the importance given to education by the country authorities. Another good and commonly accepted way of assessing the enhancement in education is looking at the pupil-teacher ratios for both primary and secondary education, which are required in calculating the number of teachers for primary and secondary education. These are only some of the data groups included in the education section of RAPID module.

Full results of RAPID module regarding education section can be summarized as:

- Children of primary school age
- Primary students
- Primary teachers required
- Primary schools required
- Primary education expenditure required
- Children of secondary school age
- Secondary students
- Secondary teachers required
- Secondary schools required
- Secondary education expenditure required

VI.2.2.1. Children of Primary School Age

Calculation of the number of children of primary school age is made by summing all of the children who are in the age range of attending primary school. The related formulation can be shown as;

ChildrenPrimAge $_t = \sum_{a=BPA}^{BPA+YrsPrimSchool-1} Pop_{a,t}$

where;

ChildrenPrimAge $_t$: Children of primary school age in time t,

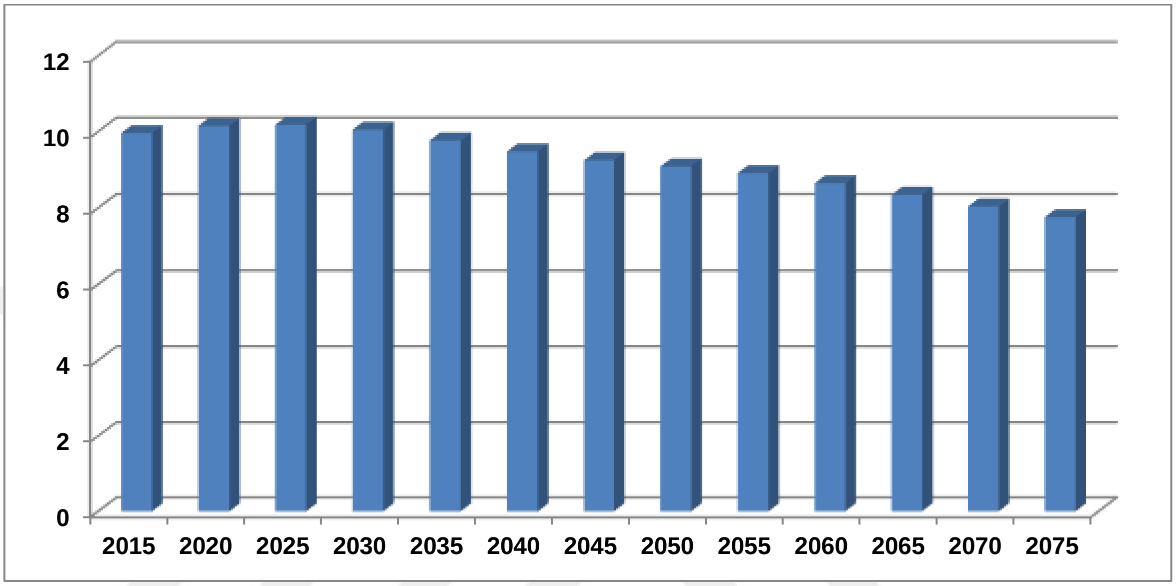
$Pop_{a,t}$: Number of people in the population with age a in time t,

BPA: Start age of primary school,

YrsPrimSchool: Standard number of years of primary school.

The number of children of primary school age for the projection period is shown in Figure VI.2.2.1.1. For the first decade of the period, there is a slightly upward trend in the number of children who are primary school age. After year 2025 this trend turns into a downward shift until the end of the projection period, resulting in 2.2 million less children of primary school age compared to present day.

Figure VI.2.2.1.1. Projection for Children of Primary School Age (Millions)



Source: Author’s calculations

VI.2.2.2. Primary Students

The number of primary students is calculated by multiplying the number of children of primary school age with the primary school enrollment rate by using the following formula:

$$PrimStudents_t = ChildrenPrimAge_t * PrimEnrRate_t$$

where;

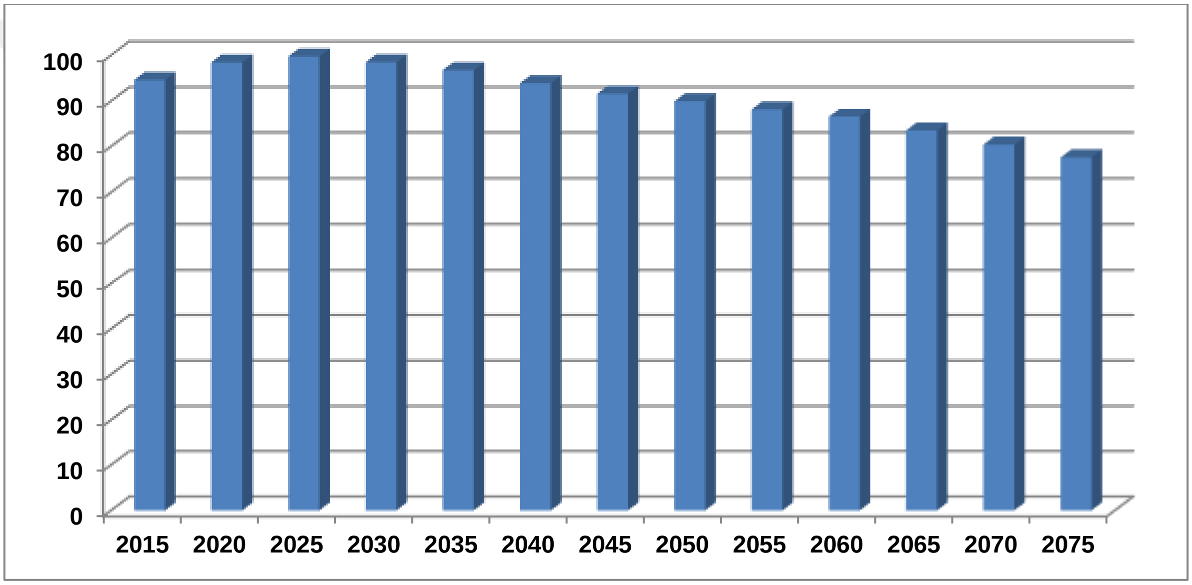
$PrimStudents_t$: Number of primary students in time t,

$ChildrenPrimAge_t$: Children of primary school age in time t,

PrimEnrRate t: Primary enrollment rate in time t.

The number of primary students projected by RAPID is presented in Figure VI.2.2.2.1. It can be derived from the figure that, similar to Figure VI.2.2.1.1, there is an increase in number of primary students until the year 2025, which is followed by a gradual decrease until the year 2075.

Figure VI.2.2.2.1. Projection for Primary Students (Thousands)



Source: Author's calculations

VI.2.2.3. Primary Teachers Required

The number of primary teachers required is derived from the division of the total number of primary students by the ratio of primary students to primary teachers, which can be interpreted by the formula:

$$\text{PrimTeachers}_t = \frac{\text{PrimStudents}_t}{\text{StudentsPerPrimTeacher}_t}$$

where;

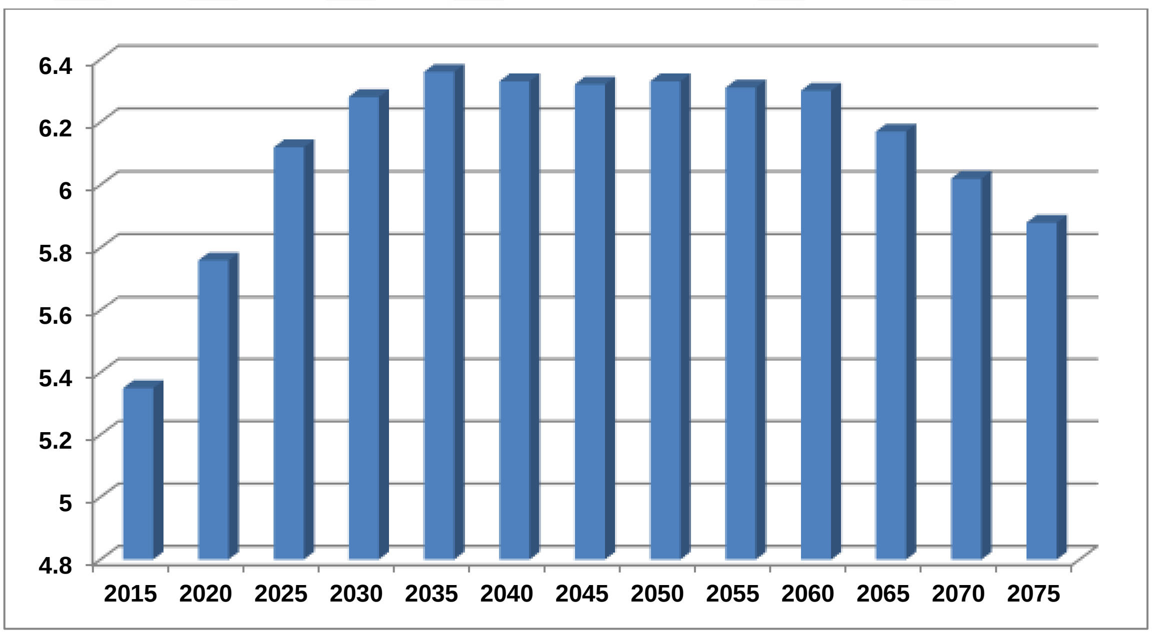
PrimTeachers $_t$: Number of primary teachers in time t,

PrimStudents $_t$: Number of primary students in time t,

StudentsPerPrimTeacher $_t$: Ratio of primary students to primary teachers in time t.

Figure VI.2.2.3.1 illustrates the number of primary school teachers. According to the projection results, primary teachers will increase in number until the year 2035 reaching the number 6.400 and stay stable until the year 2060. Afterwards, there will be a noticeable decrease in the number of primary teachers required.

Figure VI.2.2.3.1. Projection for Primary Teachers Required (Thousands)



Source: Author's calculations

VI.2.2.4. Primary Schools Required

The number of primary schools required is calculated by RAPID, dividing the number of primary students by the number of students per primary school. Its formulation can be shown as;

$$\text{PrimSchool}_t = \frac{\text{PrimStudents}_t}{\text{StudentsPerPrimSchool}_t}$$

where;

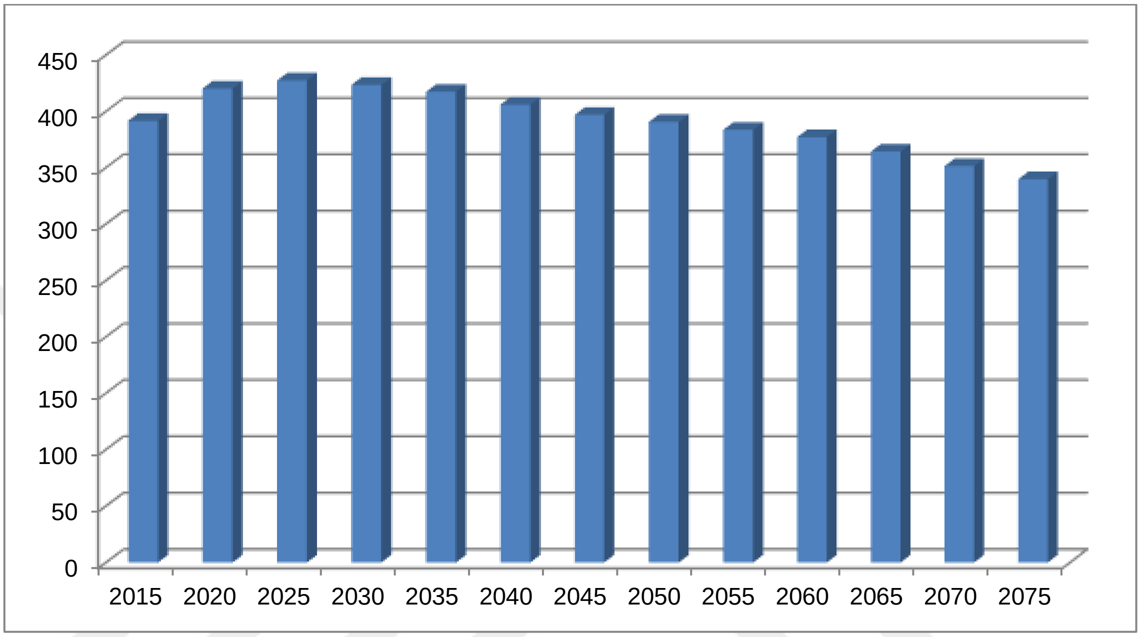
PrimSchool_t: Number of primary schools in time t,

PrimStudents_t: Number of primary students in time t,

$\text{StudentsPerPrimSchool}_t$: Ratio of primary students to primary schools in time t.

According to the projection presented in Figure VI.2.2.4.1, the number of primary schools required is increasing until the year 2025 and will be decreasing gradually until the end of the projection period.

Figure VI.2.2.4.1. Projection for Primary Schools Required



Source: Author's calculations

VI.2.2.5. Primary Education Expenditure Required

The projection of the primary education expenditure is made by multiplying total number of primary students with the average education expenditure per primary student, whose formula can be given as;

$$PrimExp_t = PrimStudents_t * ExpPerPrimStudent_t$$

where;

$PrimExp_t$: Primary education expenditure in time t,

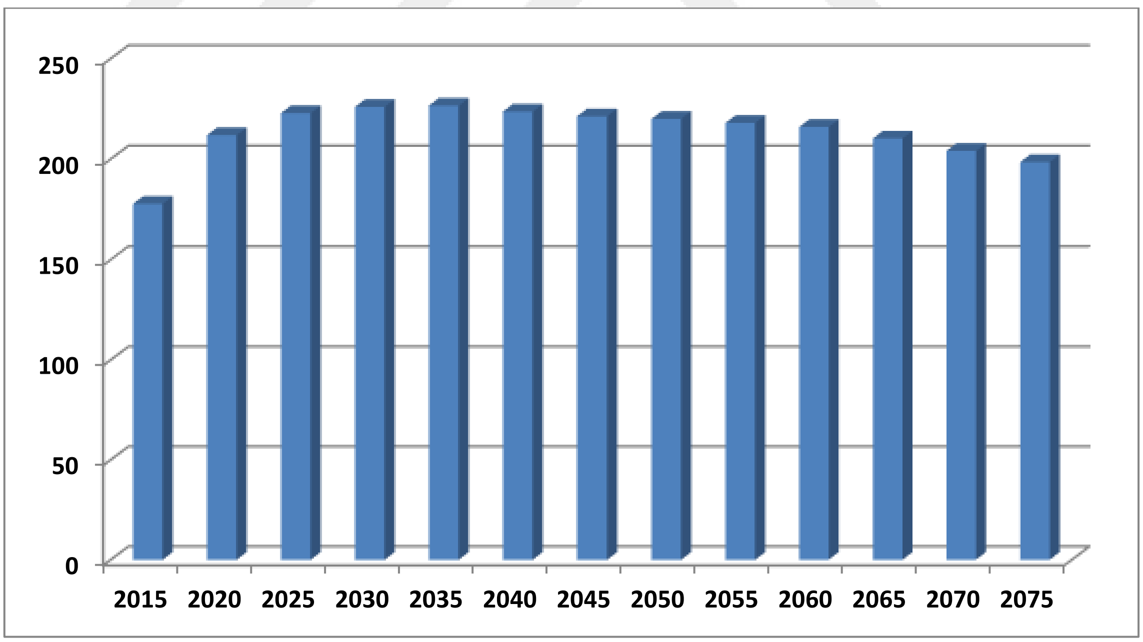
$PrimStudents_t$: Number of primary students in time t,

$ExpPerPrimStudent_t$: Average primary expenditure per primary student in time t.

The last result of RAPID regarding primary education, which is the primary education expenditures required in USD, is presented in Figure VI.2.2.5.1. As expected the projection pattern show similarities with the projection pattern of the number of primary students. As the number of students increase, the primary education expenditures also increase. After the year 2035 the amount of expenditures shows a gradual decrease as the number of primary students decrease in a similar way.

It is worth to mention that this indicator has an important role in demonstrating the levels of financial resources which will be required in order to support the primary education in the future.

Figure VI.2.2.5.1. Projection for Primary Expenditures Required (Million USD)



Source: Author's calculations

In a similar way to the primary education, results for secondary education are obtained from RAPID module of Spectrum Software.

VI.2.2.6. Children of Secondary School Age

The number of children of secondary school age is determined by adding up all children who are in the range of secondary school age. The formulation for the number of children of secondary school age is as follows:

$$ChildrenSecAge_t = \sum_{a=BSA}^{BSA+YrsSecSchool-1} Pop_{a,t}$$

where;

ChildrenSecAge $_t$: Children of secondary school age in time t,

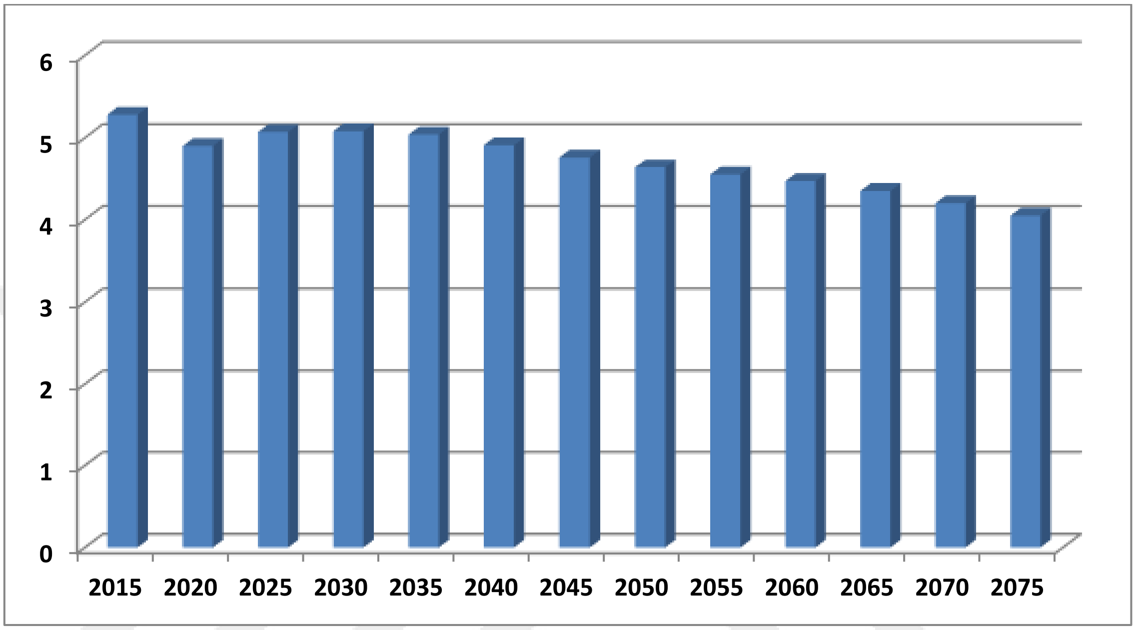
$Pop_{a,t}$: Number of people in the population with age a in time t,

BSA: Start age of secondary school,

YrsSecSchool: Standard number of years of secondary school.

Projection for children of secondary school age is given in Figure VI.2.2.6.1. A gradual decrease tendency is observed, except a more noticeable decrease for the year 2020. The decrease for the year 2020 can be explained by the decrease in the number of 15 year olds for this time period.

Figure VI.2.2.6.1. Projection for Children of Secondary School Age (Millions)



Source: Author's calculations

VI.2.2.7. Secondary Students

The number of secondary students is calculated by multiplying the number of children of secondary school age with the secondary school enrollment rate. The related formulation can be presented as:

$$SecStudents_t = ChildrenSecAge_t * SecEnrRate_t$$

where;

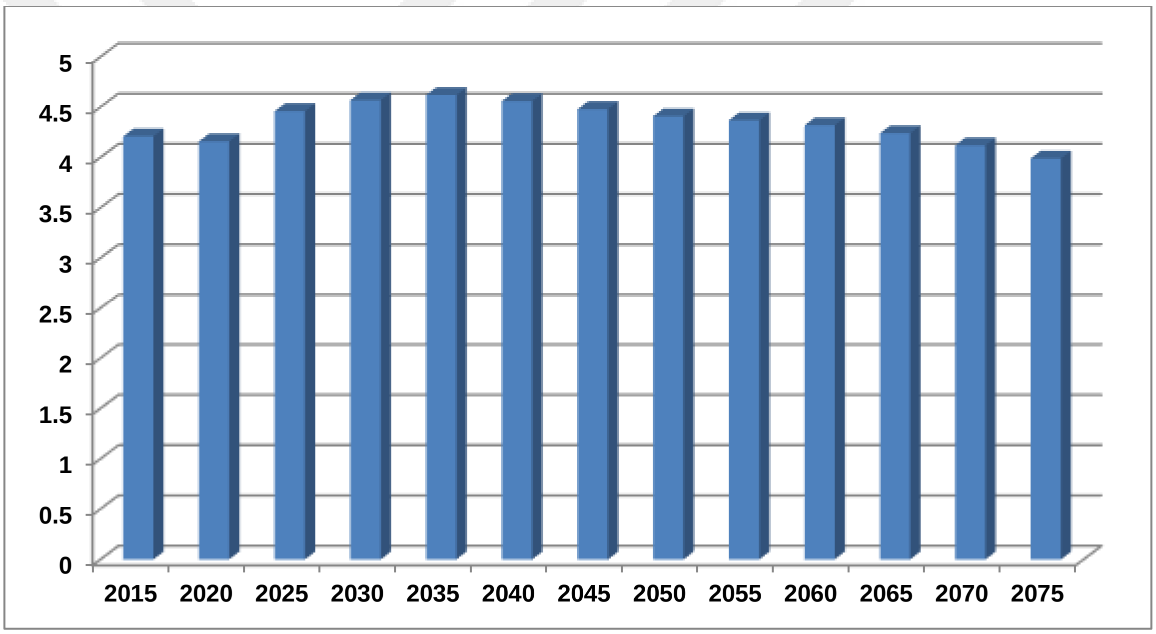
$SecStudents_t$: Number of secondary students in time t,

$ChildrenSecAge_t$: Children of secondary school age in time t,

SecEnrRate t: Secondary enrollment rate in time t.

The results of the projection for secondary students presented in Figure VI.2.2.7.1 are parallel to the results of the projection for children of secondary school age. While a decrease for the year 2020 is noticeable, the main trend is a gradual increase until the year 2035 followed by a gradual decrease till the end of the projection which is the year 2075.

Figure VI.2.2.7.1. Projection for Secondary Students (Millions)



Source: Author's calculations

VI.2.2.8. Secondary Teachers Required

The number of secondary teachers required is derived from the division of the total number of secondary students by the ratio of secondary students to secondary teachers. This calculation can be formulized as:

$$\text{SecTeachers}_t = \frac{\text{SecStudents}_t}{\text{StudentsPerSecTeacher}_t}$$

where;

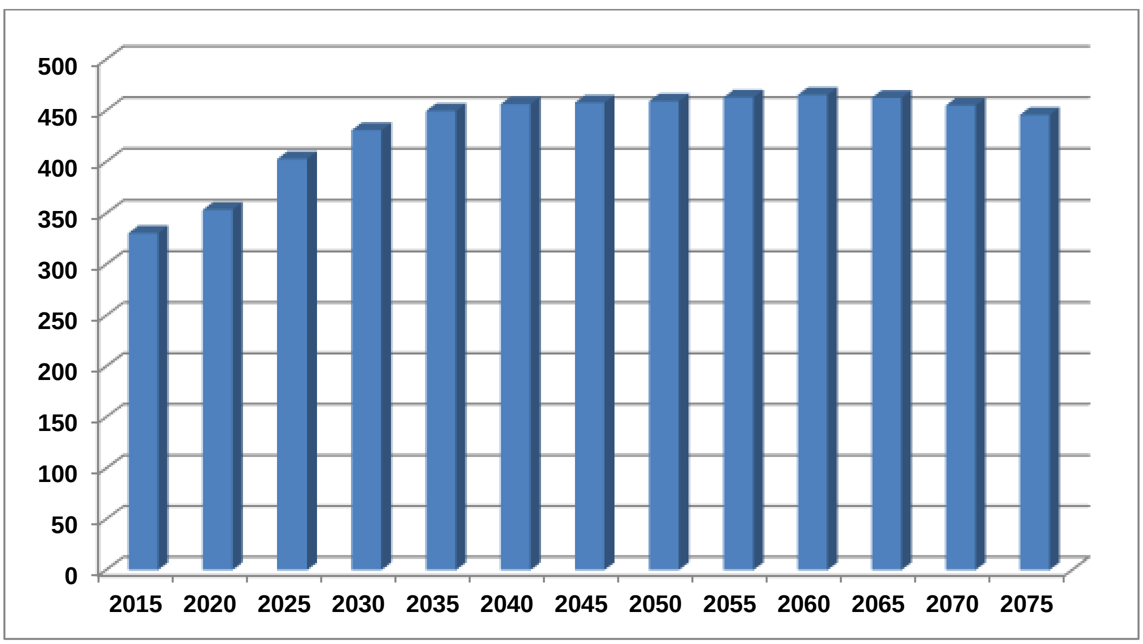
SecTeachers $_t$: Number of secondary teachers in time t,

SecStudents $_t$: Number of secondary students in time t,

StudentsPerSecTeacher $_t$: Ratio of secondary students to secondary teachers in time t.

According to the projection for secondary teachers required, which is shown in Figure VI.2.2.8.1, a gradual increase continues until the year 2040 and then it is followed by a stable number. The horizontal pattern observed after the year 2040 can be explained by the negative slope observed in the projection for secondary students and the decrease in students per teacher in the secondary education.

Figure VI.2.2.8.1. Projection for Secondary Teachers Required (Thousands)



Source: Author’s calculations

VI.2.2.9. Secondary Schools Required

The number of secondary schools required is calculated by dividing the number of secondary students with the number of students per secondary school, whose formulation is given as;

$$\text{SecSchool}_t = \frac{\text{SecStudents}_t}{\text{StudentsPerSecSchool}_t}$$

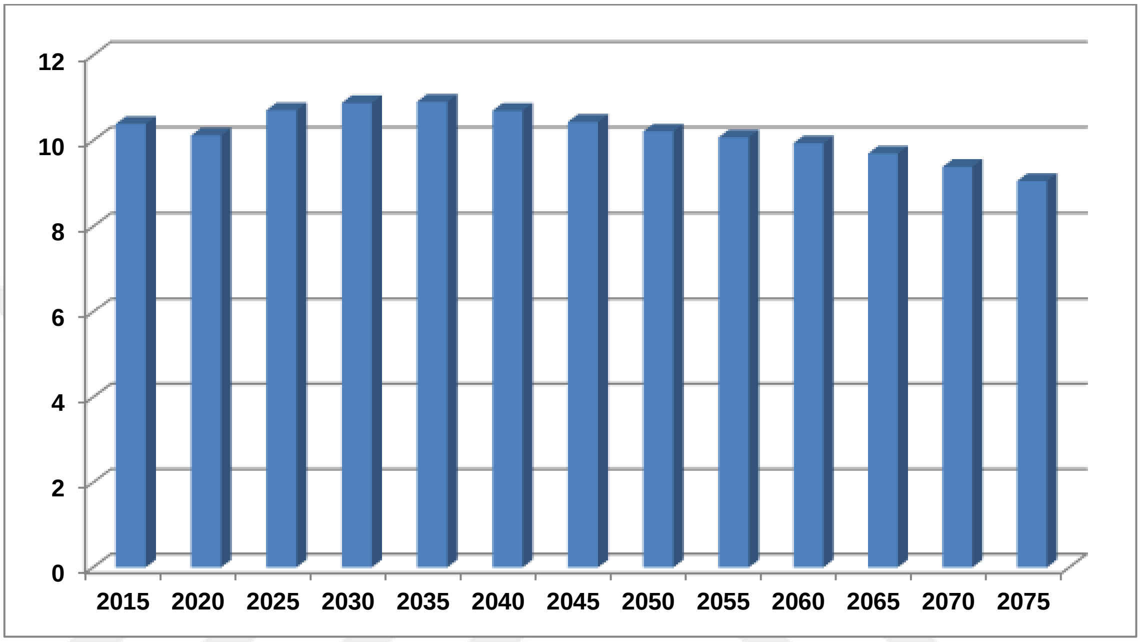
SecSchool_t: Number of secondary schools in time t,

SecStudents_t: Number of secondary students in time t,

$\text{StudentsPerSecSchool}_t$: Ratio of secondary students to secondary schools in time t.

The projection for secondary schools required is shown in Figure VI.2.2.9.1. The pattern of the projection reflects similarities with the pattern of the projection for the number of secondary students as expected.

Figure VI.2.2.9.1. Projection for Secondary Schools Required (Thousands)



Source: Author's calculations

VI.2.2.10. Secondary Education Expenditure Required

The secondary education expenditures are projected by multiplying total number of secondary students with the average education expenditure per secondary student, which can be formulated as;

$$SecExp_t = SecStudents_t * ExpPerSecStudent_t$$

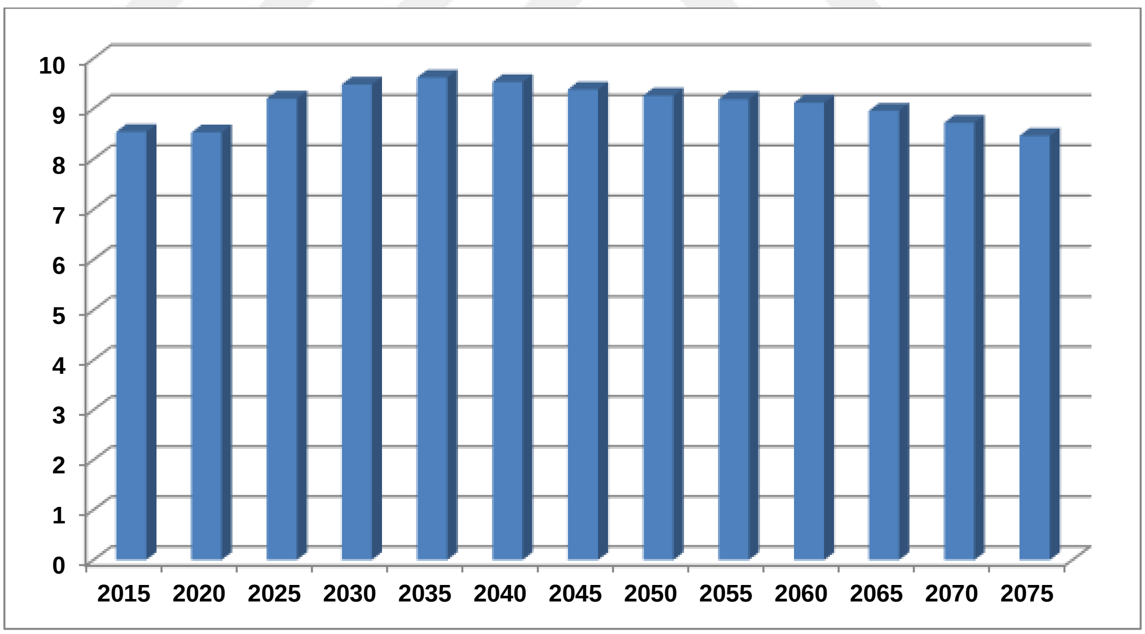
where;

$SecExp_t$: Secondary education expenditure in time t,

$SecStudents_t$: Number of secondary students in time t, ExpPerSecStudent $_t$: Average secondary expenditure per secondary student in time t.

As the final projection of the education section of RAPID, expenditures required for the secondary education, given in Figure VI.2.2.10.1, is considerably high compared to expenditures required for primary education. Even though, expenditures per primary and secondary students are close to each other, because of the remarkable difference in the number of primary and secondary students, the expenditures for secondary education is significantly bigger in amount as expected.

Figure VI.2.2.10.1. Projection for Secondary School Expenditures Required (Billion USD)



Source: Author's calculations

VI.3. Economy

Economy and population growth has a complex relationship, which might end up with different results depending on the society, considering the absorption capacity of the labor market, pace of new job creation with respect to the expansion of the workforce, relative growth of income with respect to population growth, consumption and saving behaviors of the society and so on.

However, the relationships of most of these characteristics of the society with economic growth and development are complicated to discover. So in RAPID, among these entire mentioned characteristic only the ones which are well known and easy to describe are taken into consideration. Inputs and related outputs of economy section of RAPID software, which are chosen according to this criterion, are explained in the following way.

VI.3.1. RAPID Input and Methodology Regarding Economy

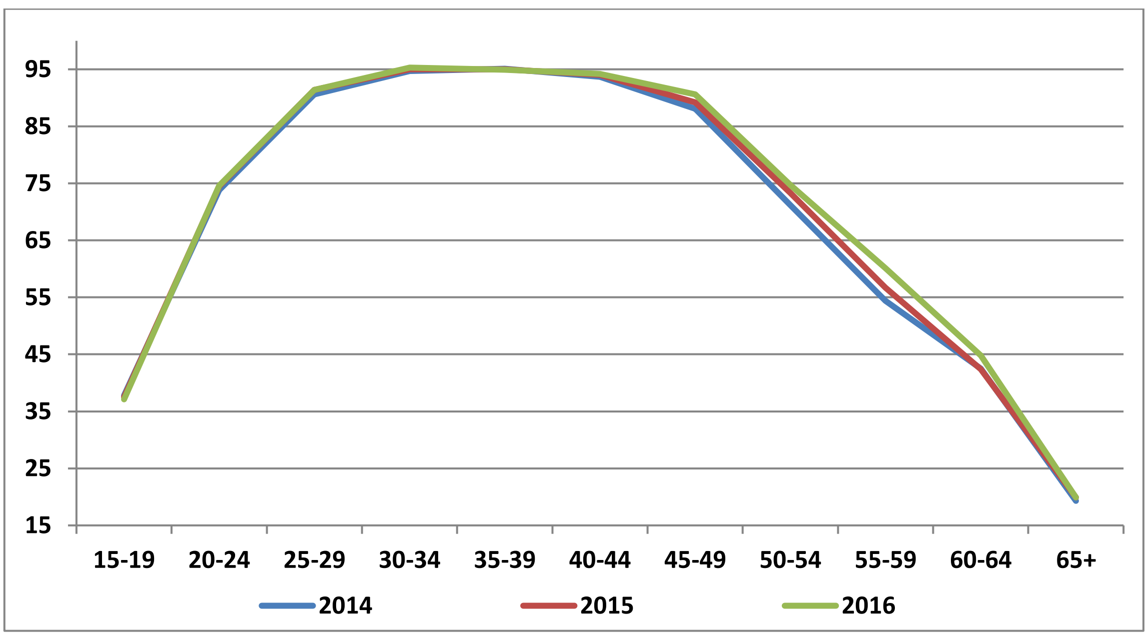
While making projections regarding economic development of a country, labor force participation rates for males and females and GDP growth rate has a significant role. These factors compose the required input for the RAPID projections regarding economy and can be listed as follows:

- Labor force participation rates for both sexes aged 10-14 and 15-64,
- Base year gross domestic product,
- Annual growth rate in GDP percentage.

VI.3.1.1. Labor Force Participation for Males

Labor force participation rates for both sexes for the age group 10-14 are accepted as zero and so neglected in the projections of this study. Regarding the calculation steps about the projection of labor force participation rates for male for the age group 15-64, first of all, the broad age group 15-64 is decomposed into 5 year age groups. This decomposition enables to make more realistic projections, as each 5 year age group has its own initial level and growth rate in time which is easier to detect. Also, the labor force participation rates have an order among 5 year age groups, which is in independent of the time or show small differences over time. To be more precise, starting from15-19 age group labor force participation rates increase until 30-34 and 35-39 age groups and then starts to decrease with an increasing pace for the older 5 year age groups. This general pattern for labor force participation rates for males in Turkey can be observed in Figure VI.3.1.1.1.

Figure VI.3.1.1.1. Labor Force Participation Rates for Males for 5 year age groups in Turkey (2014-2016)



Source: TurkStat

While making the projections for each 5 year age groups, the pattern presented in Figure VI.3.1.1.1 is preserved in general. However, small adjustments are made for the following decades considering the potential increase in the labor force participation rates of older age groups compared to present values due to the increasing trend at life expectancy at birth and expected increase in the retirement age in the future.

Moreover, by using the decomposition method for 5 year age groups, the shifts in age groups over time is captured and included in the labor force participation rate projections for 15-64 broad age group. This is done by taking the population numbers for each 5 year age group between 15 and 64 as weighting factor, while calculating labor force participation rate projection for 15-64 age group using labor force participation rate projections for each 5 year age group between 15 and 64. For all of the 5 year age group projections initial values between 2014 and 2016 are taken from TurkStat data.

The projections of labor force participation rate for males for 15-19 age group, which includes the age groups of secondary school and university students, is presented in Figure VI.3.1.1.2. It is expected that the labor force participation rate for this age group will decrease over time, as a result of the increasing enrolment ratios in secondary and tertiary education and increasing years of schooling (Tansel, 2012). So while making the projection for this age group, a decrease of a few percentage points is taken into account, considering these expectations. The projection for this age group has a power type trend line equation of $y = 37.89x^{-0.019}$.

Figure VI.3.1.1.2. The Projection of Labor Force Participation Rate for Males for 15-19 Age Group

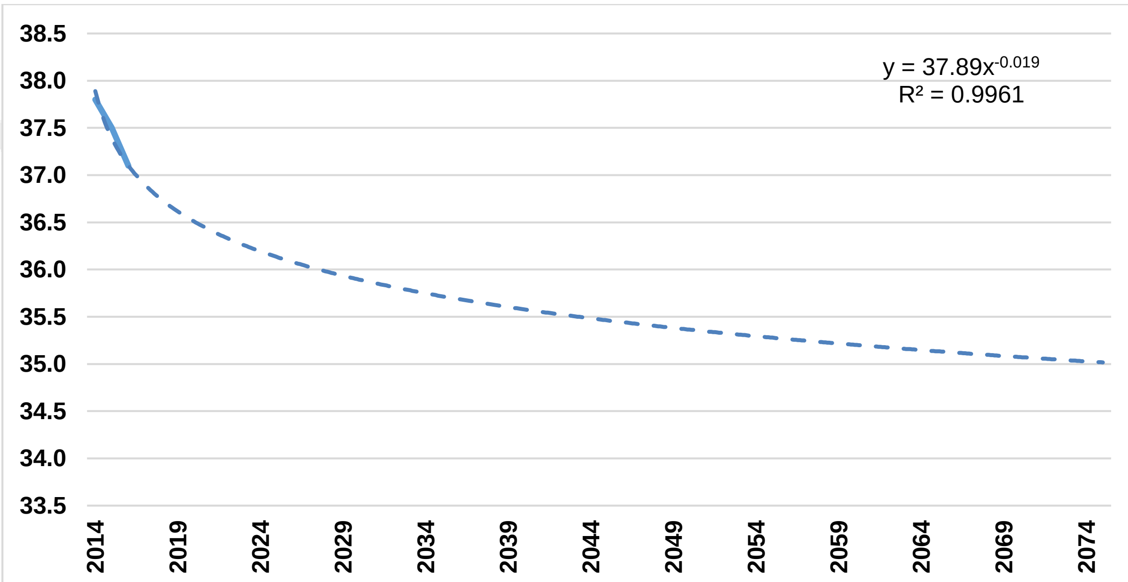
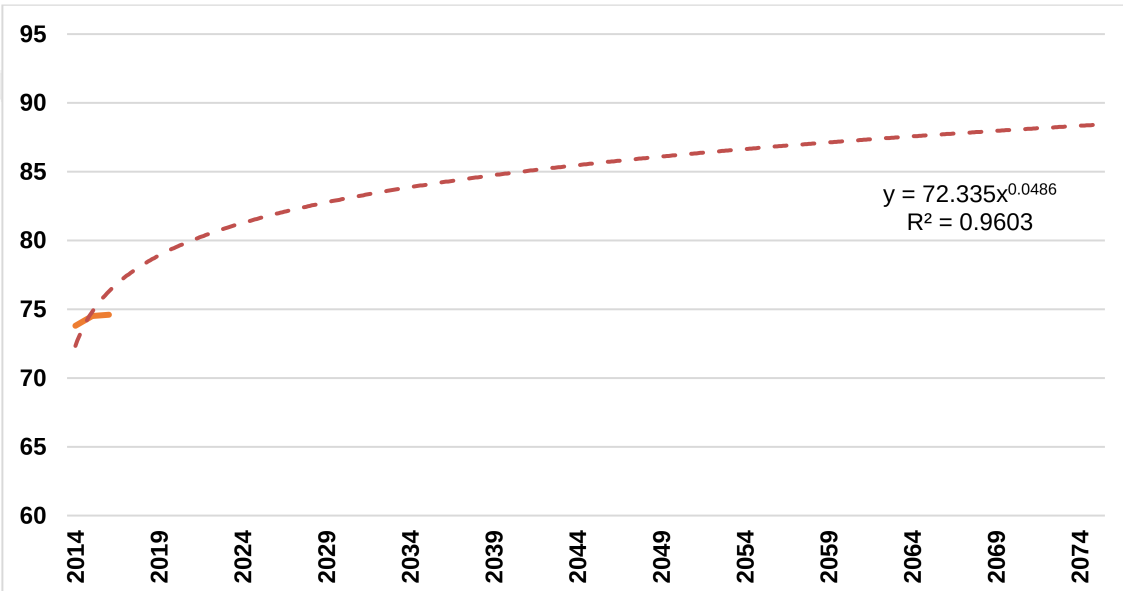


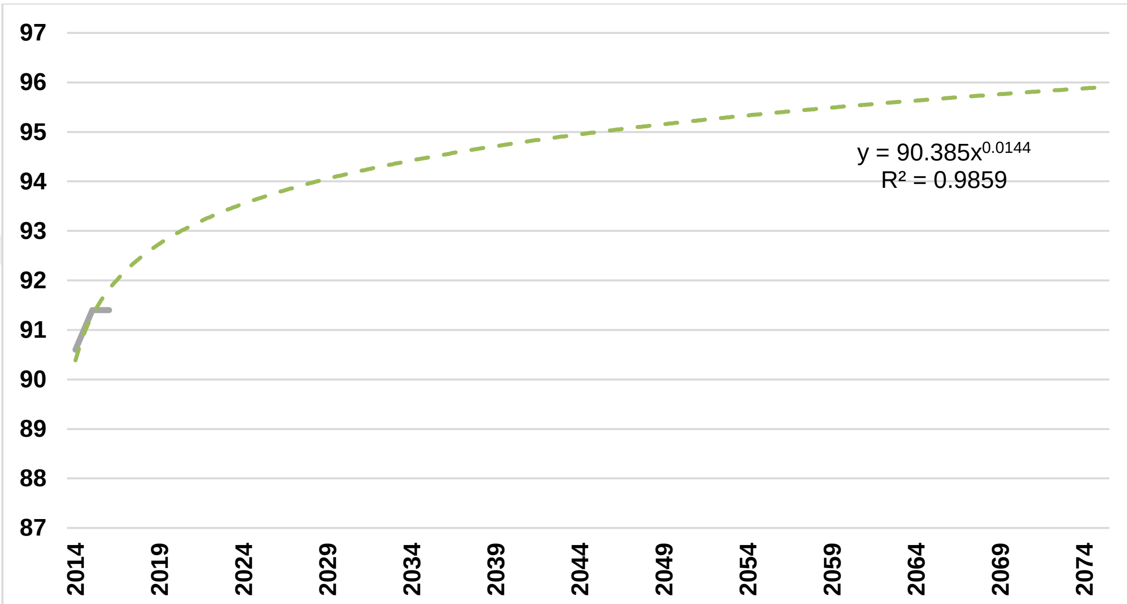
Figure VI.3.1.1.3 shows the labor force participation rate projection for 20-24 age group. This age group composed of not only university students but also fresh graduates. As tertiary enrolment ratios increase over time, the labor force participation rates for the younger part of this age group (20-21) is expected to decrease, while the rates for the older part of the age group (21-24) is expected to increase under the assumption that labor demand for population with tertiary education will tend to increase compared to population with secondary or primary education. This assumption is made considering the increasing demand for higher qualifications in the labor market, as a result of the structural change in the economy in the direction of high value added sectors from low value added sectors. It is also assumed that 21-24 sub-age group in this age group will dominate 20-21 sub-age group in terms of the trends in labor force participation rates. In this respect, overall labor force participation rate for this age group is anticipated to increase significantly over time. Considering all these factors, the derived labor force participation rate projection is a power function with an equation of y = 72,335x$^{0.0486}$ for this age group.

Figure VI.3.1.1.3. The Projection of Labor Force Participation Rate for Males for 20-24 Age Group



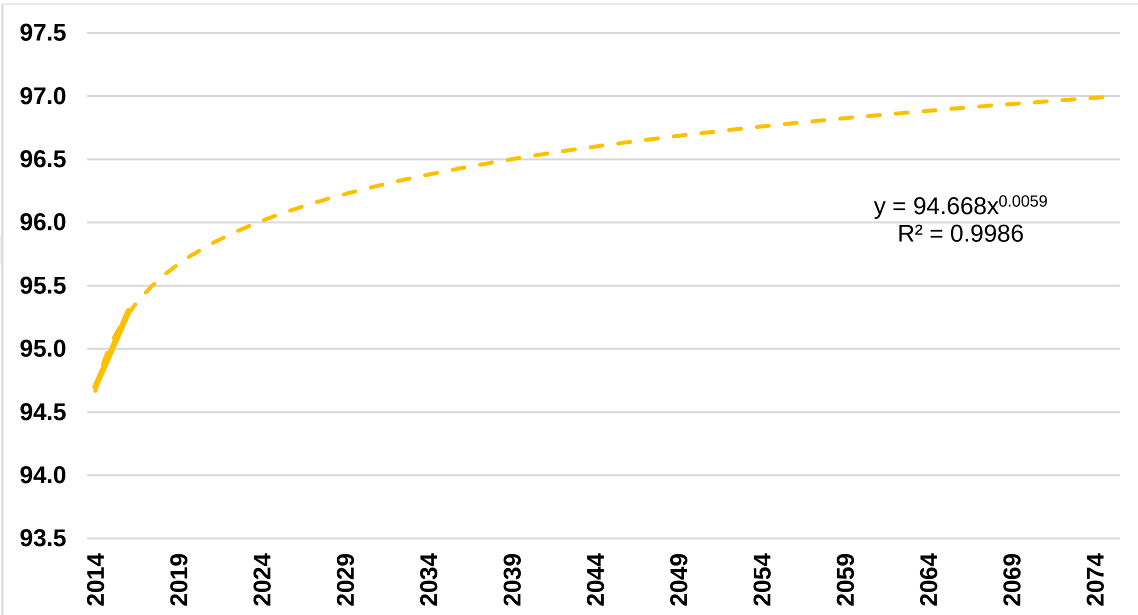
The labor force participation rates for 25-29 age group is currently high and it is expected to get higher over time and reach a value of almost 96 percent in 2075. This age group is believed to not to be negatively affected from the increasing enrolment ratios. On the contrary, the labor force participation rates for this age group are anticipated to increase in line with the increase in the enrolment ratios. The calculated projection for this age group has a power function, which has an equation of y = 90,385x$^{0.0144}$. Figure VI.3.1.1.4 illustrates the labor force participation rate projection for 25-29 age group as follows.

Figure VI.3.1.1.4. The Projection of Labor Force Participation Rate for Males for 25-29 Age Group



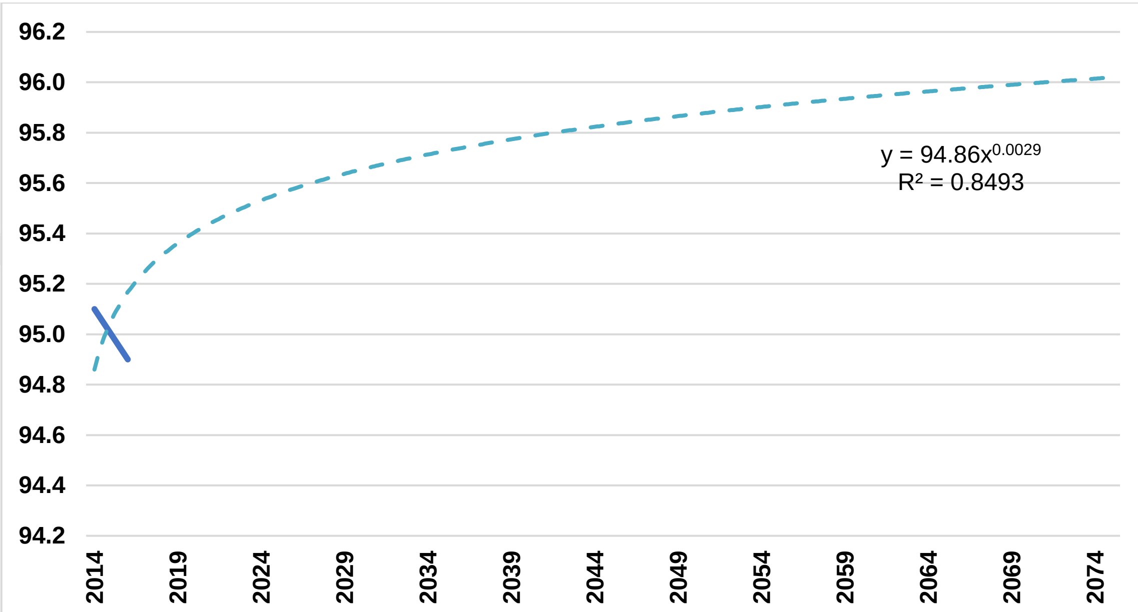
The age group with the highest labor force participation rates is currently 30-34 age group with a present value of 95.30 percent in 2016. This age group is expected to continue having the highest labor force participation rates for males over time. 30-34 age group is anticipated to reach a labor force participation rate of 97 percent in 2075. The related projection is a power function and has an equation of $y = 94.668x^{0.0059}$. The labor force participation rate projections for 30-34 age group is presented in Figure VI.3.1.1.5.

Figure VI.3.1.1.5. The Projection of Labor Force Participation Rate for Males for 30-34 Age Group



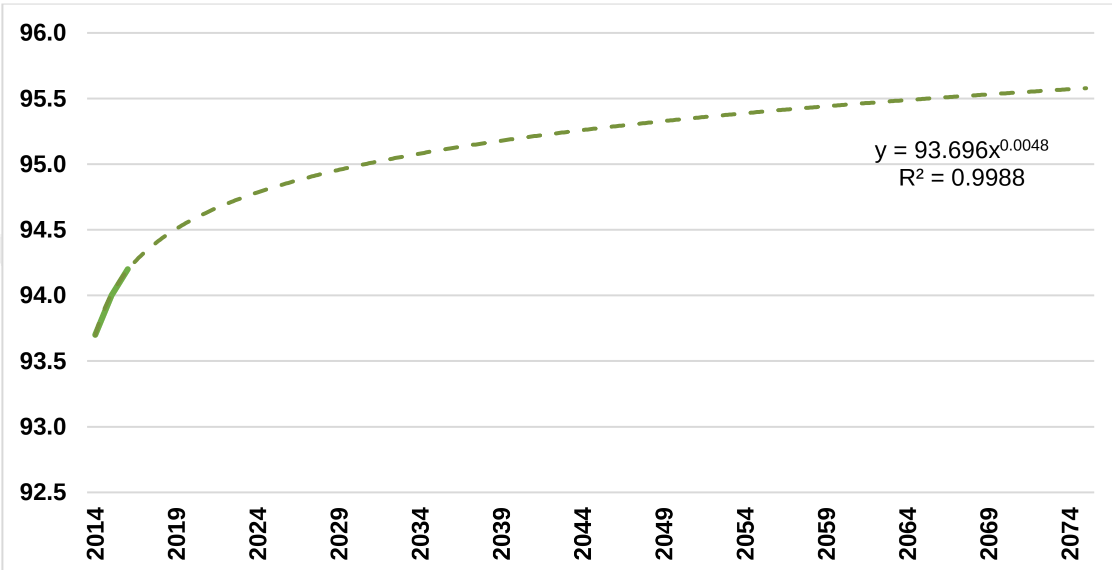
Currently 35-39 age group is the closest one to the 30-34 age group in terms of labor force participation rates for males. It is assumed that both age groups will continue to have similar labor force participation values over time, 30-34 age group being the superior one. 35-39 age group is expected to have a labor force participation rate of 96 percent in 2075, increasing slightly from the current value of 94.90 percent in 2016. The calculated power function equation has a formula of $y = 94.86x^{0.0029}$ for the labor force participation rate projection for males for 35-39 age group. The related projection is illustrated in Figure VI.3.1.1.6 as follows.

Figure VI.3.1.1.6. The Projection of Labor Force Participation Rate for Males for 35-39 Age Group



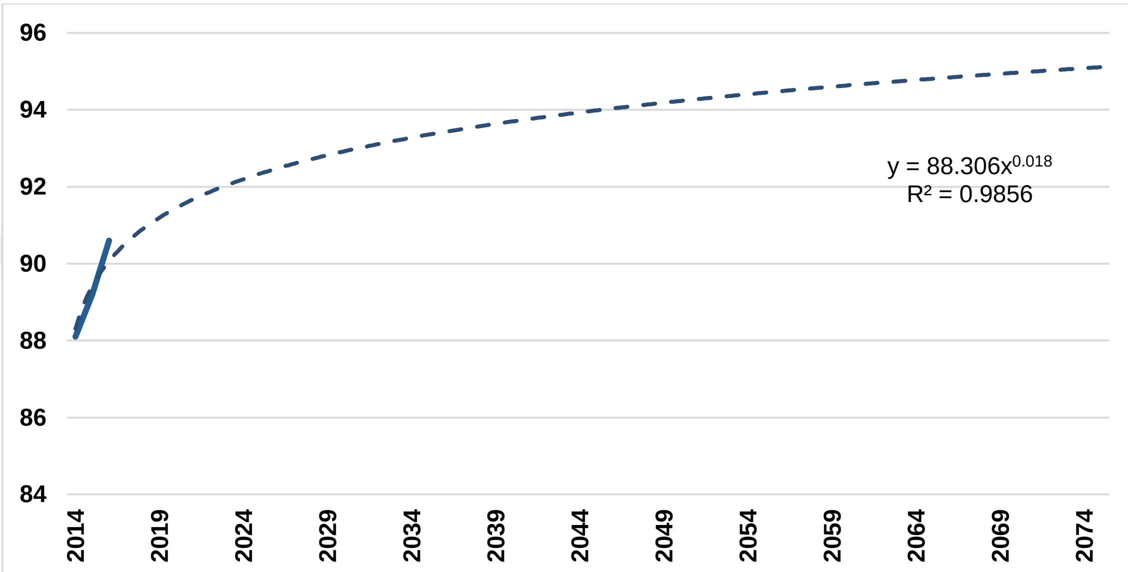
40-44 age group is one of the age groups with high labor force participation rates and is expected to improve over time. In line with this assumption, current labor force participation rate for males for 40-44 age group, which is 94,2 percent, is anticipated to reach a value of 95,57 percent in 2075. Under these assumptions, the derived power function equation for labor force participation rate projection for males for 40-44 age group is $y = 93.696x^{0.0048}$. Figure VI.3.1.1.7 presents the calculated projection for this age group as follows.

Figure VI.3.1.1.7. The Projection of Labor Force Participation Rate for Males for 40-44 Age Group



The labor force participation rate for males for 45-49 age group improved to some extent in the last couple of year and currently is close to 5 year age groups between 25 years olds and 44 years olds in value. In the following decades it is expected that 45-49 age group will be closer in value to the age groups with the highest labor force participation rates. In this respect 45-49 age group, which has a current labor force participation rate of 90.6 percent, is anticipated to reach a labor force participation rate of 95.12 percent in 2075. This projection is formulized with a power function, which has an equation of $y = 88.306x^{0.018}$ and shown in Figure VI.3.1.1.8.

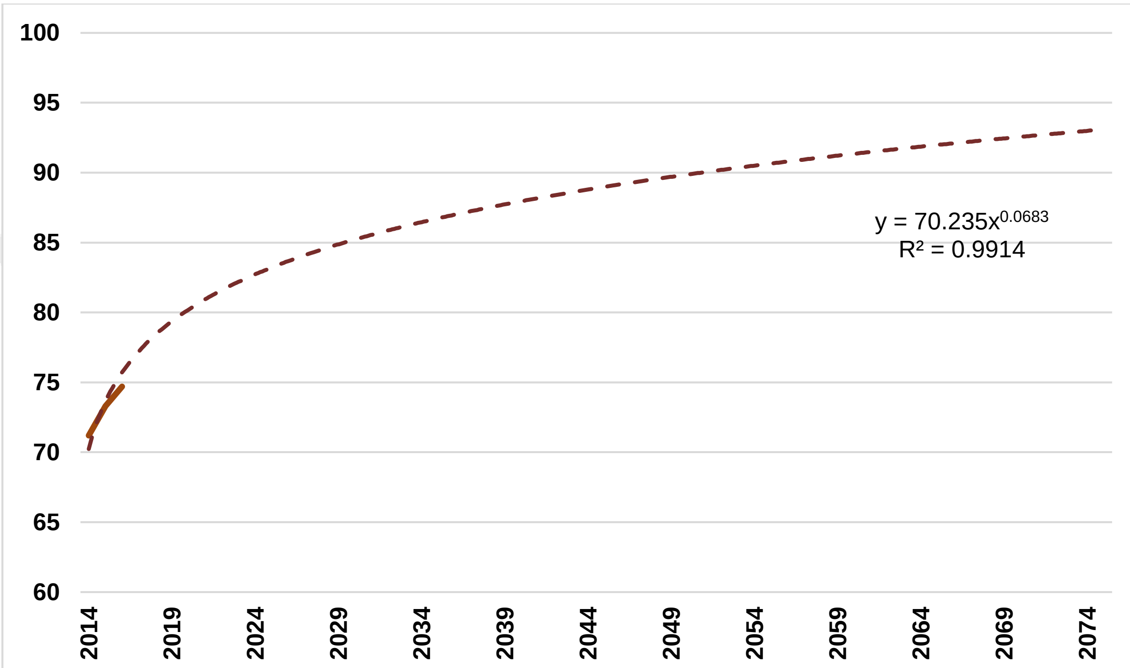
Figure VI.3.1.1.8. The Projection of Labor Force Participation Rate for Males for 45-49 Age Group



Looking at the current values it can be stated that, starting from 45-49 age group, labor force participation rates for males decreases significantly. However the gap between the 25-49 age groups and 50-64 age groups in terms of labor force participation rates is believed to narrow by time. As mentioned earlier, the reasons lying behind this expectation can be summarized by increasing life expectancy at birth and possible raise in the retirement age in the future in Turkey.

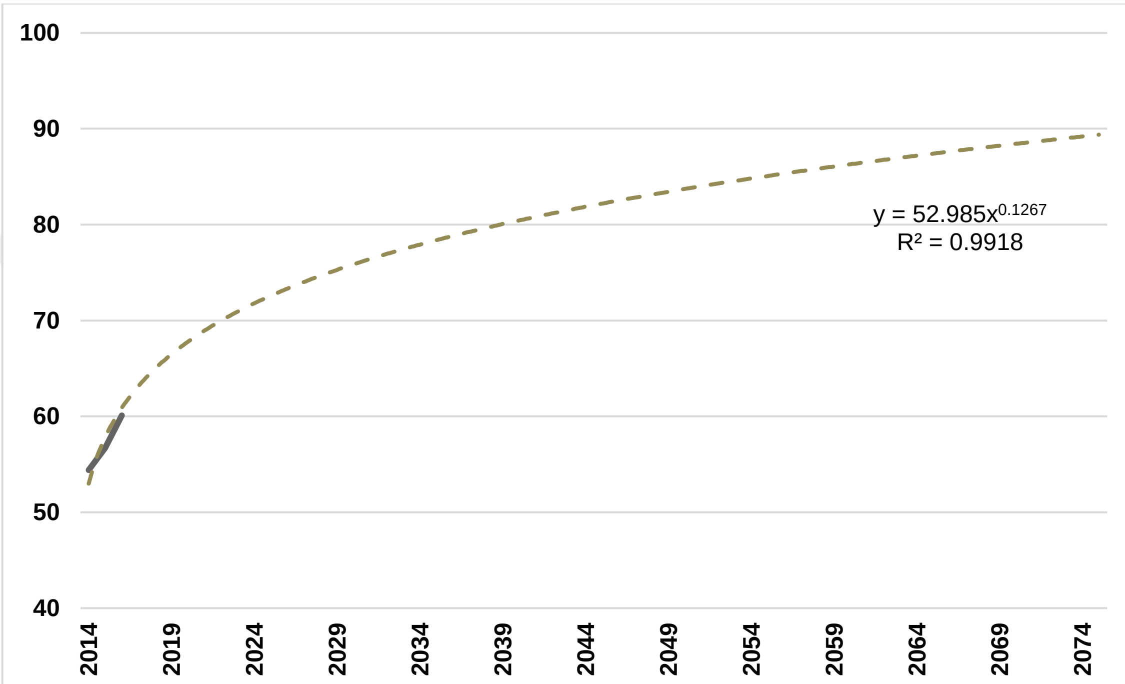
In accordance with these assumptions, 50-54 age group, which has a current labor force participation rate of 74.7 percent for males, is predicted to reach a value of 93.11 percent in 2075. So its value will be become very close to the value of 45-49 age group after a few decades. The labor force participation rate projection equation for 50-54 age group depicting this trend can be given as $y = 70.235x^{0.0683}$, which is again a power function. The labor force participation rate projection for this age group is shown in Figure VI.3.1.1.9.

Figure VI.3.1.1.9. The Projection of Labor Force Participation Rate for Males for 50-54 Age Group



The labor force participation rates for 55-59 age group for males is also expected to increase over time, but its increase is believed to be less than the increase in 50-54 age group. Labor force participation rate for this age group, which is 62.16 percent currently, is predicted to reach 89.38 percent in 2075. The related projection equation is a power function with and equation $y = 52.985x^{0.1267}$. Figure VI.3.1.1.10 illustrates the labor force participation rate projection for males for 55-59 age group as follows.

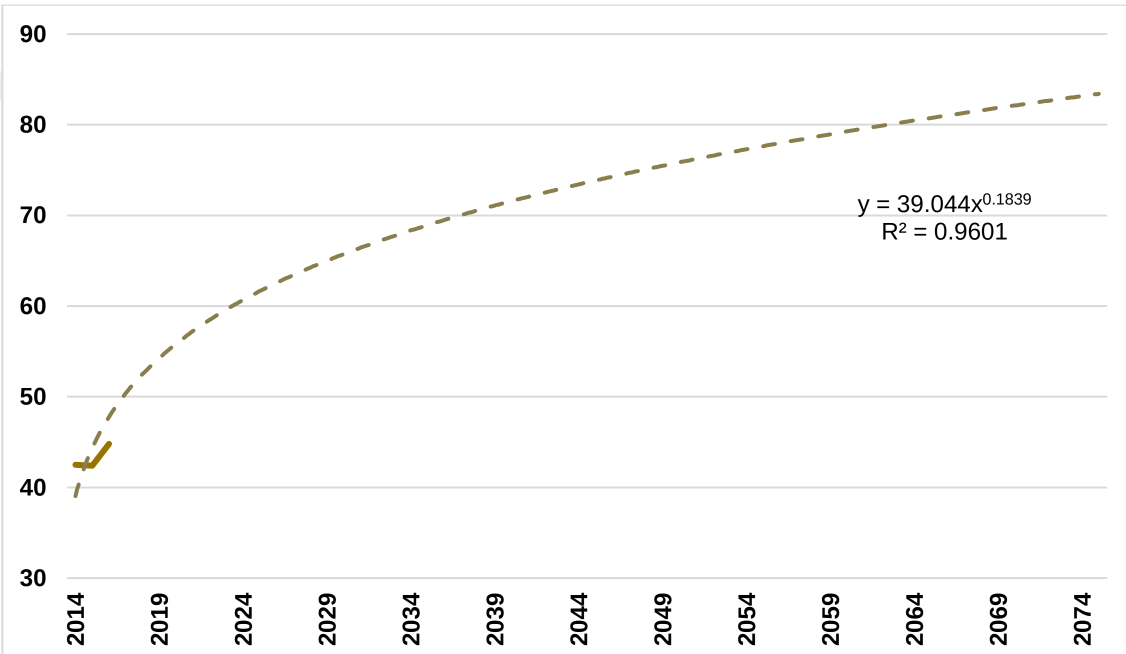
Figure VI.3.1.1.10. The Projection of Labor Force Participation Rate for Males for 55-59 Age Group



60-64 age group is the last age group which is used in economy section of RAPID module. However, as international data on labor force participation rates are usually calculated for 15+ broad age group, the projections for 65+ age group is also made in this study in order to make comparisons of future labor force participation rate values for both males and females in Turkey with the current rate values of developed and high income countries.

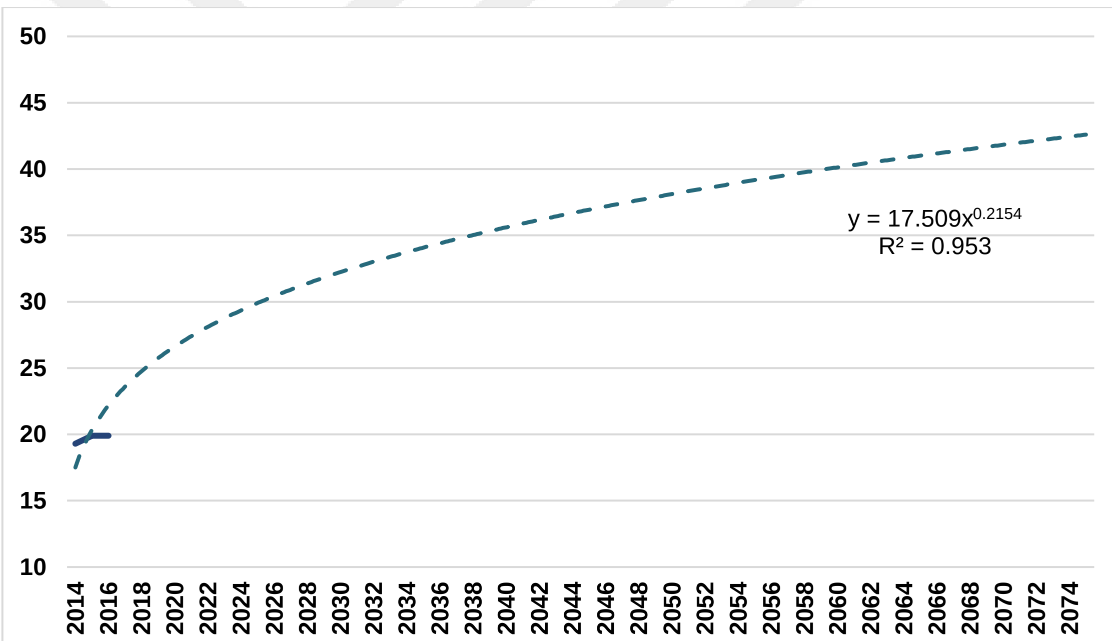
The labor force participation rate for 60-64 age group is currently 44.8 percent, which is considerably low with respect to 55-59 age group. Participation rates for this age group is assumed to increase with a higher pace compared to the increase in 55-59 age group over time and expected to reach a value of 83.4 percent in 2075. In other words, it is anticipated that the labor force participation rates for males for this age group will be almost doubled in 59 years. The projection for this age group is formulated by using a power function whose equation is $y = 39.044x^{0.1839}$ and is presented in Figure VI.3.1.1.11.

Figure VI.3.1.1.11. The Projection of Labor Force Participation Rate for Males for 60-64 Age Group



The labor force participation rates for males for 65+ age group is currently considerably low with a value of 19.9 with respect to the other age groups in labor force. In line with the other older age groups in labor force, the participation rates for this age group are expected rise over time. However, this increase is believed to be limited, considering the increase in the share of 80+ age group in the total population. According to the results of DemProj population projections, which was explained in the previous chapters, the share of the 80+ age group for both sexes will start to rise in 2023 from 1.61 percent to 8.34 percent in 2075. This increase will have a negative impact on the labor force participation rates of 65+ age group for both sexes. In 2075, the share of 80+ age group for males is projected to reach 3.34 million and consequently become of 7.02 percent of the total male population. Taking into account also the results of the DemProj population projections for Turkey, the labor force participation rate for males for 65+ age group is expected to reach 42.59 percent in 2075. The calculations of the projection for this age group is made by using the power function whose equation is $y = 17.509x^{0.2154}$. The labor force participation rate projection for males for 65+ age group is given in Figure VI.3.1.1.12.

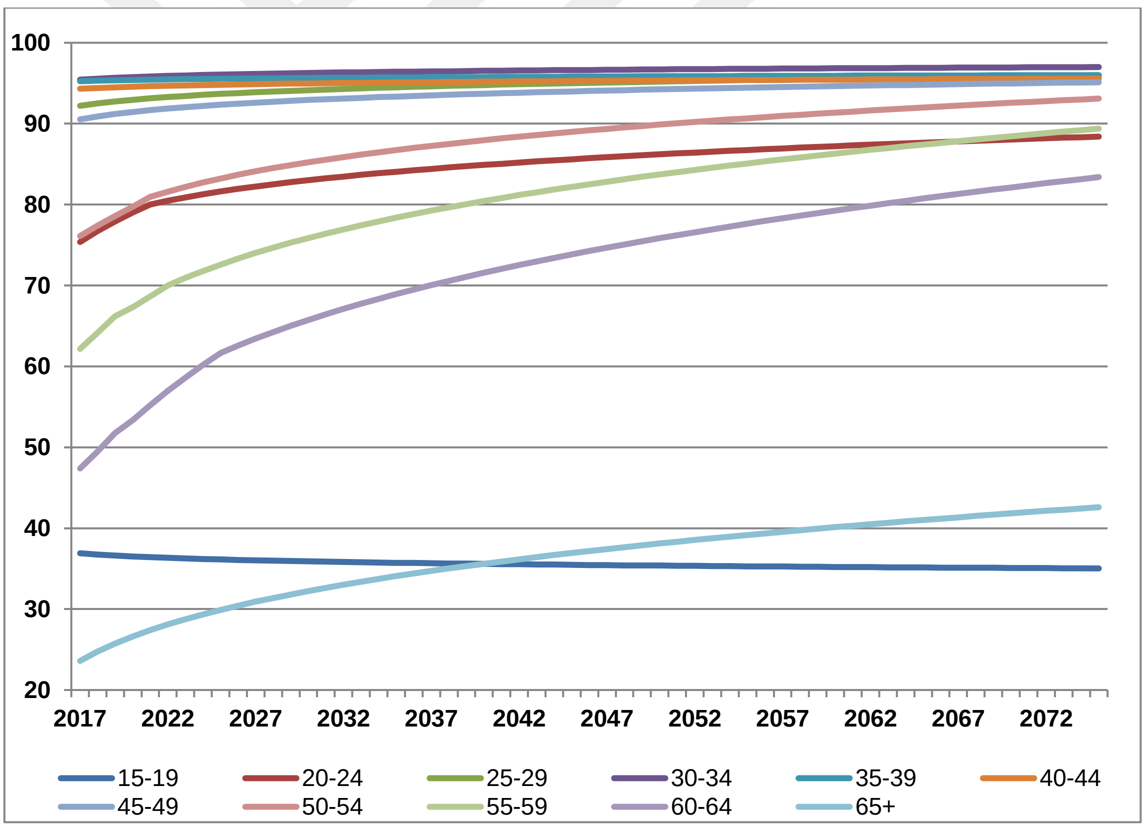
Figure VI.3.1.1.12. The Projection of Labor Force Participation Rate for Males for 65+ Age Group



Using the power function projection equations for each 5 year age group, labor force participation rate data values for each single year is calculated. Figure VI.3.1.1.13 presents the changes in labor force participation rates for males for each 5 year age group in the 15-64 broad age group and 65+ age group. It can be inferred from the figure that the only age group for which the labor force participation rate is decreasing is 15-19 age group, as a result of the increase in secondary and tertiary school enrolment ratios and average years of schooling. For all of the other age groups, the labor force participation rates are increasing with various pace levels. The gap between the age groups in terms of participation rates is decreasing, especially for 50-54, 55-59 and 60-

64 age groups. The labor force participation rates for 25-29, 30-34, 35-39, 40-44 and 45-49 age groups are becoming almost the same especially after 2050 with a diminished gap among these age groups. The labor force participation rates for 65+ age group is increasing with a slower pace compared to most of the other age groups as expected and the huge gaps between this age group and the other age groups (except 15-19 age group) are very clear in the figure.

Figure VI.3.1.1.13. The Projection of Labor Force Participation Rate for Males for Age Groups 15+



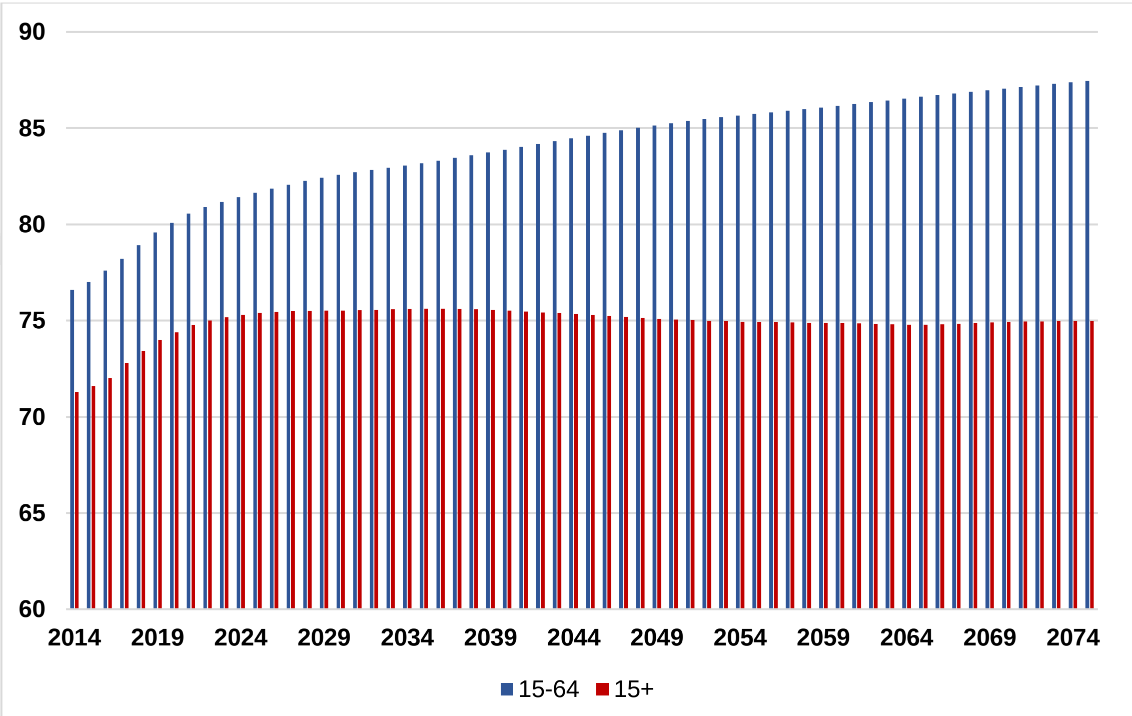
Source: Author’s calculations

Taking the male population numbers for each age group for each single year, which are projected by using DemProj module in the previous chapters, as weighting factors; labor force participation rates for males for broad age groups 15-64 and 15+

are derived for each single year from 2017 until 2075. The participation rate values between 2014 and 2016 are taken from TurkStat data. Combining TurkStat data and the projections of this study, the labor force participation rates for these 2 age groups for 2014-2075 period are shown in Figure VI.3.1.1.14.

The gap between the labor force participation rates for 15-64 and 15+ age groups is increasing, starting with 5.3 percent difference in 2014 rising to almost 12.5 percent in 2075. This increase in the gap in the participation rates for males can be argued as the result of the increase in the share of oldest old population group in the total population. It is noteworthy to mention that the participation rates for 15-64 age group is continuously rising over time, while the participation rate for 15+ age group is fluctuating slightly between 2014-2075 period. To be more precise, the participation rates for 15+ age group is rising until 2037, then starts to decrease gradually until 2065 and thereafter again starts to increase until the rest of the period. It can be commented that this mild fluctuation is a consequence of periods of increasing increase and decreasing increase observed between 2014 and 2075. In this respect, the increase in labor force participation rates for 15+ broad age group after 2065 can be explained by the period of decreasing increase observed in 65+ population, starting from 2064.

Figure VI.3.1.1.14. The Projection of Labor Force Participation Rates for Males for 15-64 and 65+ Age Groups

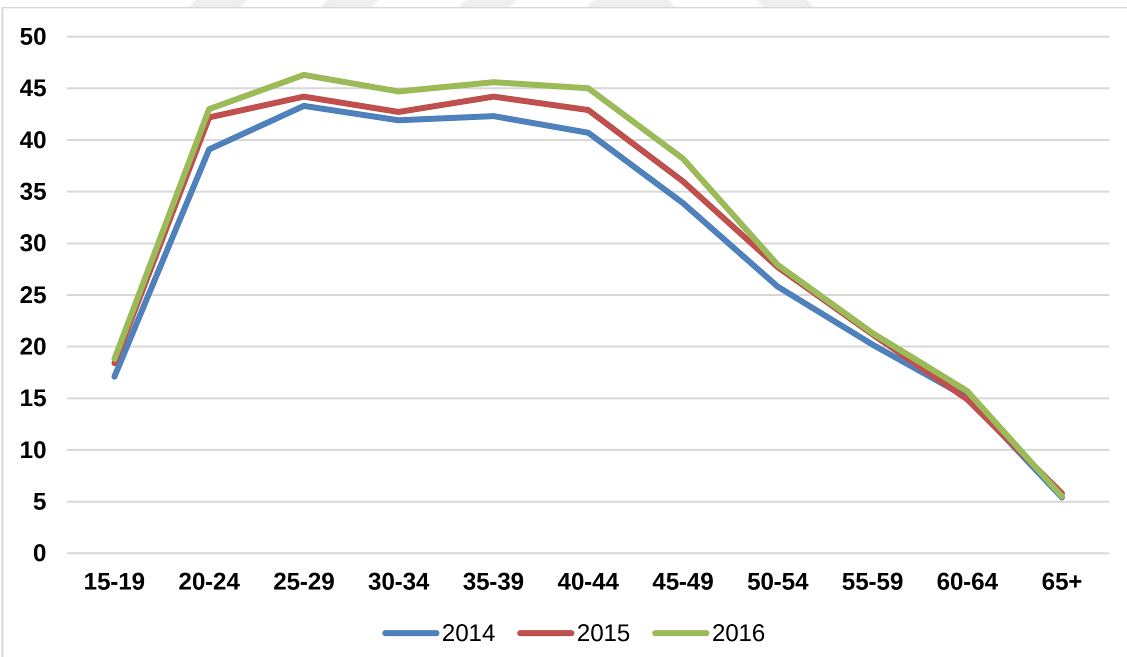


Source: Author’s calculations

VI.3.1.2. Labor Force Participation for Females

Labor force participation rates for females for the 10-14 age group are taken as zero in line with the assumption used for males and neglected in the projections of this study. While calculating the labor force participation rates for females for 15-64 age group, first of all this broad age group is divided into 5-year age groups, in accordance to the method used in calculating the participation rates for males, in order to increase the accuracy of the projections developed. Using TurkStat data about the labor force participation rates for females for 5 year age groups for the years between 2014 and 2016, the current profile about the variations of participation rates among 5 year age groups are illustrated in Figure VI.3.1.2.1 as follows. As it can be inferred from the figure, female participation rates first increase for 20-24 and 25-29 age groups and then slightly decrease for 30-34 age group. This decrease is followed by a mild increase for 35-39 age group, which is the major difference when compared with the male participation rates. After 35-39 age group, participation rates decreases first slightly for 40-44 age group and then the pace of decrease increases for the rest of the age groups compared to 40-44 age group. The decrease in participation rates for 30-34 age group can be associated with maternity leaves, which is assumed to be diminishing over time for the following decades.

Figure VI.3.1.2.1. Labor Force Participation Rates for Females for 5 year age groups in Turkey (2014-2016)



Source: TurkStat

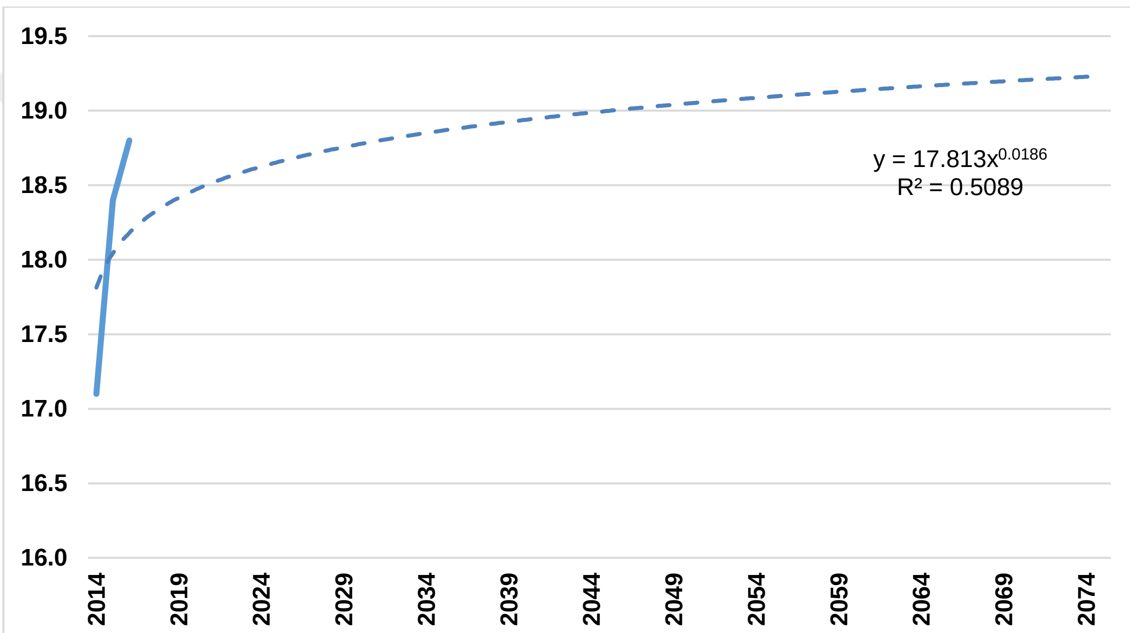
For the following projections for each 5 year age groups, the pattern presented in Figure VI.3.1.2.1 is slightly changed, anticipating that the effect of maternity leave effecting the participation rates for 30-34 age group will disappear in the following decades. In addition, other adjustments are also made, in line with the assumption that the increase in labor force participation rates for females in general will be considerably more than the projected increase for males.

Moreover, a relative increase in participation rates for older age groups with respect to younger age groups, resulting in a decrease in the gap in-between to some extent, is included in the assumptions for the related projections. This relative increase is believed to occur due to the increasing trend at life expectancy at birth and expected increase in the retirement age in the future.

As stated earlier the decomposition method for 5 year age groups enables to capture the shifts in age groups by using the population numbers for each 5 year age group between 15 and 64 as weighting factor during the calculation process of labor force participation rates for 15-64 and 15+ broad age groups. Also for all of the 5 year age group projections initial values between 2014 and 2016 are taken from TurkStat data.

To start with, 15-19 age group is taken into account and the projection for the participation rates for this age group is made. While making the projection for this age group, it is assumed that there will be a mild increase in the participation rates, even though this age group contains secondary and tertiary school age population. Compared to the same age group for males, the initial values are significantly low. Considering the gap between males and females for this age group in terms of labor participation; despite the foreseen increase in school enrolment rations and increase in years of schooling for females, an increase in participation rates for 15-19 age group for females is assumed. In this respect, the participation rate with an initial value of 18.80 percent in 2016 is projected to reach a value of 19.83 percent in 2075. The projections of labor force participation rate for females for 15-19 age group is presented in Figure VI.3.1.2.2, which has a power type trend line equation of $y = 17.813x^{0.0186}$.

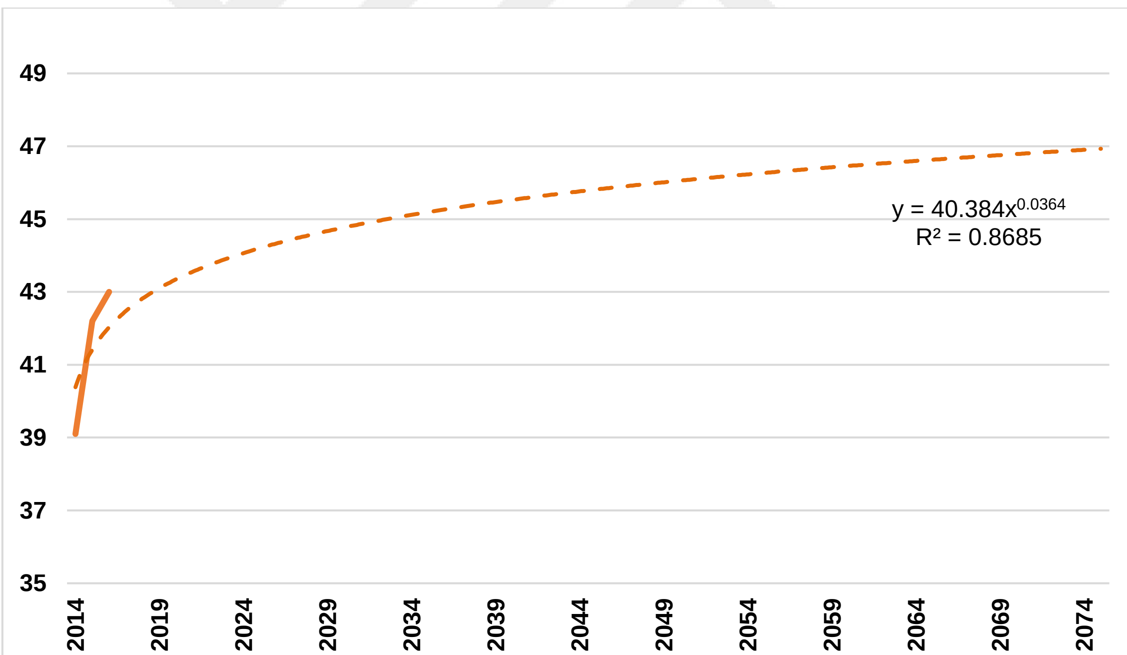
Figure VI.3.1.2.2. The Projection of Labor Force Participation Rate for Females for 15-19 Age Group



The labor force participation rate projection for 20-24 age group is also expected to increase over time, although this age group includes also tertiary school age population. In other words, it is anticipated that the negative effects of tertiary school age population on participation rates are suppressed by the positive effects of new university graduates aged between 21 and 24. Parallel to the assumption made for males for this age group, it is argued that the level of desired workforce qualifications will be increasing in the future due to structural transformation in the economy from primary sectors towards secondary and tertiary sectors. The demand for higher qualifications in the labor market is assumed to be met by high qualified labor supply which is mostly composed of younger generations in the workforce as their educational attainment will be higher compared to older generations. This will result in increasing labor force participation rates for the younger age groups of the workforce not only for males but also for females.

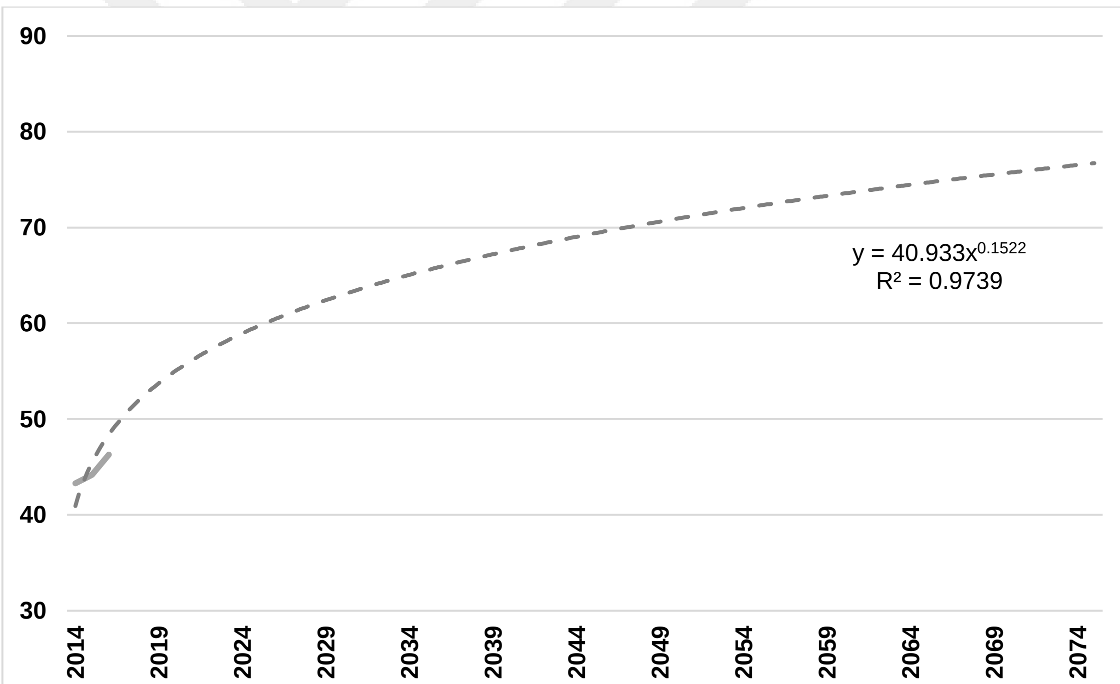
Under these assumptions the derived labor force participation rate projection is based on a power function which has an equation of $y = 40.384x^{0.0364}$. Figure VI.3.1.2.3 illustrates the projected labor force participation rates for females for 20-24 age group in the following way.

Figure VI.3.1.2.3. The Projection of Labor Force Participation Rate for Females for 20-24 Age Group



The initial labor force participation rates for 20-24 and 25-29 age groups are very close to each other for females with values of 43 percent and 46.3 percent in 2016 respectively. However, it is expected that the gap between these two age groups will expand over time in favor of 25-29 age group, as in this age group educational level is expected to be as high as in 20-24 age group and in addition the population in this age group is assumed to have completed their education already. Moreover the educational level of this age group is expected to be higher over time, which will positively contribute to the labor force participation rate of this age group. The anticipated labor force participation rate for this age group in 2075 is 76.71 percent. The related projection equation is a power function, which has a formula of $y = 40.933x^{0.1522}$. The labor force participation rate projection for 25-29 age group is presented in Figure VI.3.1.2.4.

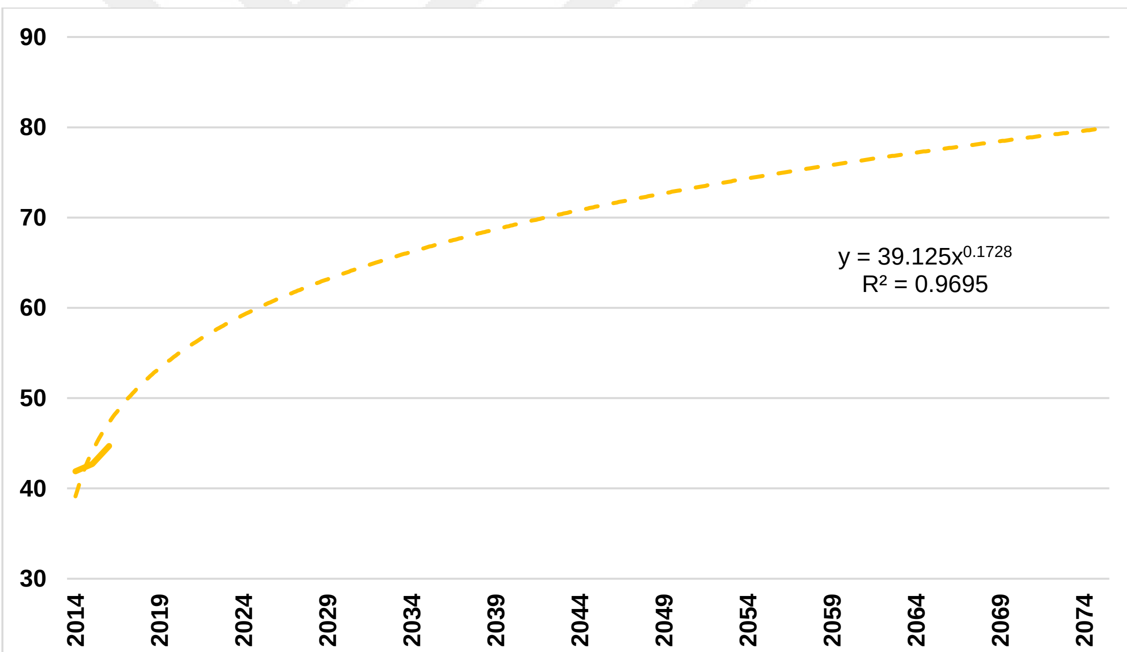
Figure VI.3.1.2.4. The Projection of Labor Force Participation Rate for Females for 25-29 Age Group



Currently, 30-34 age group is one of the age groups with the highest labor force participation rates for females. Even though this age group does not have the highest participation rate, as a consequence of the maternity leave; in the following decades 30-34 age group is anticipated to reach the highest labor force participation rate compared to other 5 year age groups, as it is the case for males for this age group. Behind this assumption, is the expected new laws and regulations supporting participation of the mothers in the labor force.

This age group has a participation rate of 44.7 percent in 2016 and expected to have a participation rate of 79.83 percent in 2075, which is a few percent points higher than the participation rate of 25-29 age group for the same year. The labor force participation rate projection for this age group is determined by a power function with a formula of $y = 39.125x^{0.1728}$. The projection for 30-34 age group is shown in Figure VI.3.1.2.5.

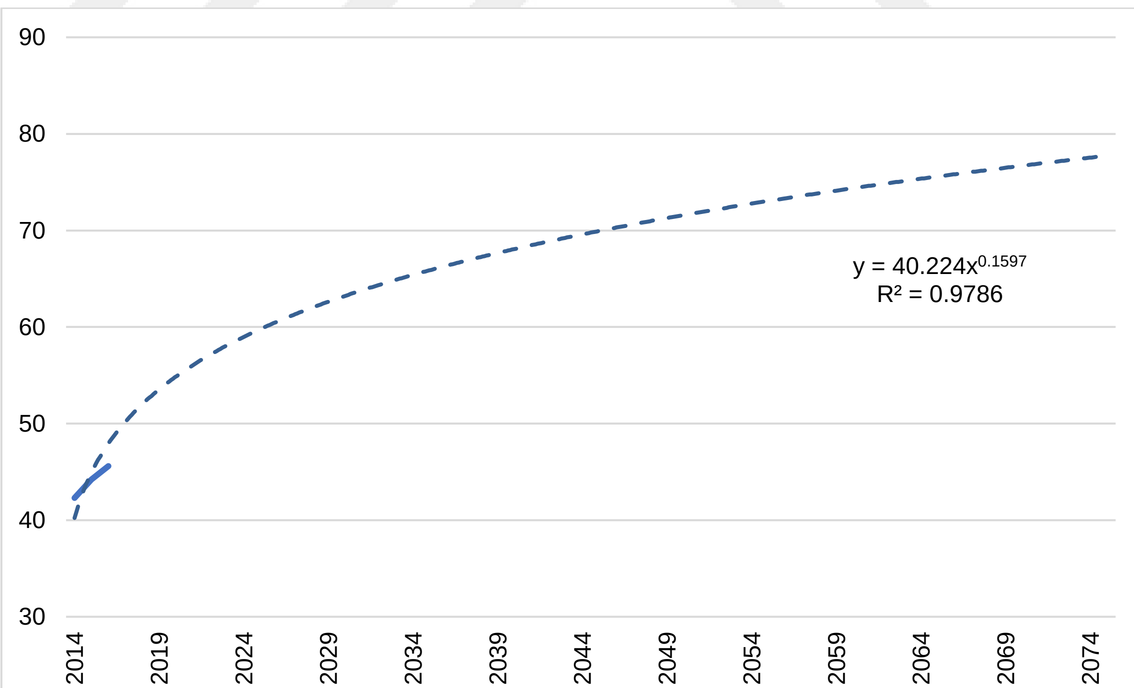
Figure VI.3.1.2.5. The Projection of Labor Force Participation Rate for Females for 30-34 Age Group



35-39 age group currently has a participation rate of 45.6 percent, which is very close to the rate of 30-34 age group. In the future both age groups are anticipated to have similar patterns in terms of labor force participation. However, even though the participation rate of 35-39 age group was higher compared to 30-34 age group in the last few year, it is anticipated to be just the opposite in the following decades under the following assumptions. First of all, the decreasing trend in total fertility rate is assumed to alleviate the negative contribution of maternity leave (especially concentrated on this age group) on labor force participation for females in the future. Secondly, as a result of the decreasing fertility and increasing age of marriage for women, it is expected that the negative effects of maternity leave will shift from 30-34 age group to 35-39 age group in the coming decades.

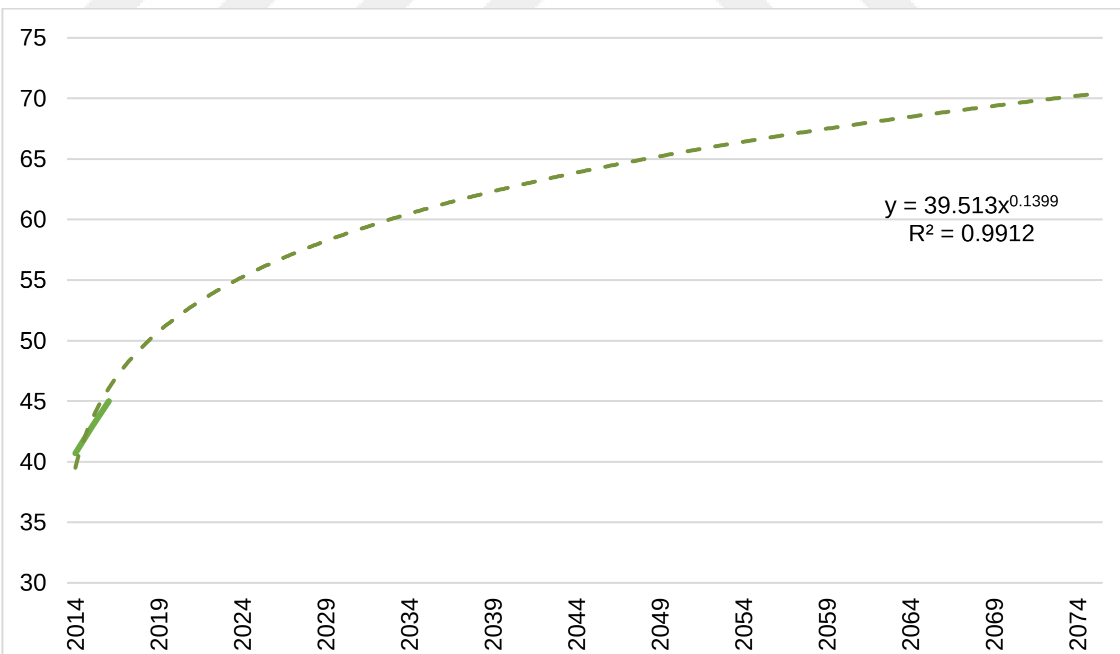
Taking into account all of these assumptions, the labor force participation rates for this age group is anticipated to reach a value of 77.76 percent in 2075, which will be a few percentage points lower than the value for 30-34 age group for the same year. The related projection has an equation of $y = 40.224x^{0.1597}$, which is a power function and is illustrated in Figure VI.3.1.2.6 in the following way.

Figure VI.3.1.2.6. The Projection of Labor Force Participation Rate for Females for 35-39 Age Group



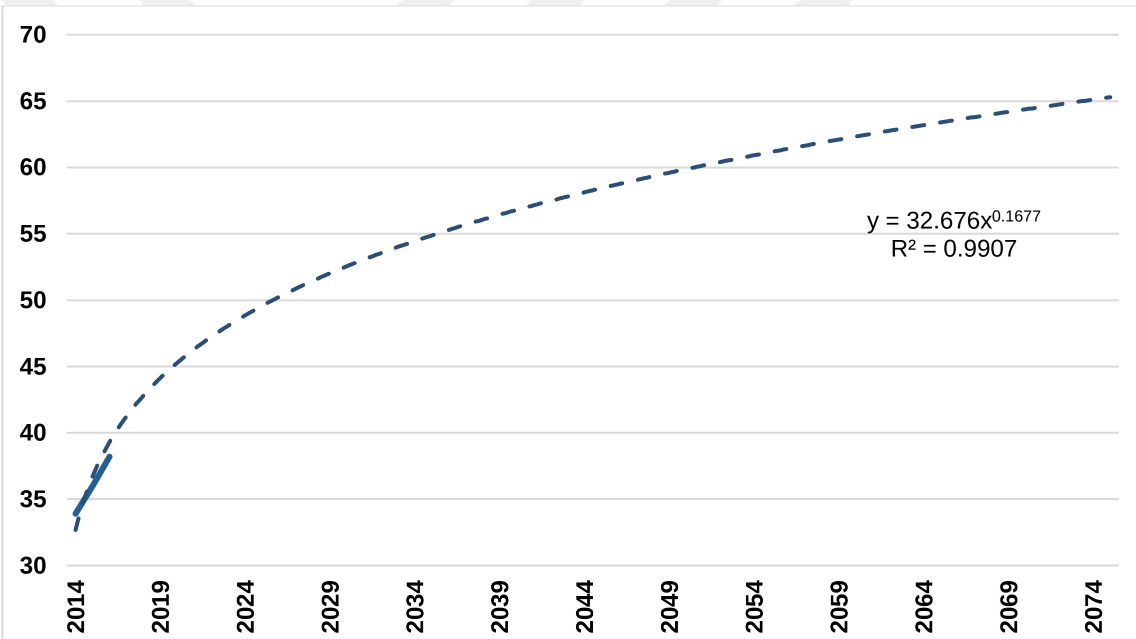
The labor force participation rate for 40-44 age group, which is 45 percent in 2016, is initially slightly lower than the rate for 35-39 age group. It is assumed that this small gap will continue in the following decades increasing slightly due to the postponed marriage and child bearing for women. As a consequence, the negative effects of marriage and child bearing for women on the labor force participation rates for 30-34 age group is anticipated to pass over to 35-39 and 40-44 age groups. As time passes, it is foreseen that this negative effect will be distributed more to 40-44 age group and less to 35-39 age group. Considering these assumptions, the labor force participation rate for females for 40-44 age group is expected to rise to 70.39 percent in 2075. The derived power function equation for the participation rate projection for this age group is $y = 39.513x^{0.1399}$. The projection developed regarding the labor force participation rate for 40-44 age group for females is shown in Figure VI.3.1.2.7.

Figure VI.3.1.2.7. The Projection of Labor Force Participation Rate for Females for 40-44 Age Group



45-49 age group has currently a lower labor force participation rate compared to each of the 5 year age groups between 25-44 age group. In the coming decades, it is assumed that the gap between this age group and the above mentioned age groups will be smaller, resulting in a labor force participation rate of 65.28 percent in 2075. The participation rate for this age group was 38.20 percent in 2016, which was 6.80 percent less compared to 40-44 age group. The projection regarding this age group, which is presented in Figure VI.3.1.2.8, has a power function equation of $y = 32.676x^{0.1677}$.

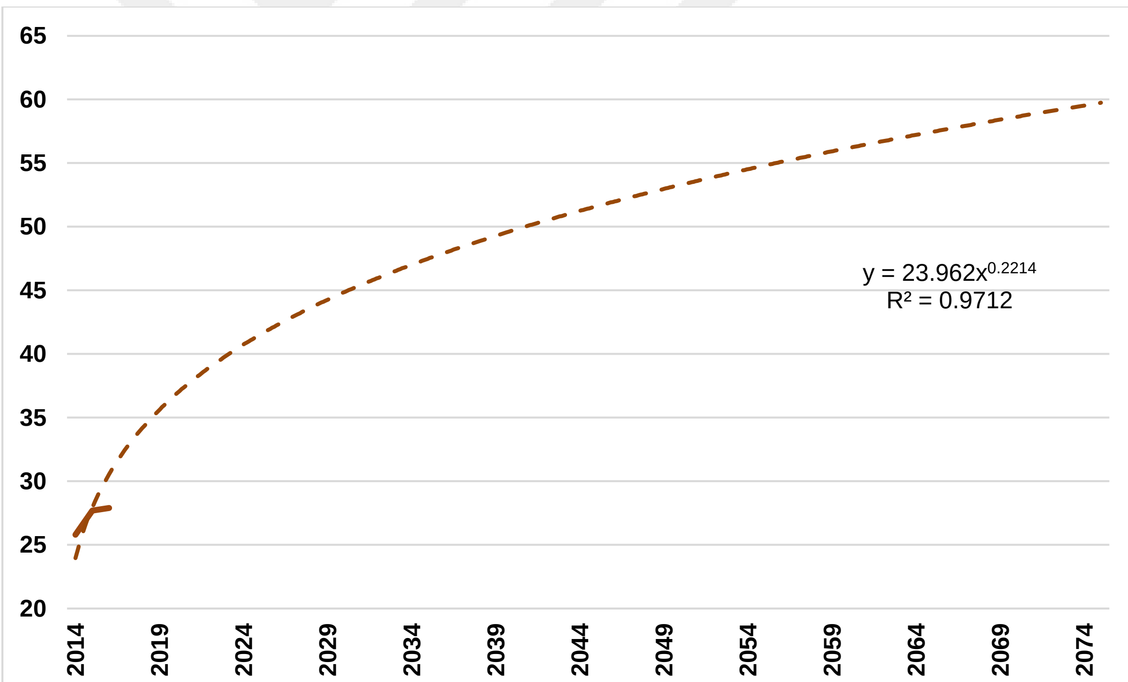
Figure VI.3.1.2.8. The Projection of Labor Force Participation Rate for Females for 45-49 Age Group



Current data on labor force participation rates for females indicate that following 25-44 age group, a gradual decrease in participation rates is observed. The level of decrease is especially high while moving from 45-49 age group to 50-54 age group. Regarding the projection for 50-54 age group, it is predicted that the level of decrease will diminish over time. Accordingly, the current participation rate for this age group, which was 27.9 percent in 2016, is expected to reach a value of 59.75 percent in 2075. While the ratio of participation rate for 50-54 age group to the participation rate for 45-49 age group was around 0.73 of in 2016, this ratio is expected to rise to almost 0.92 in 2075, pointing out a decrease in the gap between the participation rates of these 2 age groups. In line with the assumptions made for males for this age group, the reasons lying behind this expectation can be based on increasing life expectancy at birth and possible raise in the retirement age in the future in Turkey.

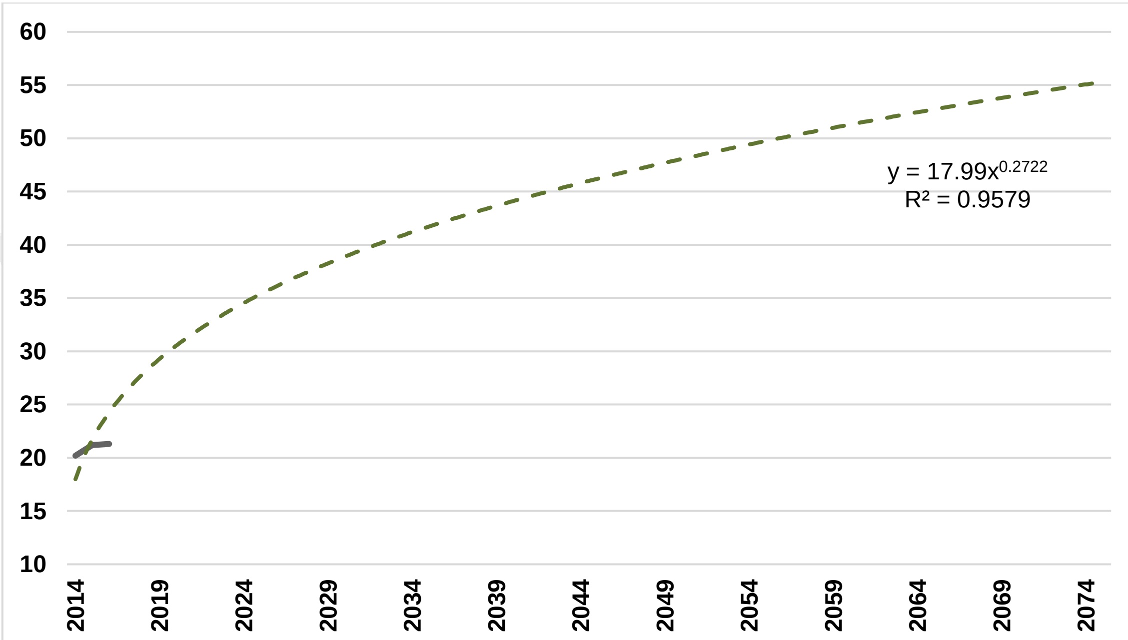
The labor force participation rate projection for 50-54 age group has a power function equation, which is formulated as $y = 23.962x^{0.2214}$ and it is presented in Figure VI.3.1.2.9.

Figure VI.3.1.2.9. The Projection of Labor Force Participation Rate for Females for 50-54 Age Group



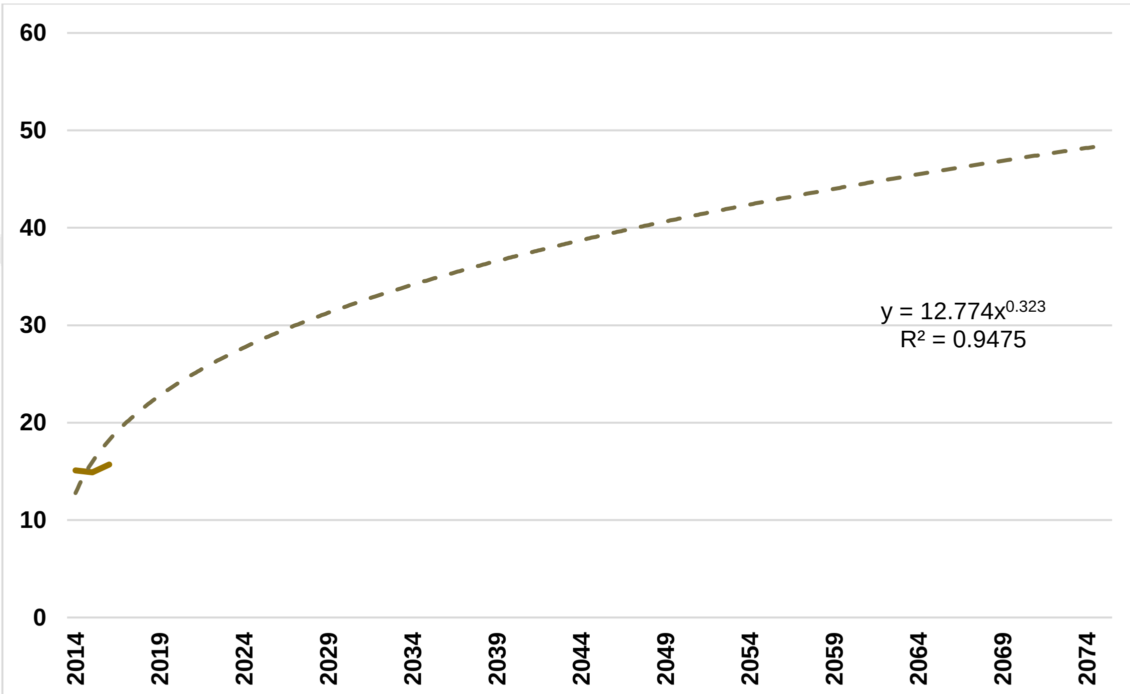
The labor force participation rates for 55-59 age group is 21.3 percent for 2016, lower than the value for 50-54 age group as expected. Similar to all of the other age groups, participation rates for this age group is predicted to rise but stay below the rates of 50-54 age group during the whole period. In 2075, it is anticipated that participation rates for 55-59 age group will come up to 55.32 percent, which will be almost 5 percentage points less than 50-54 age group. The projection for this age group is given in Figure VI.3.1.2.10, whose equation is formulated as $y = 17.99x^{0.2722}$.

Figure VI.3.1.2.10. The Projection of Labor Force Participation Rate for Females for 55-59 Age Group



60-64 age group currently has the lowest participation rates among 15-64 broad age group with a value of 15.7 percent in 2016. However, it is foreseen that the participation rates for this age group will rise significantly reaching a value of 48.45 percent in 2075 and so will become closer to the values of 55-59 age group. Under these assumptions, the participation rates for this age group will triple in 59 years for females. The labor force participation rate projections for 60-64 age group is calculated by using the power function equation, $y = 12.774x^{0.323}$. The graphical display of this projection is presented in Figure VI.3.1.2.11.

Figure VI.3.1.2.11. The Projection of Labor Force Participation Rate for Females for 60-64 Age Group



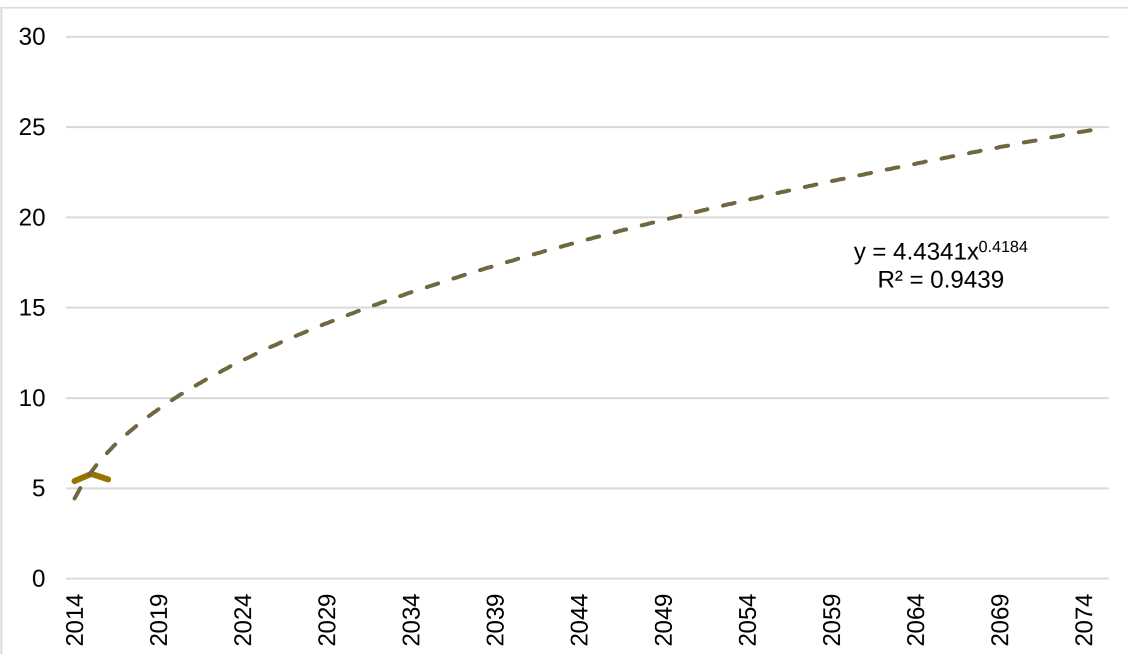
It is useful to underline that even though 60-64 age group is the last age group for the projections made by RAPID module; in order to make labor force participation rate comparisons with developed and high income countries, the participation projections for 65+ age group is also derived, just the same way as it was done for males.

The labor force participation rates for females for 65+ age group is currently quite low with a value of 5.5 percent in 2016, which is almost a quarter of the value for males. This rate is expected to increase considerably and reach 24.93 percent in 2075, which will be more than half of the value for males for the same year. In other words, it can be inferred that the gap between males and females in terms of labor force participation rates for 65+ age group will reduce over time until 2075.

Similar to participation rates for males, the participation rates for this age group for females are expected rise over time in line with the other older age groups. But the increase in the participation rates for this age group is expected to be constrained because of the negative effects of 80+ age group on labor force participation rates for 65+ age group. Looking at the DemProj population projection results, it can be said that while the share of the 80+ age group for females in total female population is 2.1 percent in 2015, this share will be rising to 9.66 percent in 2075.

The participation rate projection for 65+ age group for females is derived by the power function formula, $y = 4.4341x^{0.4184}$. Figure VI.3.1.2.12 displays the labor force participation rate projection for this age group as follows.

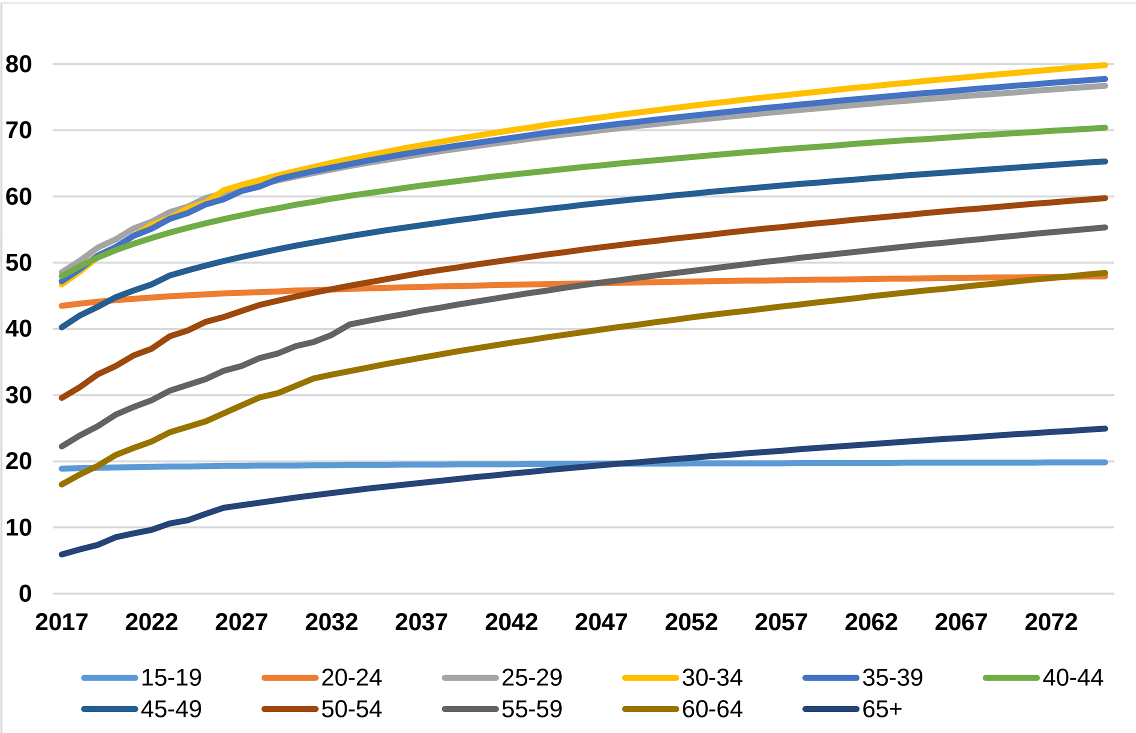
Figure VI.3.1.2.12. The Projection of Labor Force Participation Rate for Females for 65+ Age Group



The future values of labor force participation rates for females are derived by using power function equations illustrated and described previously for each 5 year age group for each single year until 2075. The improvements in labor force participation rates for each 5 year age group lying in-between the ages 16-64 and 65+ age group is demonstrated in Figure VI.3.1.2.13.

Participation rates for all of the age groups are increasing over time but with different paces. While the participation rates for 15-19 age group stays almost constant over the whole period and for 20-24 age group increases only slightly, the rates for all other age groups rises significantly till the end of the period, 2075. The horizontal trend for the participation rates for 15-19 age group can be explained by increasing enrolment ratios for both secondary and tertiary education and rising mean years of schooling of this age group. Moreover, the limited increase in the participation rates for 20-24 age group can be stated as a result of increasing enrolment ratios and mean years of schooling, similar to the educational improvements in 15-19 age group. It is noteworthy to mention that during the years of increase in participation rates, while the gaps between the age groups diminish for males, they stay almost the same for females. The main reason of this outcome can be explained by the participation rates which are initially high for males. It is seen that the initial values for females are considerably low, leaving space for improvement, on the contrary for males. Also, the diversification of labor force participation rate levels for 65+ age group for females from the other age groups is clearly observed in the figure.

Figure VI.3.1.2.13. The Projection of Labor Force Participation Rate for Females for Age Groups 15+



Source: Author's calculations

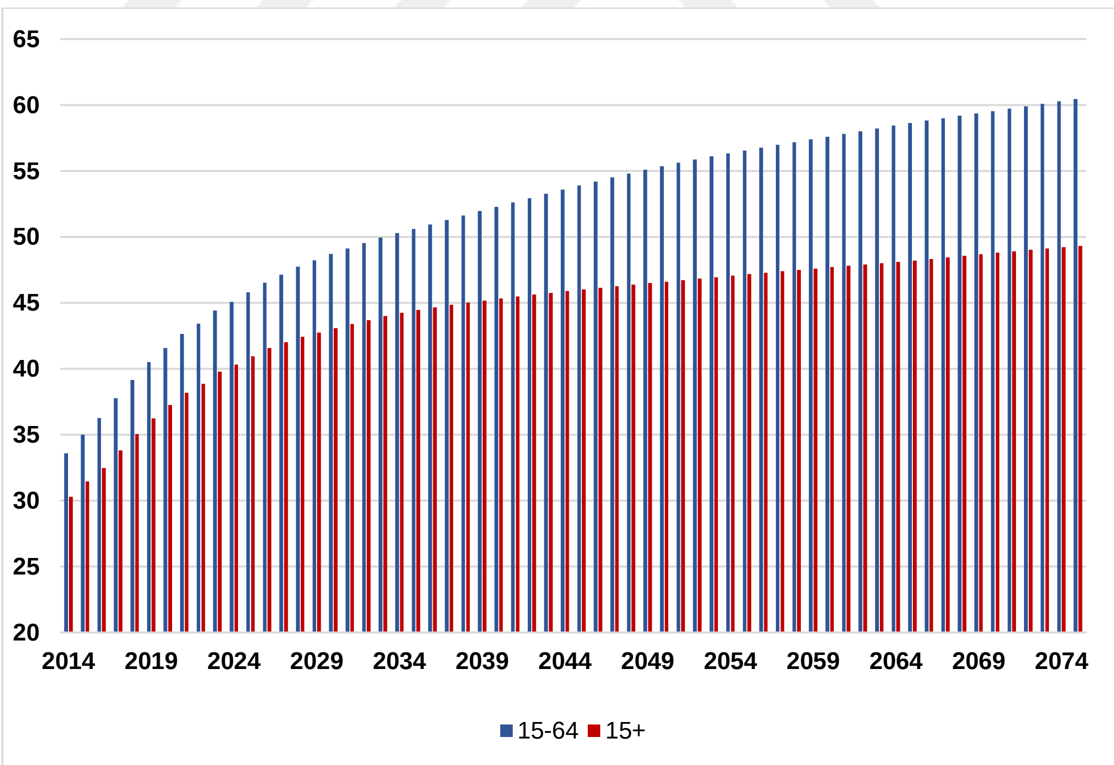
Using the female population values for each age group for single years as weighting factors for labor force participation rates for related each age group, participation rates for broad age groups 15-64 and 65+ are derived, applying the same method used for the calculations of participation rates for males previously. Female population values for the future years are taken from the population projections results of DemProj module again.

The participation rate values for females for 2014-2016 period are taken from TurkStat data. Combining TurkStat data and the projections of this study, the labor force participation rates for these 2 broad age groups for 2014-2075 period are presented in Figure VI.3.1.2.14.

The gap between the labor force participation rates for females for 15-64 and 15+ age groups is increasing, with an initial value of 3.30 percent in 2014 and a final value of 11.14 percent in 2075. The increase in the gap is an expected outcome, considering the rise in the share of oldest old female population in the total female population over time.

It might be useful to underline that on the contrary to the projections for males, both 15-64 and 65+ broad age groups exhibit increasing labor force participation rates for females throughout whole period, 2014-2075.

Figure VI.3.1.2.14. The Projection of Labor Force Participation Rates for Females for 15-64 and 65+ Age Groups



Source: Author's calculations

VI.3.1.3. Base Year Gross Domestic Product and Annual Growth Rate in GDP

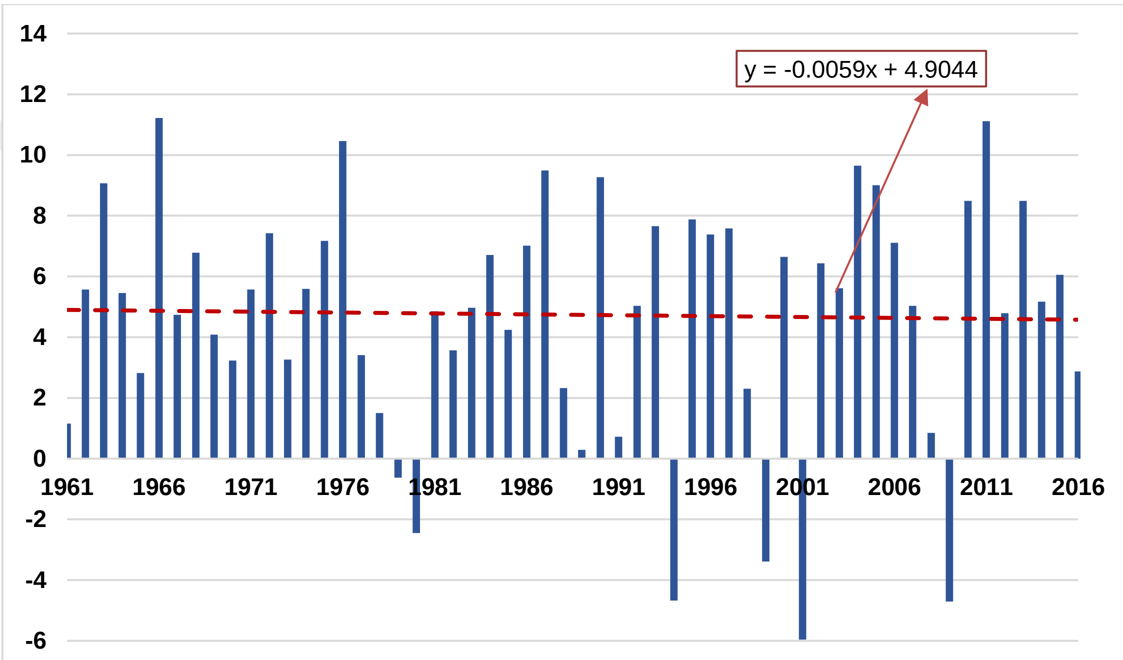
Gross domestic product (GDP) value from World Bank datasets for the year 2015, which is 1,087,551 million US dollars, is taken as the base year value in this study. Data is in constant 2010 US dollars, which is also used for the calculations of real GDP growth rates, given in World Bank datasets.

In RAPID module, it is advised that future annual growth rates to be based on historical GDP growth patterns (usually for the periods of 5 years or 10 years) or growth projections stated in national development plans.

Historical data taken from World Bank datasets indicates an average annual growth rate of 4.74 percent as shown in Figure VI.3.1.3.1. In addition, GDP growth rate projections stated in Medium Term Programme (2017-2019) prepared by Republic of Turkey Ministry of Development are 4.4, 5.0 and 5.0 for the years 2017, 2018 and 2019 respectively. Considering both past data and future projections and also the long time interval from 2015 to 2075, average annual GDP growth rate for Turkey for the RAPID projections is taken as 4 percent. This value is equal to the average value of GDP growth rates used in low variant and medium variant scenarios of the labor force participation projections in the report “2050’ye Doğru Nüfusbilim ve Yönetim: İşgücü Piyasasına Bakış” which is prepared by Aysıt Tansel as part of a project conducted in cooperation between UNFPA and the Turkish Industry and Business Association (TUSIAD).

Moreover, according to the forecast tables of “Global Economic Prospects - June 2017” prepared by World Bank, the real GDP growth rates for Turkey are 3.5, 3.9 and 4.1 for the years 2017, 2018 and 2019 respectively. Despite the increasing trend in the World Bank projections, it is assumed that the upward pattern will not be continuous and average annual growth rate will be around 4 percent in the long run, in line with the historical data for Turkey.

Figure VI.3.1.3.1. Real GDP Growth Rates for Turkey (Annual, 1961-2016)



Source: World Bank

VI.3.2. RAPID Output, Methodology and Findings Regarding Economy

The indicators included in the economy section of RAPID module, labor force participation rates and annual growth rate in GDP, are the main determinants of the economic developments in a country. Using these indicators as inputs several outcomes are derived, which hold valuable information for the decision makers of the country, especially in terms of “no poverty”, “zero hunger”, “decent work and economic growth” sections of Sustainable Development Goals 2017 set for the 2030 Development Agenda.

From this point of view, findings derived in this section of RAPID module is believed to play a major role in the assessment of future developments and requirements of the macro-economy of the country for the 2015-2075 period.

RAPID results regarding economy are given below:

- Labor force,
- Child dependents,
- New jobs required,
- Gross domestic product,
- Gross domestic product per capita.

VI.3.2.1. Labor Force

While calculating the size of the labor force in the projections, both size of the populations for the broad age group 15-64 and the related labor force participation rates are required. To be more precise, the future size of labor force for 15-64 age group is derived by multiplying the labor force participation rates for 15-64 age group with the size of the population for that age group. The calculation is made separately for males and females, however the size of labor force is given for both sexes as output. The formulation of labor force calculation is presented as follows:

$$LaborForce_{t,s} = (Pop\ 15\text{-}64_{t,s} * LFPR\ 15\text{-}64_{t,s}) + (Pop\ 10\text{-}14_{t,s} * LFPR\ 10\text{-}14_{t,s})$$

where;

$LaborForce_{t}$: Size of the labor force in time t,

$Pop\ 15\text{-}64_{t,s}$: Population of sex s aged 15-64 in time t,

$LFPR\ 15\text{-}64_{t,s}$: Labor force participation rate for population of sex s aged 15-64 in time t,

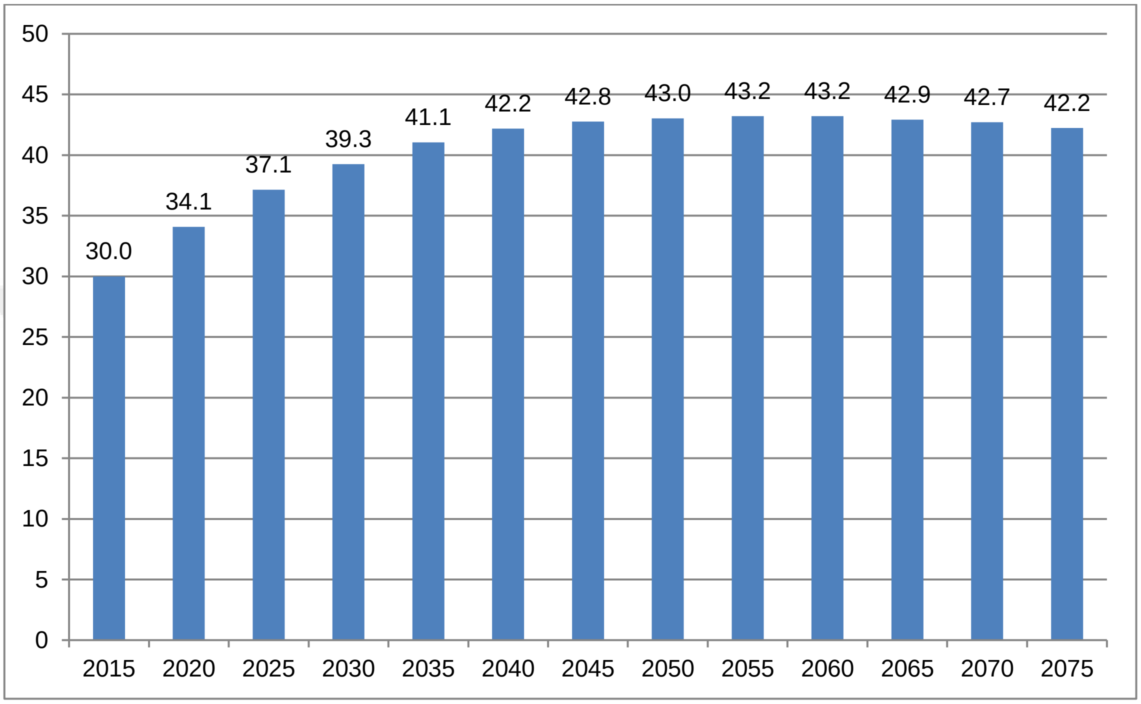
$Pop\ 10\text{-}14_{t,s}$: Population of sex s aged 10-14 in time t,

$LFPR\ 10\text{-}14_{t,s}$: Labor force participation rate for population of sex s aged 10-14 in time t.

It is noteworthy to mention that new entrants in the labor force for the next 15 years are determined considering the current total fertility rates. Therefore, different total fertility rate assumptions result in variations in the size of the labor force. In this respect, lower total fertility rate assumptions will lead to sudden shortages in the projected labor force values for the next 15 years; or just the opposite, assumptions including higher total fertility rates for present day will result in a rapid surplus in the labor force for the future in 15 years.

According to the projection result, the size of labor force increases significantly until 2058 reaching a number of 43.25 million people. After then, a gradual decrease is observed till the rest of the period. The increase in labor force is considerably fast until 2023 with an average annual increase rate of 2.33 percent. Following this period until 2058, the annual percent increase in labor force slows down, dropping down to an average annual increase rate of 0.86 percent between 2016 and 2058. From 2058 on, the average annual decrease rate in labor force is 0.14 percent. In 2075 the labor force declines to 42.23 million people. The variations in the labor force for the whole period is shown in Figure VI.3.2.1.1.

Figure VI.3.2.1.1. The Size of Labor Force (Millions)



Source: Author's calculations

VI.3.2.2. Child Dependents

Basically, child dependents include 0-9 age group in addition to the part of 10-14 age group, who are not in the labor force. In this study, as the labor force participation rates for 10-14 age group is taken as zero; child dependents are exactly equal to the size of 0-14 age group. The formulation used by the economy section of RAPID module is given as;

$$\text{ChildDependents}_t = \text{Pop 0-9}_t + [\text{Pop 10-14}_t * (1 - \text{LFPR 10-14}_t)]$$

where;

ChildDependents $_t$: Children ages 0-9 years and children ages 10-14 years who are not working at time t,

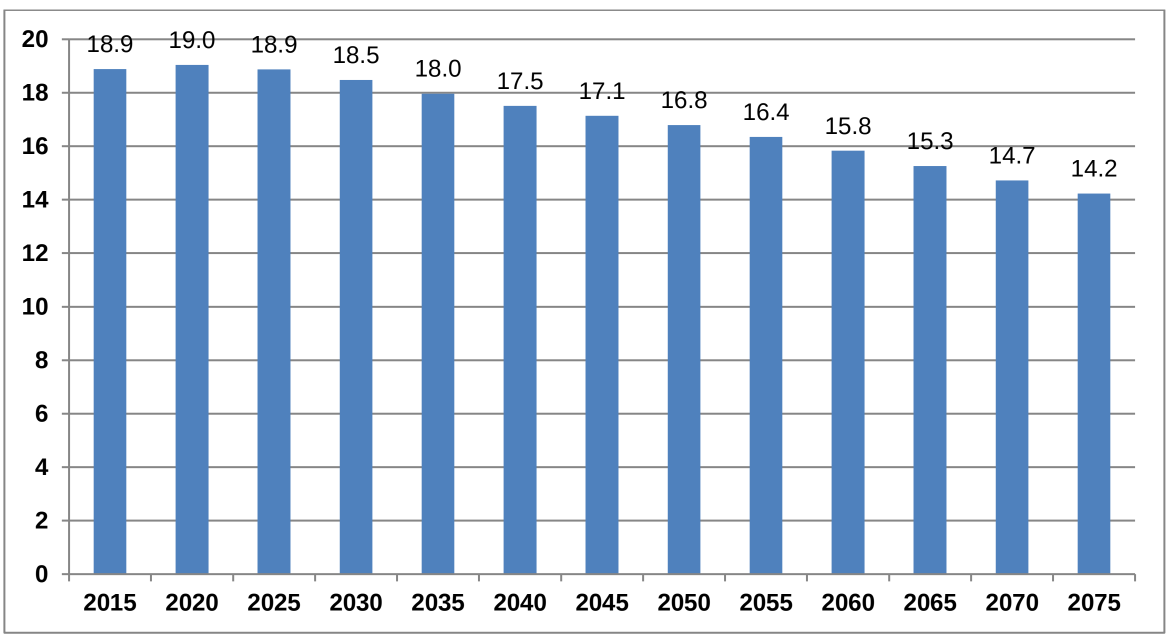
Pop 0-9 $_t$ = Population aged 0-9 in time t,

Pop 10-14 $_t$ = population aged 10-14 in time t,

LFPR 10-14 $_t$ = labor force participation rate for population aged 10-14 in time t.

Then number of child dependents increase slightly until 2021 and then starts to decrease with and increasing speed until 2040. After 2050 the pace of decrease increases again in general throughout the rest of the period. Figure VI.3.2.2.1 demonstrates the number of child dependents for each 5 year interval from 2015 until 2075.

Figure VI.3.2.2.1. Child Dependents (Millions)



Source: Author’s calculations

VI.3.2.3. New Jobs Required

The calculation of new jobs required in the economy is quite straight forward. The size of labor force of the current year is subtracted from the projected size of labor from the following year, which is a net measure of new jobs required. During the calculation process, not only new entrants but also retirements and deceases among current work force are also considered. The formulation of new jobs required can be shown as;

$NewJobs_{t} = LaborForce_{t} - LaborForce_{t-1}$,

where;

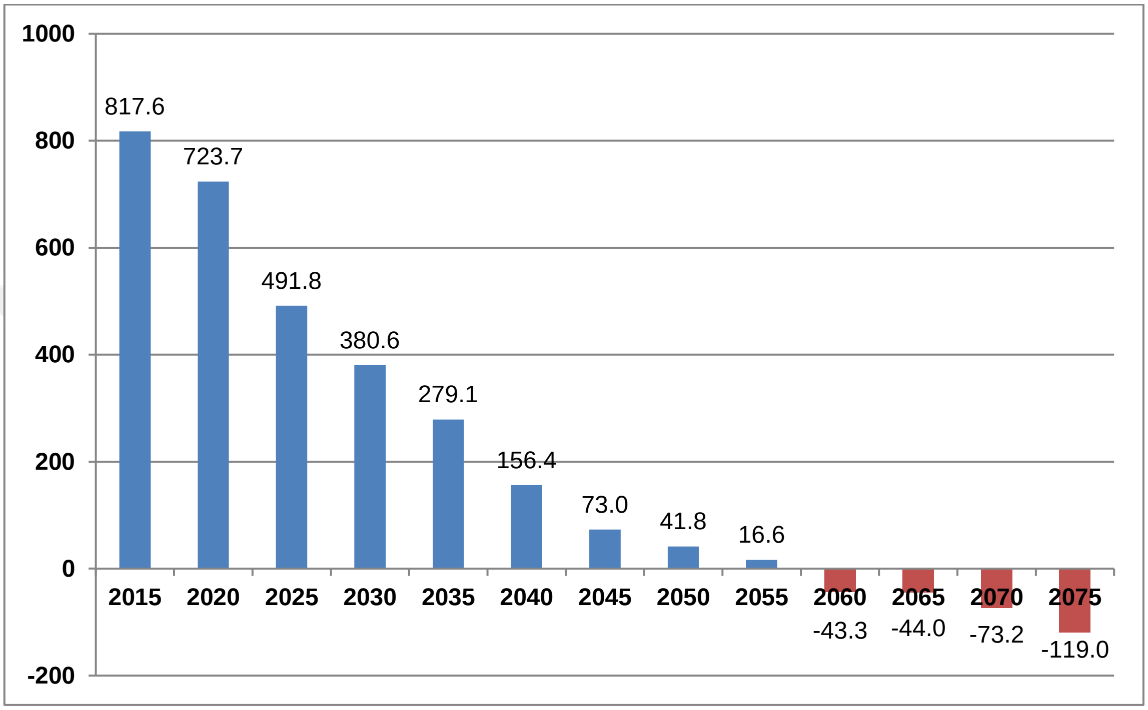
$NewJobs_{t}$: New jobs required in time t,

$LaborForce_{t}$: Size of the labor force in time t,

$LaborForce_{t-1}$: Size of the labor force in the previous year.

New jobs required in general have a decreasing trend in Turkey for the whole period of interest, which is the result of the slowdown in the increasing pace of the labor force. Especially between 2020-2025 period the new jobs required decreases significantly. Moreover, new jobs required turns into negative values starting from 2058, pointing out a period in which the size of labor force is getting smaller each next year. The shrinkage in the size of the labor force can be explained by both the decrease in the growing pace of the labor force participation rates and the decrease in the share of working age population. In other words, the decrease in the size of working age population suppresses the increase in labor force participation rates, leading to decrease in the size of the labor force in Turkey starting from 2058. The change in the new jobs required for the whole period is presented in Figure VI.3.2.3.1.

Figure VI.3.2.3.1. New Jobs Required (Thousands)



Source: Author's calculations

VI.3.2.4. Gross Domestic Product

While making the projections regarding gross domestic product (GDP), the growth rate is taken as exogenous factor and a constant growth rate is applied. At this point, it is necessary to emphasize that GDP values projected by RAPID module are not forecasts of the future values. They are in fact the future GDP values which will be reached under a pre-determined constant GDP annual growth value. RAPID module aims to demonstrate the effects of population change on GDP per capita by taking economic growth rate exogenous and constant. However, the constant value for the GDP growth rate used in RAPID module has to be reasonable and should be based on solid assumptions in line with the projected growth values determined by international reliable institutions such as World Bank, United Nations and OECD or national development programmes prepared by the country authorities such as ministry of development. The equations used in the calculations are given as;

$$GDP_{t} = GDP_{t-1} * (1 + AnnualGDPGrowth_{t})$$

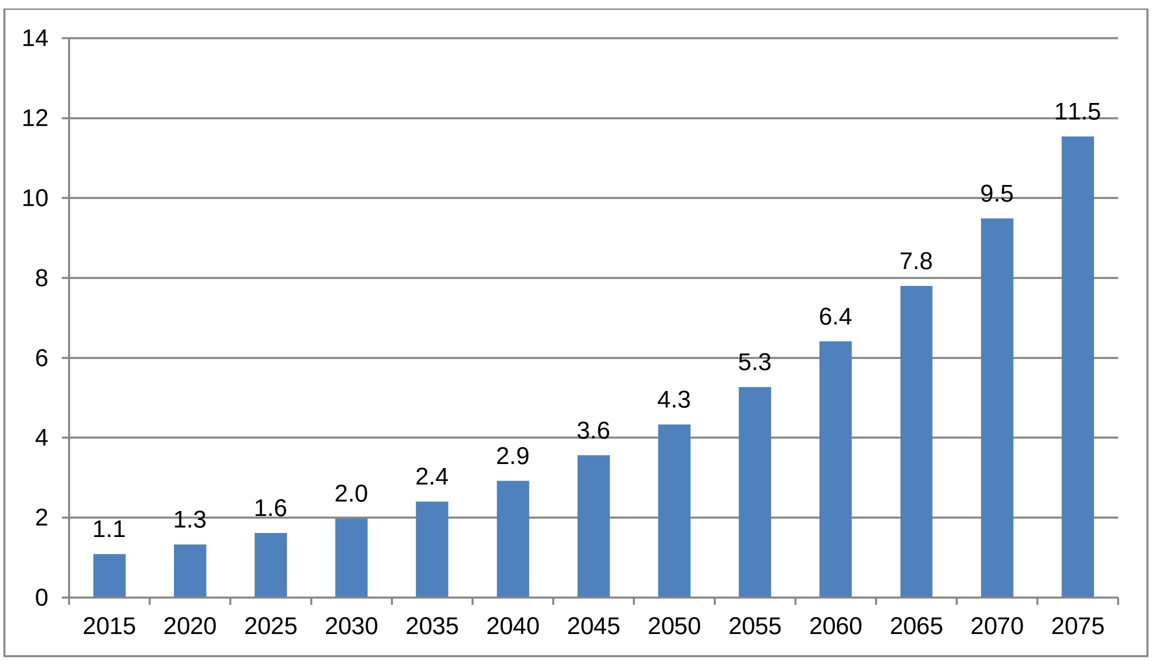
where;

GDP_{t} = gross domestic product in time t,

$AnnualGDPGrowth_{t}$: Annual growth in gross domestic product in time t.

The gradual rise in GDP observed till 2040, increases its pace afterwards and exhibits a more rapid increase till the rest of the period. The calculated GDP values for 5 year periods from 2015 to 2075 are presented in Figure VI.3.2.4.1.

Figure VI.3.2.4.1. Gross Domestic Product (Trillions)



Source: Author’s calculations

VI.3.2.5. Gross Domestic Product per Capita

The derived GDP values are used in the calculation process of gross domestic product per capita (GDP per capita). The projected GDP values are divided by the projected population size in order to calculate GDP per capita values. Just the same as in GDP projections, GDP per capita calculations give future values under the assumption of a constant economic growth. RAPID module outputs regarding GDP per capita intend to show population change effects in the economic well-being of individuals. Related formulas about the calculations are demonstrated in the following way.

$$\text{GDPPerCapita}_t = \frac{\text{GDP}_t}{\text{TotalPop}_t}$$

where;

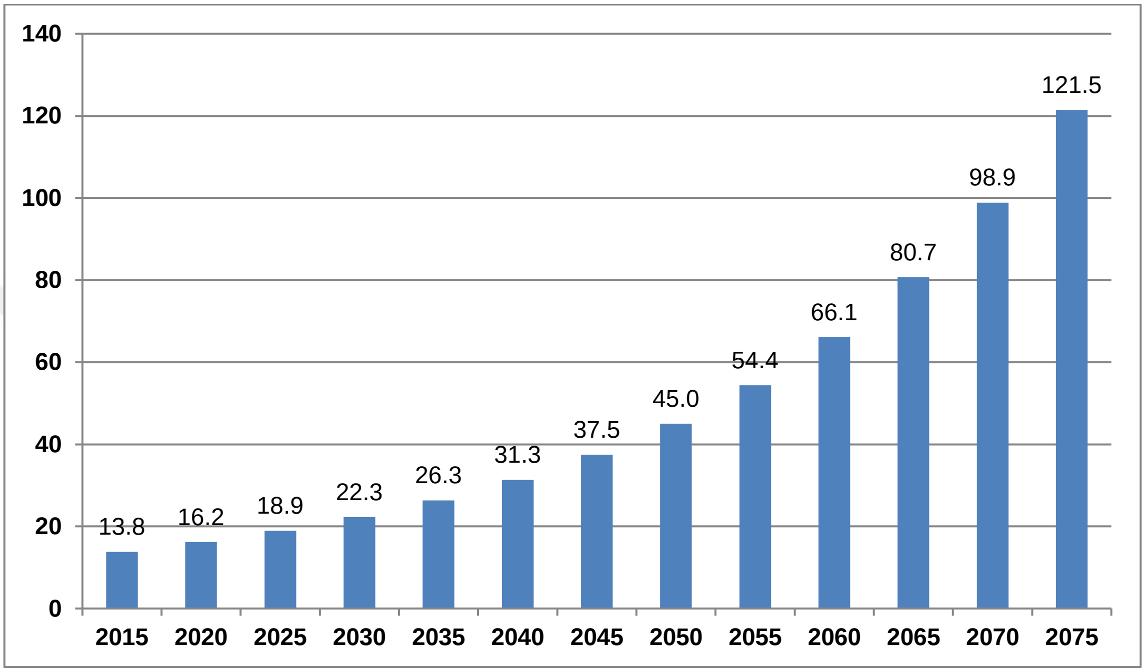
GDPPerCapita_t: Gross domestic product per person in time t,

GDP_t: Gross domestic product in time t,

TotalPop_t: Total population in time t.

Similar to the GDP projections, GDP per capita projections point out a moderate gradual increase till late 2040's, followed by a steeper increase until 2075. The percentage change in GDP per capita reaches 4 percent in 2059 and continues to increase till the end of the period. While the GDP per capita in Turkey was around 13,800 US dollars initially, it reaches a value of around 45,000 US dollars in 2050 and 121,480 US dollars in 2075. It is noteworthy to remind that these values can only come true under the assumption of a continuous 4 percent annual GDP growth throughout the whole period, 2015-2075. Figure VI.3.2.5.1 presents the change in GDP per capita in Turkey for 2015-2075 period on conditions that are explained previously.

Figure VI.3.2.5.1. GDP per Capita (Thousands)



Source: Author's calculations

VI.4. Health

Indicators related to health are also important while evaluating not only the improvements living standards during economic development but also labor productivity in terms of quality of labor. Increasing health status of a country indicates enhancements in the quality of life of the society. In addition, the improvements in health status of a population might be used as a proxy of decreasing inequality in terms of accession of health services provided in the country. Moreover, positive changes in health conditions of the labor force is anticipated to result in increase in labor productivity, which is one of the driving forces of the economic growth.

Outputs of the health section of RAPID have also a key role in evaluating the current and future status of the two of the topics of Sustainable Development Goals 2017, which are good health and well-being and reduced inequalities.

VI.4.1. RAPID Input and Methodology Regarding Health

In order to derive required health projections, RAPID module asks ratios of the population under consideration to health personnel and health institutions, in addition to the ratio regarding health expenditures taking into account the changing size of the population over time.

The following is the full list of input data which is required regarding health section of the module:

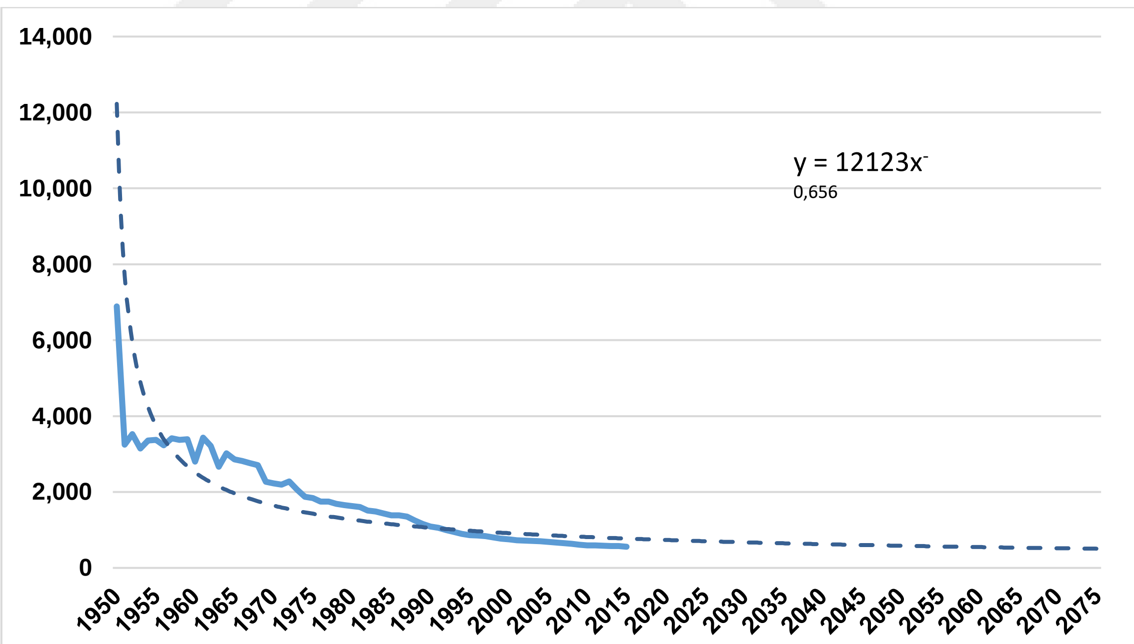
- Population per doctor, nurse, health center, hospital, and hospital bed,
- Annual health expenditure per person.

VI.4.1.1. Population per Doctor, Nurse, Hospital, Health Center and Hospital Bed

In the first step of the projection calculations for population per doctor and population per nurse data for 1950-2015 period are taken from TurkStat datasets regarding health. As the second step most suitable function for the projections are selected among linear, exponential, power, polynomial and logarithmic functions. While making the selection, the function with the highest explanatory ability (highest R^2) and the most realistic outcome is preferred. In this respect power functions is found to be the most suitable one for the trendlines of the projections. Also it is assumed that the projection values for 2050 for these two indicators will be approaching to the present values of high income countries. In other words, it is foreseen that the quality of health services in Turkey in 2050 will be converging to the current levels in high income countries.

While making the projections for population per doctor the power function $y = 12123x^{-0,656}$ is used. According to this projection, the present value of high income countries, which is 342.20 persons per doctor, will be approached in 2055 in Turkey, with a value of 342.87 persons per doctor. In 2075 the projected value of this indicator will be 281.89 persons per doctor. The trendline of the projection and historical values taken from TurkStat datasets are demonstrated in Figure VI.4.1.1.1.

Figure VI.4.1.1.1. Population per Doctor

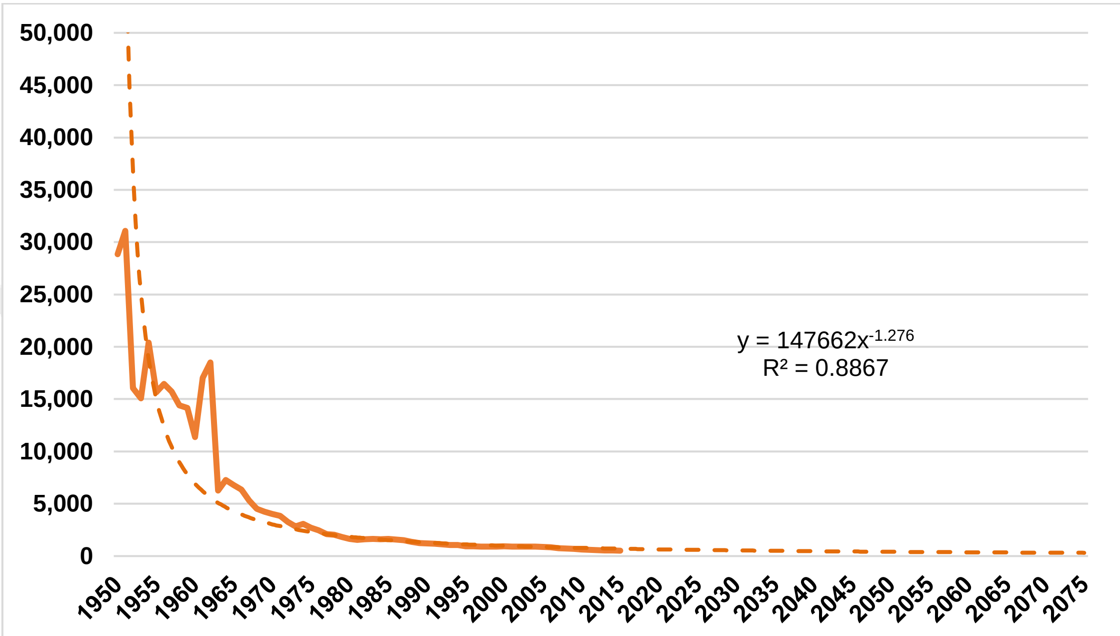


The future numbers of population per nurse is derived by using the power function $y = 147662x^{-1,276}$. The projection points out that the value 116.16 persons per nurse, which is the current value for high income countries, will be approached in 2059 in Turkey, with a value of 116.17 persons per nurse. In the last year of the projection (2075), the value for the number of persons per nurse is anticipated to drop down to 95.83.

It is important to underline that while making the projections for number of population per nurse also the ratio of doctor to nurse is taken into account after 2050's. For high income countries this ratio was 2.95 in 2013. However this ratio for Turkey was 1.04 in 2013 and has been increasing from the past till present. Even though the population per doctor and per nurse indicators for Turkey could reach the present values of these indicators for high income countries in 2050's, the ratio of number of doctors to number of nurses was still below the required level. Because of this reason, number of nurses after 2050's is also shaped by this ratio. It is aimed that the present value of this ratio for high income countries will be reached in 2075 in Turkey.

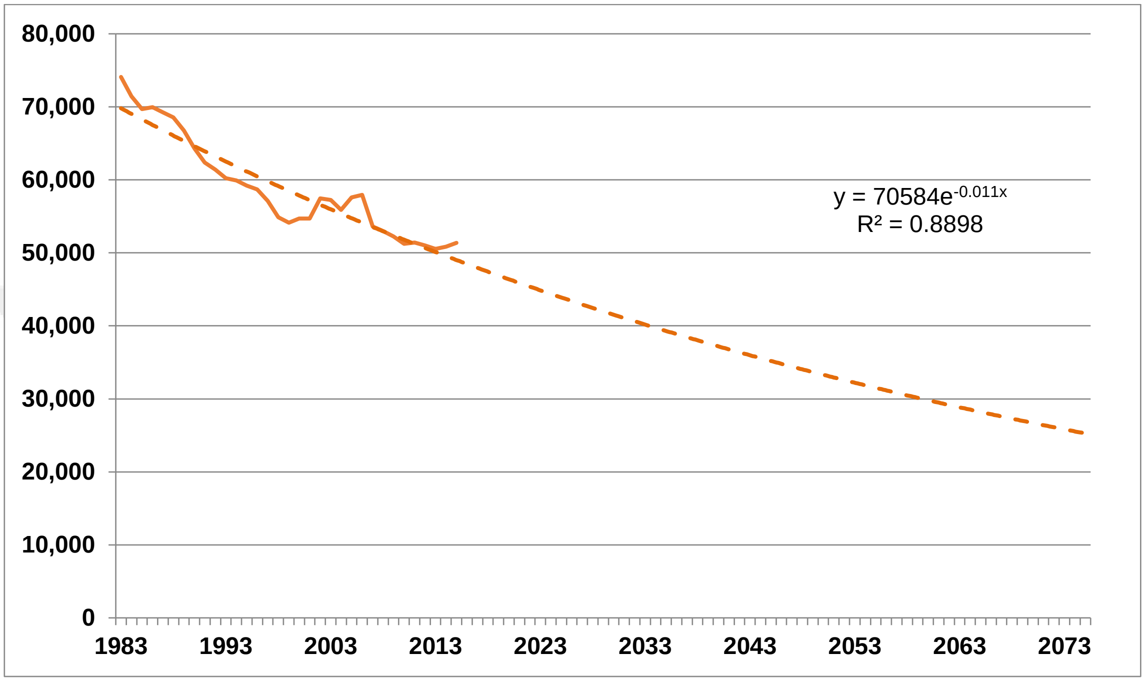
Figure VI.4.1.1.2 illustrates both the past values and the future projected values of persons per nurse indicator for Turkey for the whole period.

Figure VI.4.1.1.2. Population per Nurse



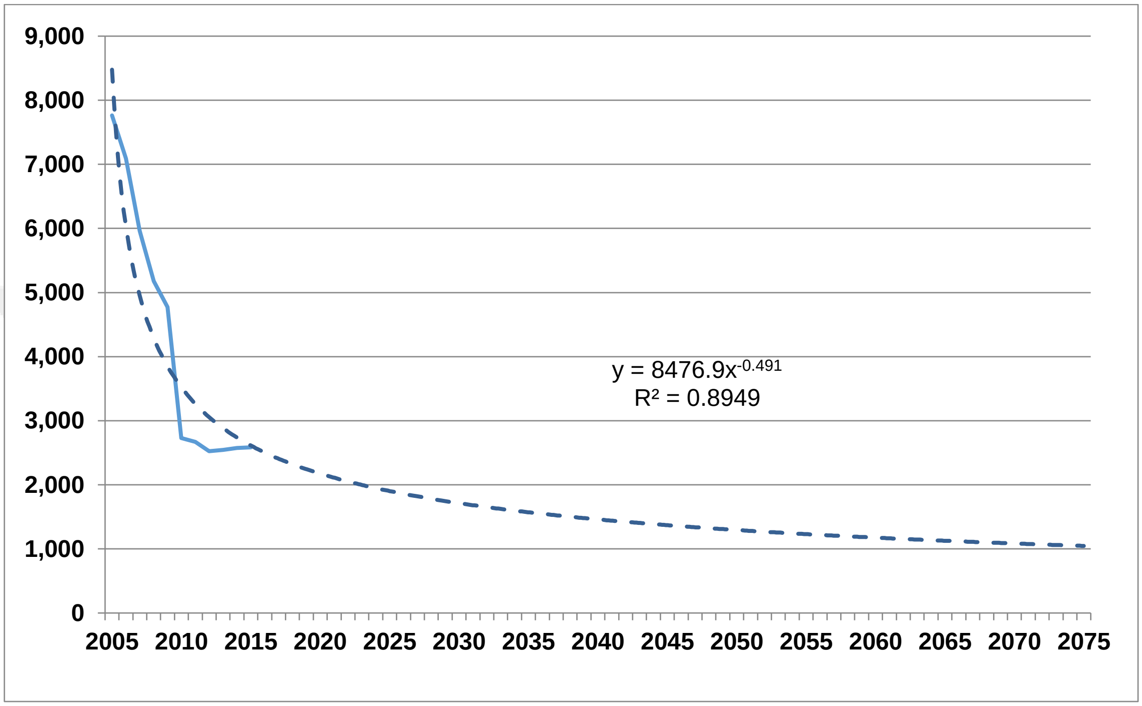
Past data as the input of projection of the population per number of hospitals are taken from TurkStat dataset. Data values before 1980's are considerably low and in the beginning of 1980's there is a huge jump in the values of the data. In order to avoid unrealistic trendlines developed using the past data to project future values, the data starting from 1980's is taken into account. The best fit for the projection of this indicator is an exponential function with the formulation $y = 70584e^{-0,011x}$. According to the projection, 51,364 persons per number of hospitals in 2015 will go down to 33,485 in 2050 and 25,455 in 2075. In other words, the number of people per number of hospitals will be halved in 60 years from 2015 to 2075 as demonstrated in Figure VI.4.1.1.3.

Figure VI.4.1.1.3. Population per Number of Hospitals



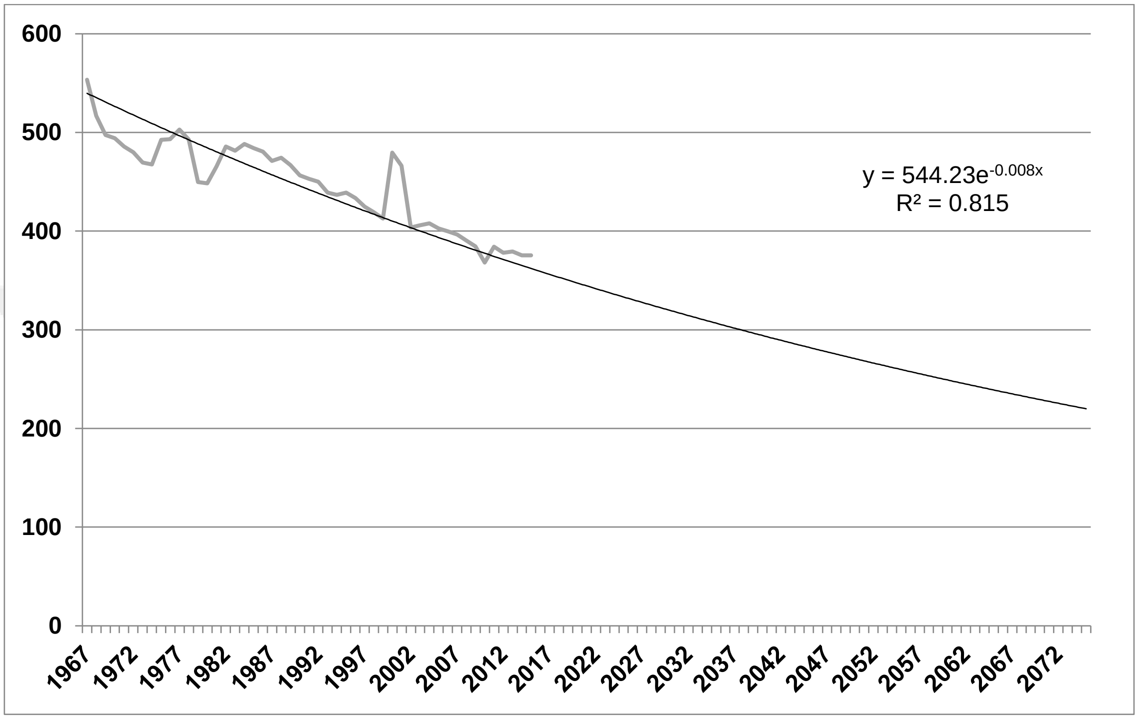
Historical data regarding population per number of health centers between 1967 and 1999 are just the same as the data for population per number of hospitals according to TurkStat datasets. However, in 2000 there is a significant drop in the data values from 54 thousand to 6 thousand and continuing with a gradual decrease trend after 2005. So, for the projection the past data between 2005 and 2015 period is taken into account. The trendline used for the projection is a power function and has a formula $y = 8476.9x^{-0.491}$. In the past population per number of health centers exhibited a serious decrease and in the future this trend is expected to continue with a decreasing pace. The decrease in the pace is believed to be stronger over time, making the power function best fit for the projections. The pattern of the past data and the trendline used in the projections are presented in Figure VI.4.1.1.4. While the population per number of health centers in 2015 was 2586, it is anticipated to drop down to 1294 and then 1045 in 2050 and 2075 respectively.

Figure VI.4.1.1.4. Population per Number of Health Centers



The data for population per hospital bed is consistent from the beginning in the data sets of TurkStat. So the full data between 1967 and 2015 period is used while developing the related projection for the population per hospital bed. The trend line used for the projection is an exponential function, which is the type of trend line also used in projection for population per number of hospitals. The projection used has a formula $y = 544.23e^{-0.008x}$, which is used in deriving the future data values. The exponential function used in the projection has in general a linear downward pattern, resulting in a significant decrease in the future values. The population per hospital bed was 376 in 2015. This number is projected to fall down to 279 in 2050 and 228 in 2075 as shown in Figure VI.4.1.1.5.

Figure VI.4.1.1.5. Population per Hospital Bed

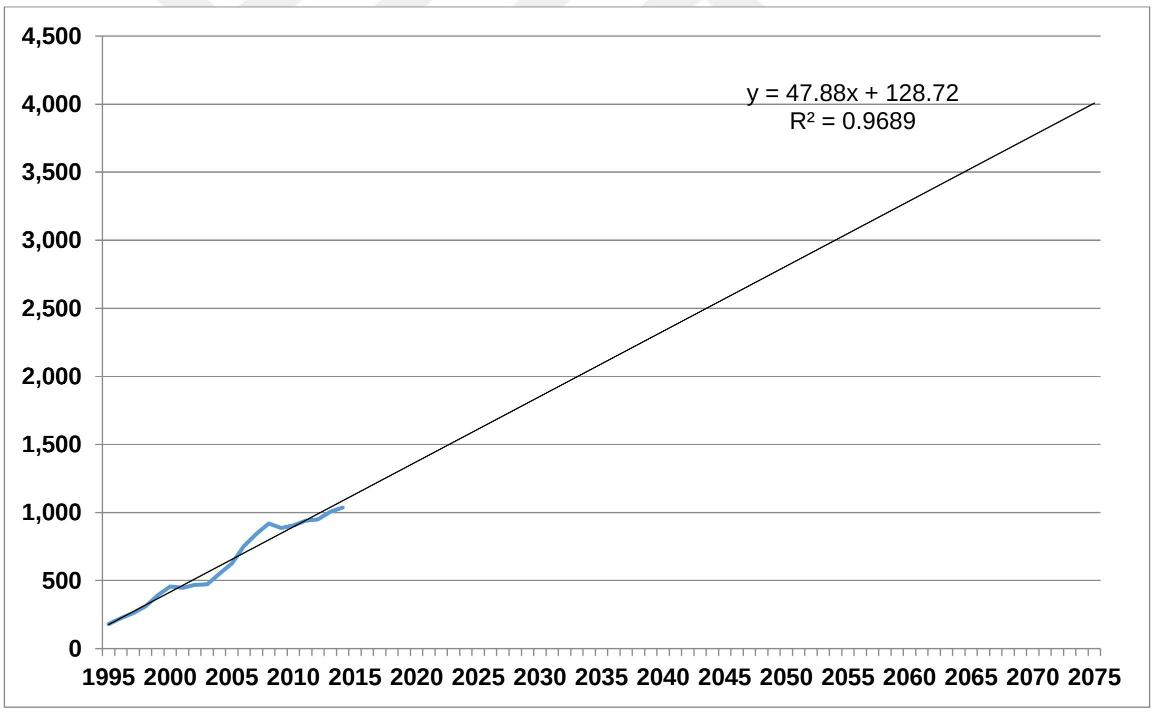


VI.4.1.2. Annual health expenditure per person

Regarding annual health expenditure per person World Bank data sets are used. The data are in international dollars converted using 2011 purchasing power parity (PPP) rates. Available data from World Bank data sets cover 1995-2014 period. While developing the projections, all types of functions, including exponential, linear, logarithmic, polynomial and power functions, are tested for the trendline that will be based on in the projected values of annual health expenditure per person. Considering the past pattern and targeted value for 2075, the linear function is the best fit for the trend line to be used in the projection. The linear function used in deriving the future values of annual health expenditure per person has an equation, which can be expressed as $y = 47.88x + 128.72$.

The projection of annual health expenditure per person is presented in Figure VI.4.1.2.1 in the following way. Annual health expenditure per person was 1,134 dollars in 2015 and according to the projection it will be 2,810 dollars in 2050 and 4,007 dollars in 2075. At this point it is informative to remind that the annual health expenditures per person was almost 5,205 dollars in 2014. So, it can be stated that according to the projection made the health expenditure per capita in 2075 for Turkey will be around 1,000 dollars below the current value in high income countries.

Figure VI.4.1.2.1. The Projection for Annual Health Expenditure per Person (Constant 2011 International Dollars)



VI.4.2. RAPID Output, Methodology and Findings Regarding Health

The number of physicians, nurses and hospital beds are also good indicators of importance given to health care in a country. These indicators can point out how the financial resources transferred to the health sector contribute to improving the quality of the health services provided to the society.

Also, health expenditure per capita is a necessary input to observe the changes in health expenditures over time in a more accurate way by removing the effects of population change. In other words, increase in health expenditure might also be a result of the increase in the size of the population. So in order to make a better evaluation, the changes in health expenditures must be considered separately, neutralizing the effects of population change on the amount of health expenditures. RAPID module uses health expenditure per person to calculate annual health expenditure taking into account the change in the size of the population over time.

The projections of these indicators are only some of the outputs of health section of RAPID module. Full set of output can be listed as follows:

- Doctors required,
- Nurses required,
- Health centers required,
- Hospitals required,
- Hospital beds required,
- Annual health expenditure,
- Population at high health risk.

VI.4.2.1. Doctors, Nurses, Hospitals, Health Centers and Hospital Beds Required

The size of population is divided by population per doctor indicator in order to derive number of doctors required for each year of the projection. The formulation of the calculation process can be shown as;

$$\text{Doctors}_t = \frac{\text{TotalPop}_t}{\text{PopPerDoctor}_t}$$

where;

Doctors_t: Number of doctors in time t,

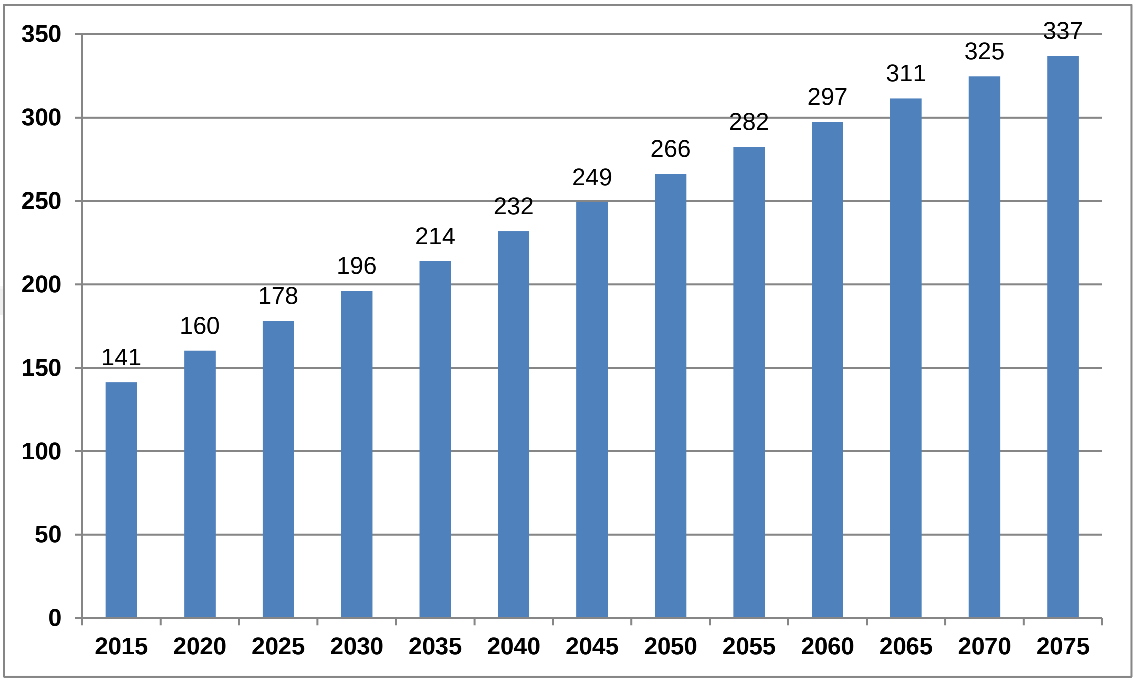
TotalPop_t: Total population in time t,

PopPerDoctor_t: Number of persons per doctor in time t.

This indicator has a significant role in showing the future expansion of the health sector in order to keep the expected levels of health services calculated for each year. This indicator also helps to reveal the extent of the training required for the new doctors entering the health sector.

The number of doctors required follows a linear increasing trend in general and the initial value in 2015, which is 141 thousand, reaches to 337 thousand in 2075. The number of doctors required goes up to more than twice the initial value in 60 years. Figure VI.4.2.1.1 demonstrates the change in doctors required for 2015-2075 period.

Figure VI.4.2.1.1. Doctors Required (Thousands)



Source: Author’s calculations

Considering the expansion in the health system without taking into account the size of nurses required might be misleading. In most of the developing countries nurses are also have an important role in health services. The calculation of nurses required is very similar to the calculation of doctors required. While projection the number of nurses required total population is divided by population per nurse indicator. The number of nurses required also points out the number of new nurses, who are entering the health system and require training, by comparing current number of nurses with the projected number of nurses for the next year. The formulation for the related calculations can be shown as;

$$\text{Nurses}_t = \frac{\text{TotalPop}_t}{\text{PopPerNurse}_t}$$

where;

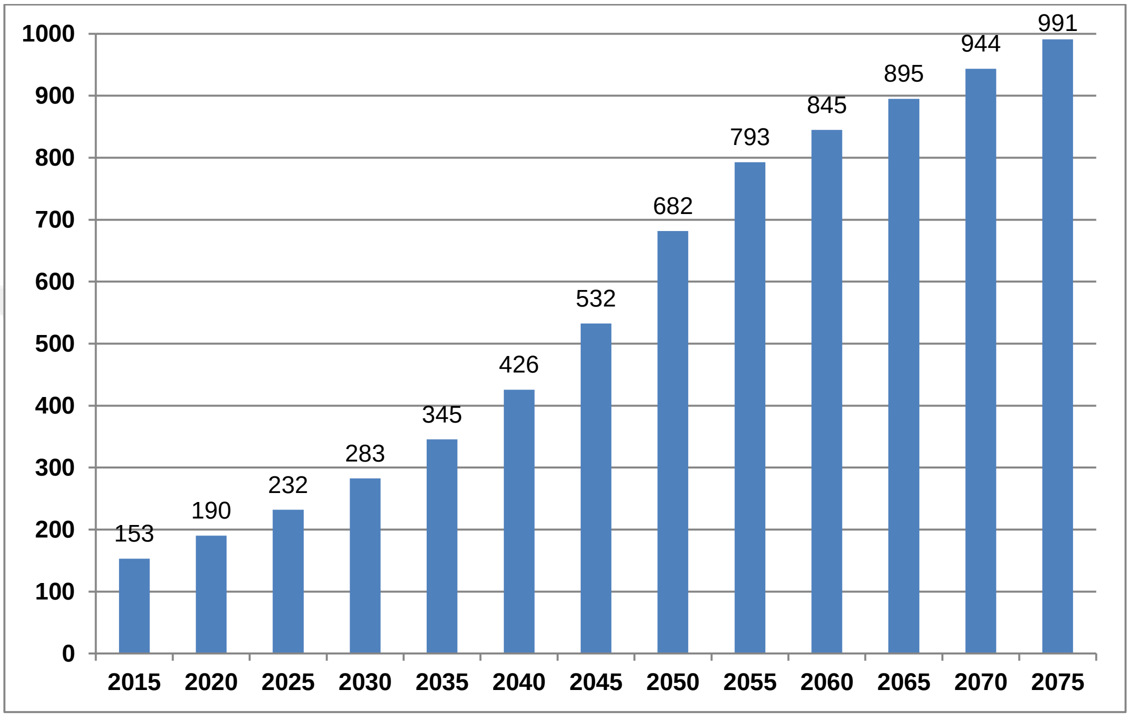
Nurses_t: Number of nurses in time t,

TotalPop_t: Total population in time t,

PopPerNurse_t: Number of persons per nurse in time t.

The number of nurses required rises with and increasing slope until 2050 and then continues to grow with a milder slope. The changes in the slope of the projection is a result of assumptions made and targets aimed. While developing population per nurse indicator it was targeted that current values of high income countries would be reached in 2050's. This target resulted in the increasing slope of the projected number of nurses required until 2050's. However, due to the assumption that the current value of the ratio of number of doctors to number of nurses in the high income countries would not be exceeded by 2075, the slope of the projection for number of nurses required decreases after 2050's and almost stays constant, resulting in a linear increase till the rest of the period. The projection for the whole period is presented in Figure VI.4.2.1.2. The number of nurses required increases to 793 thousand in 2055 from the current value of 153 thousand in 2015, which can be stated as a significant improvement. Afterwards, the rate of increase decreases and in the final year of the projection, the number of nurses reaches to 991 thousand.

Figure VI.4.2.1.2. Nurses Required (Thousands)



Source: Author's calculations

The number of hospitals required is also one of the important indicators in terms of the development in infrastructure of the health sector. This indicator is derived by dividing total population with the population per hospital as shown in the following formulation.

$$\text{Hospitals}_t = \frac{\text{TotalPop}_t}{\text{PopPerHospital}_t}$$

where;

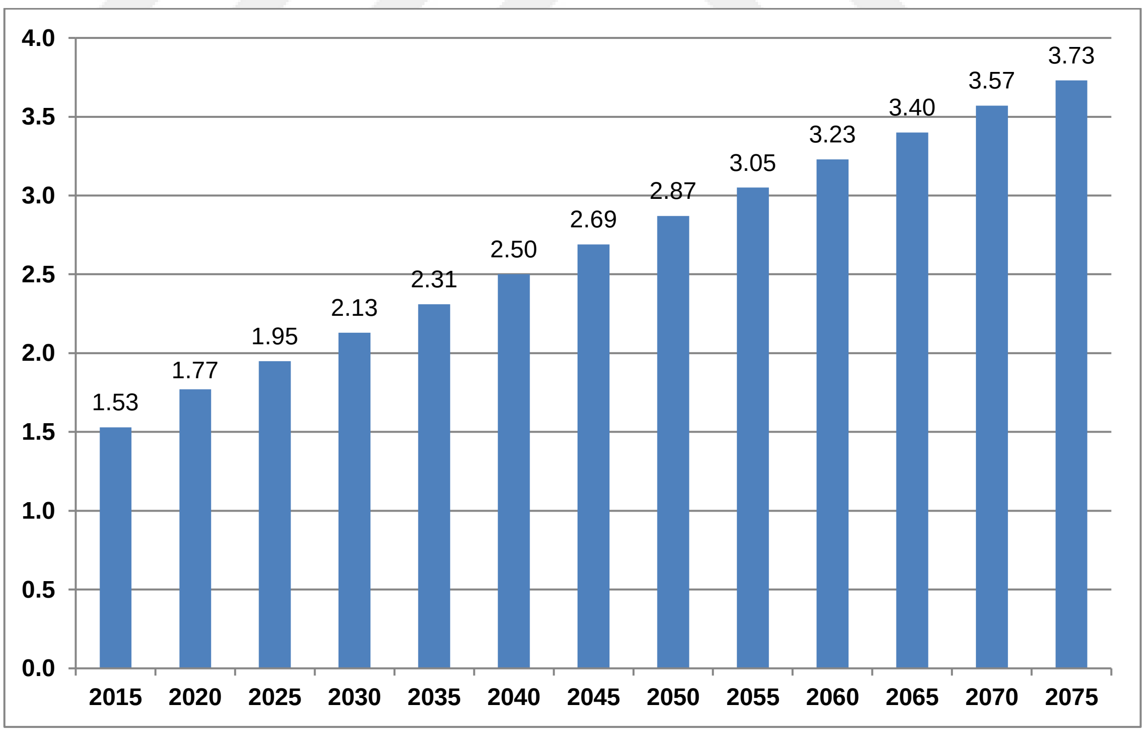
Hospitals $_t$: Number of hospitals in time t,

TotalPop_t: Total population in time t,

PopPerHospital_t: Number of persons per hospital in time t.

The projected values of hospitals required exhibits a linear increasing trend over time between 2015-2075 period. The number of hospitals, which is currently 1500, rises gradually throughout 60 years and reaches a value of around 3700, which is more than the twice the initial value, according to the projections made. Figure VI.4.2.1.3 illustrates the improvements in the number of hospitals required in Turkey till 2075.

Figure VI.4.2.1.3. Hospitals Required (Thousands)



Source: Author’s calculations

As hospitals are usually located in urban areas and unable to cover the whole country, omitting health centers required might be misleading in planning future developments in the health system of a country by the authorities. In this respect, the number of health centers required is an essential indicator regarding the requirements of health infrastructure. While deriving the projections of this indicator, total population is divided by population per health center as shown in the following equation.

$$\text{HealthCenters}_t = \frac{\text{TotalPop}_t}{\text{PopPerHealthCenter}_t}$$

where;

HealthCenters_t: Number of health centers in time t,

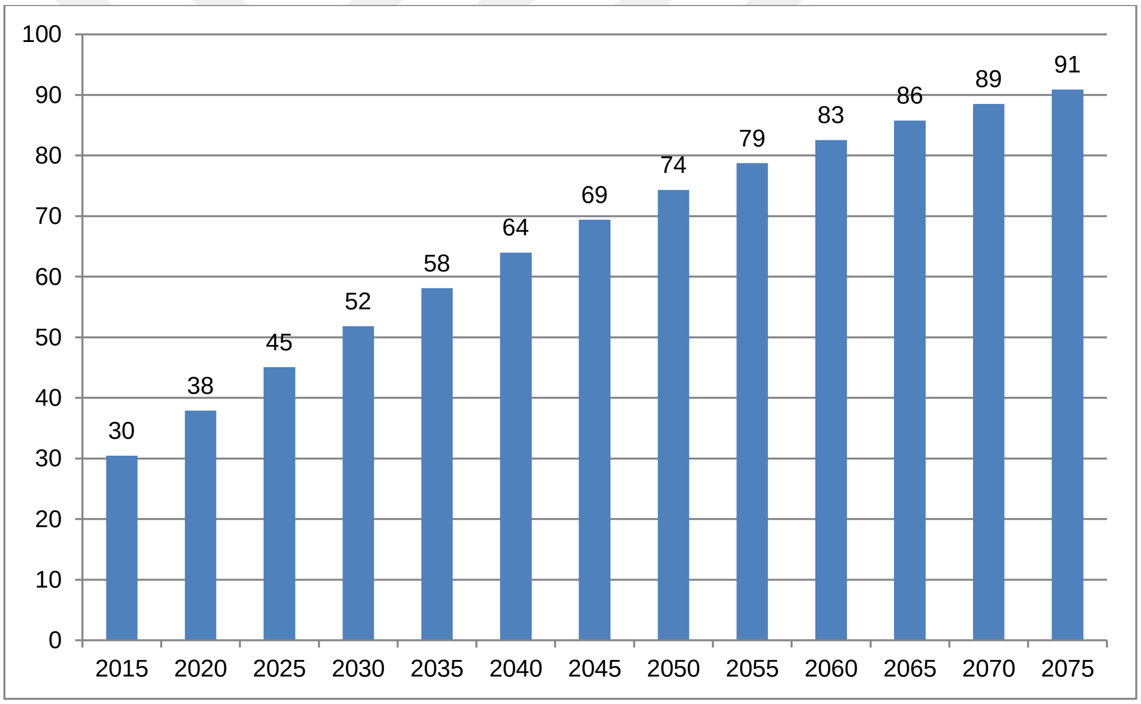
TotalPop_t: Total population in time t,

$\text{PopPerHealthCenter}_t$: Number of persons per health center in time t.

Health centers required indicator increases gradually over time, in line with the increase in the number of hospitals required. The pace of the increase decreases after 2055 and continues with a considerably milder upward slope. As a result of the continuous increase over time, number of health centers required reaches a value of around 79 thousand in 2055 in 40 years from an initial value of 30 thousand in 2015. After 2055 the number of health centers continues to increase in a moderate level and reaches a value of around 91 thousand in 2075 as shown in Figure VI.4.2.1.4.

Compared to the increase in number of hospitals required, number of health centers required increases with a steeper slope until 2055. It can be argued that the decrease in the slope of the projected number of health centers is a result of keeping the balance between number of hospitals and health centers, which is checked by the ratio between the initial and final values of these two indicators. It is also important to highlight that the ratio of initial to final number of health centers is slightly outstrips the ratio for hospitals. This was made on purpose, as it is assumed that increasing the number of health centers compared to hospitals might do a better job in developing economies in terms of covering the basic medical needs of the population living in the underdeveloped rural areas of the countries demanding less financial support from the authorities.

Figure VI.4.2.1.4. Health Centers Required (Thousands)



Source: Author’s calculations

Hospital beds required is also a useful health sector indicator in terms of pointing out the capability of the health services supplied in a more detailed way than the number of hospitals required. The calculation of the projected values of this indicator is also quite simple, whose formulation is made in the following way.

$$\text{HospitalBeds}_{\,t} = \frac{\mathrm{TotalPop}_{\,t}}{\mathrm{PopPerHospitalBed}_{\,t}}$$

where;

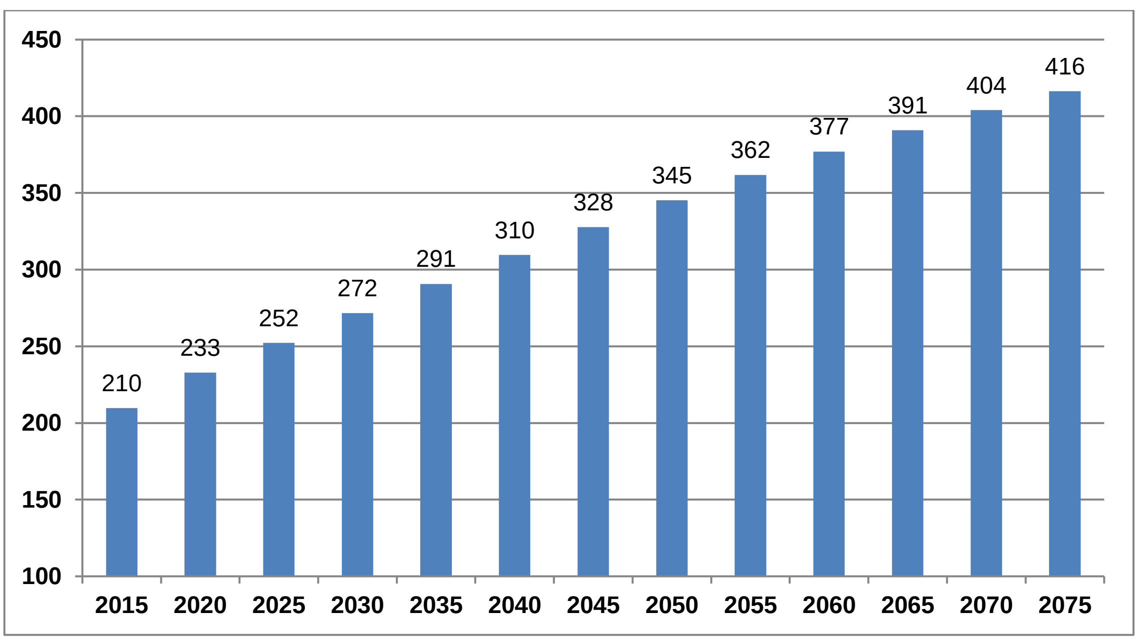
HospitalBeds $_t$: Number of hospital beds in time t,

$\mathrm{TotalPop}_{\,t}$: Total population in time t,

$\mathrm{PopPerHospitalBed}_{\,t}$: Number of persons per hospital bed in time t.

The projected values of hospital beds required exhibit a similar linear increasing trend with the projected values of hospitals required. As a result of this linear upward trend the initial value of almost 210 thousand hospital beds raises to almost 362 thousand in 2055 and more than 416 thousand in 2075. Figure VI.4.2.1.5 illustrates the improvement in hospital beds required in Turkey for 2015-2075 period.

Figure VI.4.2.1.5. Hospital Beds Required (Thousands)



Source: Author’s calculations

VI.4.2.2. Annual Health Expenditure

The projection of annual health expenditure is beneficial while demonstrating required financial funding for the health services for the future. The calculation of this indicator is made by multiplying total population with the average annual health expenditure per person. Its formulation can be shown as;

$$HealthExp_t = TotalPop_t * HealthExpPerPerson_t$$

where;

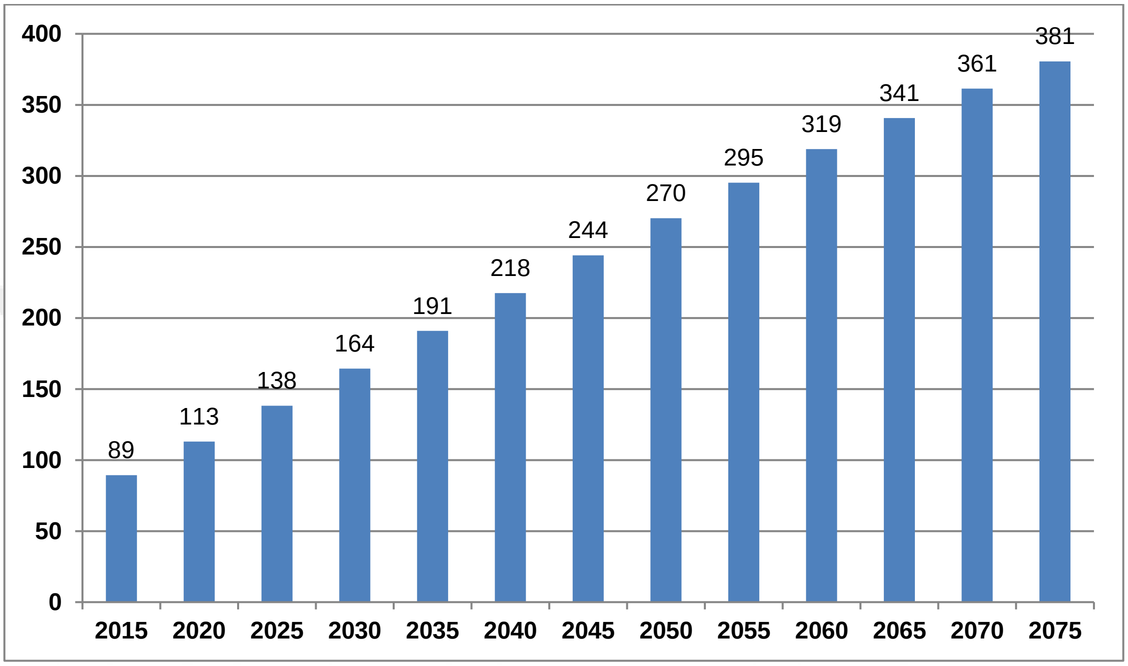
$HealthExp_t$: Annual health expenditure in time t,

$TotalPop_t$: Total population in time t,

$HealthExpPerPerson_t$: Health expenditure per person in time t.

The projection indicates that annual health expenditures increase to around 270 billion international dollars (converted using 2011 purchasing power parity (PPP) rates) in 2050 from around 89 billion international dollars in 2015. The final value in 2075, which is the end of the period, is projected to be around 381 billion international dollars. Even though the increase in annual health expenditures is noteworthy, it must be noted that the expenditure value in 2075 for Turkey is significantly below the value for the high income countries in the present day. Figure VI.4.2.2.1 demonstrates the improvement in the projected values of annual health expenditures for Turkey for 2015-2075 period.

Figure VI.4.2.2.1. Annual Health Expenditures (Billions)



Source: Author's calculations

VI.4.2.3. Population at High Health Risk

Population at high risk is accepted to be composed of the total infant and child population, who belong to the 0-4 age group, in addition to total female population of childbearing age, whose ages are between 15 and 49. Due to their age groups and sex, these groups are believed to be under exposure to typical health risks. To be more precise, children under the age of 5 assumed to be more likely to catch a disease because of their underdeveloped immune systems and possibility of poor nutrition, especially in underdeveloped or developing countries. Also females of childbearing age is potentially likely to be exposed to complications associated with short birth intervals and multiple pregnancies especially in the countries, where the fertility levels are still high and the quality of health services are relatively poor.

$HealthRiskPop_{t} = FemalePop_{15\text{-}49,\, t} + Pop_{0\text{-}4,\, t}$

where;

$HealthRiskPop_{t}$: Population considered to be at high risk in time t,

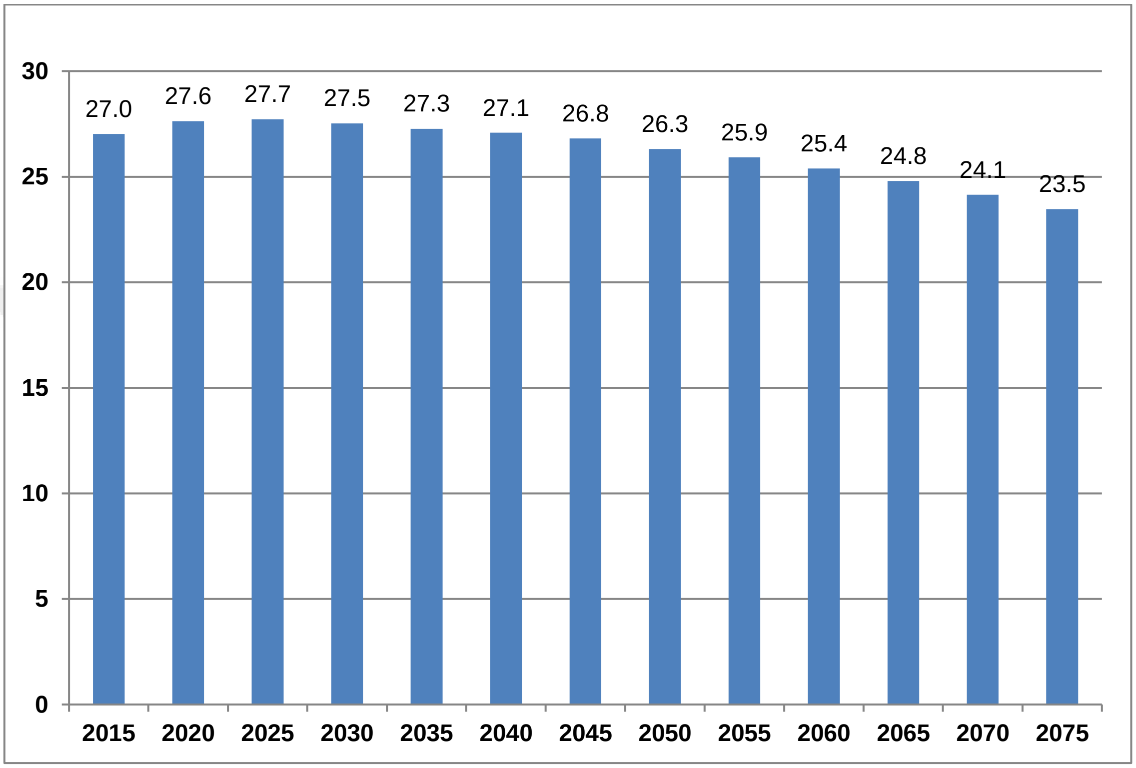
$FemalePop_{15\text{-}49,\, t}$: Female population of reproductive age (15-49) in time t,

$Pop_{0\text{-}4,\, t}$: Population under the age of 5 in time t.

According to the projection, population at high health risk in Turkey increases until 2024 from around 27 million in 2015 to around 27.7 million and then decreases gradually with an increasing rate. In 2075 the size of population at high health risk is expected to be limited to around 23.5 million people. The variations in population at high health risk for the whole period are shown in Figure VI.4.2.3.1.

It is also important to consider that the size of population at high health risk is reduces over time, even during the times when the size of total population is increasing. Decreasing total fertility levels plays the major role in the decrease in the size of population at high health risk. The outcomes of the projection of this indicator might be useful in shifting the priorities regarding the future funding plans of health sector in order to increase the efficiency of the services provided.

Figure VI.4.2.3.1. Population at High Health Risk (Millions)



Source: Author's calculations

VI.5. A Brief Evaluation and Comparison with High Income Countries

The projections developed in this section reveal the expected future values of these socio-economic indicators under the assumptions stated here. It is obvious that Turkey is anticipated to make progress in all of the indicators studied in this chapter. However, the extent of the progress is a key factor in assessing the support of these indicators to demographic opportunities arising from the change in age structure, in order to contribute to the economic development and growth in Turkey.

At this point it might be helpful to compare present values of these socio-economic indicators for Turkey with the past values of the high income countries and detect the years in which present values of the high income countries will be reached in the future for Turkey, according to the projections developed in this section of the thesis. For the following comparisons the past values are taken from World Bank datasets, while the future values for Turkey are from the results of RAPID module of the Spectrum Software.

VI.5.1. Education

The net primary school enrolment ratio in Turkey in 2015 was 94.14 percent, which was slightly lower than the value in high income countries in 1999, which was 96.38 percent. On the other hand, the net enrolment ratio in high income countries in 2015, which was 96.50 percent, is expected to be reached in 2018 in Turkey. In 2042 the ratio in Turkey is predicted to be 99 percent and consequently will be converging to the ratio in Belgium, Denmark, Finland, France, Germany, Norway, Spain, Sweden, and United Kingdom today. So, it can be commented that Turkey is not far from high income countries in terms of the net primary school enrolment ratio.

The net secondary school enrolment ratio in Turkey in 2015 was 86.35 percent and was almost equal to the value in high income countries in 1999, which was 87.54 percent. The enrolment value in high income countries, which was 92.24 percent in 2015, is anticipated to be reached in Turkey in 2038. The net enrolment ratio for secondary education in Turkey is predicted to converge to the current values in France, Belarus, and United Kingdom, which is 98 percent, in 2075. Even though the gap between the high income countries and Turkey in terms of net enrolment ratio for secondary education is currently more and expected to be more compared to the gap in terms of primary education, it can still be commented that Turkey is expected to make a significant improvement in the secondary enrolment ratios in the coming decades.

However, it is crucial to mention that the role of the quality of education is more important than the role of the enrolment ratios for the quality of the future labor force and consequently for the economic development and growth for the future years. This issue will be taken into consideration in the last chapter of the thesis.

Also students per teacher for both primary and secondary schools can be taken as an indicator for the quality of the education system in the country. The number of students per teacher in primary education was 19.33 in 2014 for Turkey. This ratio is very similar to the ratio for high income countries in 1971. Current ratio for high income countries, which was 14.16 in 2015, is projected to be achieved in 2051 for Turkey. The number of students per teacher in secondary education was 12.73 in 2015 for Turkey according to TurkStat data-sets. This value is very similar to the value for high income countries for the same year.

At this point it is noteworthy to mention that even though the number of students per teacher for primary education values in TurkStat and World Bank data-sets are very close to each other for the corresponding years, the same data for secondary education exhibit significant differentiations when compared. For this part of the calculations in this chapter, TurkStat data is taken into consideration, as the future values for Turkey for this indicator are calculated by RAPID using TurkStat data. Also the values for 1998-2011 period are missing in World Bank data-sets, which makes it difficult to make a comparison.

VI.5.2. Labor Force Participation

There is a big gap in labor force participation rates for males and females in Turkey according to present data. While the rates for males in Turkey are similar to the rates of high income countries, the rates for females in Turkey are significantly lower than the values in high income countries.

The male labor force participation rates in Turkey were 71.40 percent in 2016, which was slightly higher than the rate in high income countries which was 68.08 percent for the same year. According to the participation rate projections made in this chapter, the participation rates for males is expected to be slightly lower than 75 percent in 2075.

On the other hand, the female labor force participation rate in Turkey was 30.36 percent in 2016, which was almost 22 percent points lower than the value in high income countries for the corresponding year. According to the projections made in this chapter, the labor force participation rate for females is predicted to reach 49.31 percent in 2075, which is almost 3 percent points lower than the current value in high income countries.

Looking at the present values and future expectations; it can be commented that while the participation rates for males in Turkey is currently considerably high and expected to improve over time, the participation rates for females in Turkey is currently considerably low compared to high income countries but expected to improve significantly and reach to the present levels in high income countries in 60 years.

VI.5.3. Health Services

While making evaluations regarding current situation and future progress in health services provided, World Bank data sets are used. World Bank provides data for the number of doctors/nurses/hospital beds per thousand people, However, RAPID module requires input data as population per doctor/nurse/hospital beds. So, necessary conversions are made before using the data for comparison.

Population per doctor value was 584.45 in 2011 in Turkey, which corresponds to the value in 1969 in high income countries. This comparison is made by using extrapolation techniques, as Word Bank data goes back to only 1990. According to the projections made in this chapter, the most recent data for high income countries, which in 2011 with a value of 342.20, is expected to be reached in 2055 in Turkey.

Population per nurse value was 416.32 in 2011 in Turkey. However it is not possible to find the year which corresponds to the same value of the indicator for high income countries as related data for high income countries is not available. The only value available for high income countries is for 2011 and has a value of 116.16. According to the projections made, this value is predicted to be reached in 2059 in Turkey.

The value for population per hospital bed was 400 in 2011 in Turkey, which was considerably high compared to high income countries. In 2011 the value of this indicator was 237.10 in high income countries. It is striking that while population per hospital bed has a decreasing trend in Turkey, is has an increasing trend in high income countries. As the nature of the indicator, lower values point out an improvement and vice versa. According to the calculations, the value of this indicator is expected to decrease to 228.16 in 2075 and so will be converging to the current value in high income countries, which was 237.10 in 2011.

Health expenditure per capita (PPP, constant 2011 international dollars) value for Turkey was 1,036.47 in 2014. Using extrapolation techniques it is derived that this value is close to the value for high income countries in 1990, which was 1,010.82. On the other hand, according to the projections made by using linear function, which was the best fit, it is anticipated that the health expenditure per capita value for Turkey will be 4,007 international dollars in 2075. This predicted value is almost 1,200 international dollars less than the value in 2014 for high income countries, which was 5,204.82 international dollars.

VI.5.4. Evaluation and Comparison Summary

Evaluating the past performances and the projections of the future values of the socio-economic indicators related to education, labor force participation and health services used in RAPID module, following results can be inferred:

- In terms of school enrolment, while primary education in Turkey is close to the high income countries', there is still a gap that needs to be lessened for secondary education.
- Not only the enrolment ratios but also the quality of education has an important role for the improvements in the qualifications of the future labor force.
- In terms of number of students per teacher, which can be taken as a proxy of the quality of educations; Turkey needs more improvement in primary education than in secondary education, when compared with high income countries.
- Labor force participation rate for males in Turkey is high compared to high income countries. On the other hand participation rate for females is considerably low with respect high income countries. If it is targeted to make significant utilization of the advantages coming from demographic shifts, then the labor force participation rate for females in Turkey needs urgent improvement.
- In terms of health services provided, which was measured with population per doctor, per nurse, per hospital beds and etc., there are still a few decades ahead in order to reach the levels in the high income countries. The quality of health services provided is important because of two main reasons. The first one is that it can be used as an indicator of quality of labor force. The second one can be explained as the level of living standards of the population, which is useful in pointing out the development in the country.

VII. SUGGESTIONS AND CONCLUSION

VII.1. Suggestions

VII.1.1. Suggestions for the Policy Makers in Turkey

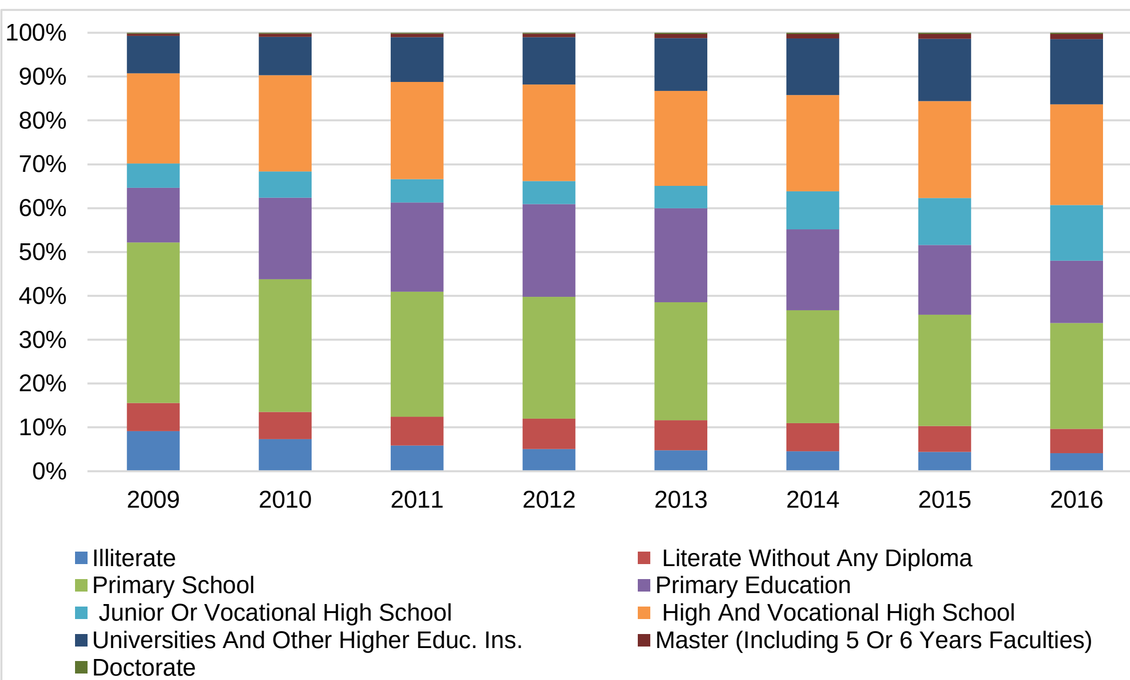
VII.1.1.1. Education System in Turkey and Policy Suggestions

As stated commonly in literature, education is one of the valuable assets of economic growth and development, especially during the times when the share of working age population is the highest in the total population. Increase in the level of education, which can be measured by mean years of schooling, school enrolment ratio and etc., leads to an improvement in the quality of the future labor force.

Gross enrolment ratios in Turkey for secondary and tertiary education have been on the rise for the last decades. While the pattern for secondary education has been to some extent volatile, the pattern for tertiary education has been continuously upward. In this respect, the gross enrolment ratio for secondary education increased to 100.3 percent in 2013 from 72.2 percent in 2000. Similarly, the gross enrolment ratio for tertiary education reached to 79 percent in 2013 from 25.3 percent in 2000. The improvements in gross enrolment ratios are remarkable, especially for tertiary education. It is noteworthy to mention that the gross enrolment ratios for secondary and tertiary education in high income countries were 105.5 and 73.8 respectively in 2013. When the values for the year 2013 are compared with high income countries, it is observed that while the gross enrolment ratio for secondary education in Turkey was around 5 percent points lower than it was in high income countries, the ratio for tertiary education in Turkey was around 5 percent points higher than it was in high income countries. Looking at these values it can be stated that Turkey caught the level in secondary education and even passed beyond the level in tertiary education for high income countries.

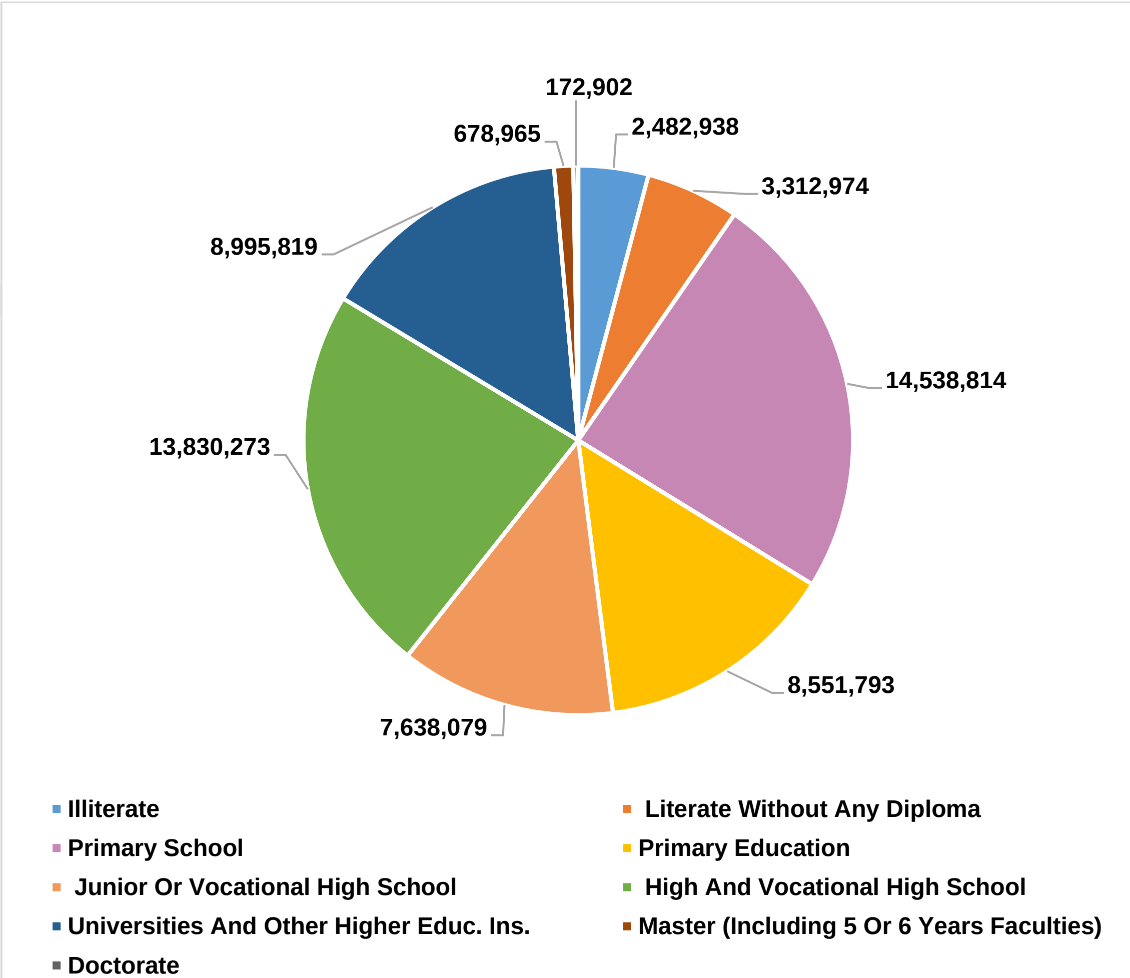
In the recent years, the educational attainment level structure in Turkey has considerably improved, considering the population aged 15 and over. The number of illiterate population dropped down to 2.5 million in 2016 from 4.9 million in 2009. The population, who is literate but without any diploma fluctuated slightly and reached a value of 3.3 million in 2016. While the population with uncompleted primary education decreased around 5 million and fell to a value of 14.5 million in 2016, the population with primary education increased from 6.7 million to 8.6 million in 7 years. The number of junior or vocational high school and high and vocational high school graduates increased in the last 7 years and reached a value of 21.5 million from 13.9 million. Finally, the number of graduates from universities and other higher educational institutions almost doubled in 7 years and increased to a value of almost 9 million from 4.6 million. The developments in the educational attainment levels can clearly be seen in Figure VII.1.1.1.1. In addition, the current composition of the educational attainment levels are presented in Figure VII.1.1.1.2.

Figure VII.1.1.1.1. The Percentage Distribution of Educational Attainment Levels (2009-2016)



Source: TurkStat

Figure VII.1.1.1.2. Educational Attainment Levels (2016)



Source: TurkStat

However, it must be highlighted that the quality of education is more important and effective in evaluating the educational attainment levels with respect to mean years of schooling or school enrolment ratios. So accordingly, it can be more useful to compare quality of education in Turkey with the high income countries' in order to determine the level of improvement in education in Turkey.

The Programme for International Student Assessment (PISA), which is the OECD's global education survey, can be used as a tool to evaluate the quality of education. In 2015, more than half a million 15-year-old students all over the World, who are representing 28 million students of their age in 72 countries, took these international tests prepared by OECD. According to 2015 PISA test results[27], which include mathematics, reading and science, Turkey's performance was below the average in all of the three categories:

- In mathematics, Turkey's ranking was 34 among 35 countries and the average score for Turkey was 420, which was 70 points below the average value of 35 countries.

- In reading, Turkey's ranking was 34 among 35 countries and the average score for Turkey was 428, which was 64 points below the average value of 35 countries.

- In science, Turkey's ranking was 34 among 35 countries and the average score for Turkey was 425, which was 68 points below the average value of 35 countries.

Also according to PISA 2015 overview, Turkey's performance has been stable in science and mathematics, while it has been declining in reading since 2006. All these outcomes indicate that quality of education in Turkey is need to be improved. In order to accomplish this goal, the authorities in Turkey might consider the success stories of other countries regarding their PISA performances. Countries including Brazil and Germany have been succeeding in improving the PISA scores of their students by making regulations in their education system. In addition, it might be helpful to examine the education systems of Japan, South Korea, Estonia, Canada and Finland. All of these five countries had astonishing performances in PISA tests in 2015, as being in

[27] PISA 2015 test results for all three test categories are illustrated in the World map format in Appendix C.

the top 10 in the rankings of all three test categories (mathematics, reading and science) for the selected year.

At this point it must be noted that, the decrease in the number of primary and secondary school age children in Turkey and accordingly their share in the total population can also be utilized in improving the quality of education. In other words, smaller number of students to invest means, more expenditure per student under the condition of same amount of financial resources used for education. According to the results of RAPID module used in one of the previous chapters, total number of primary school age population reaches a value of 10.18 million in 2025 from a value of 9.96 million in 2015. In 2030 this value decreases to 10.05 million and the decreasing trend becomes more visible afterwards. On the other hand, total number of secondary school age population increases since 2030 and reaches a value of 5.08 million and afterwards starts to decrease gradually till the rest of the period. However, the total number of both primary and secondary school age population reaches a value 15.25 million in 2025 and this value drops down to 15.13 million in 2030. In the following years the declining trend becomes more clear. In this respect, after 2030 Turkey has a chance of increasing investment per student without increasing the total amount of financial resources for education. In case the total amount of resources on education is raised too, the chance of increasing the quality of education becomes more likely. From a different point of view some of the excess financial resources resulting from the decrease in the number of primary and secondary school age population despite the increasing total population, can be used for the tertiary education[28]. According to the projections made by using RAPID module, both the primary and secondary education expenditures will be decreasing after 2035[29], leaving an opportunity to spend more on tertiary education. It must be remembered that during a structural transformation in the

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[28] The number of students in tertiary education has been increasing in the last decades and expected to rise. During 1999-2008 period number of students in tertiary education increased 75 percent and enrolment ratio almost doubled from 14.8 percent to 28.6 percent according to Kavak, 2011 (Open higher education was not included in these calculations).

[29] The total expenditure for primary and secondary education is estimated to decrease to 229.29 million US dollars in 2050 and 206.99 million US dollars in 2075. The initial expenditure in 2015 was calculated as 186.29 million US dollars.

economy, where a shift from primary sectors to secondary and tertiary sectors occurs, higher education becomes more important. In this respect, higher education becomes a determining factor in the quality of the labor force, which is required in a developing economy.

The quality of education has to be evaluated also for the tertiary education, which cannot be done by using PISA tests. In line with the increase in enrolment ratios for tertiary education and the increase in the size of the population aged between 18 and 22, which corresponds to the age interval for tertiary education, the number of universities[30] in Turkey has been growing too. Maintaining similar education qualities among all of the universities in Turkey, which have been increasing rapidly in number, becomes a necessity.

One last point in addition to the level and quality of the education is the importance of the core curriculum in the schools. The set of common courses required in the schools has to be chosen wisely by the authorities, in order to avoid unnecessary knowledge and skills provided in the schools. The courses taught should prepare the students not only for their future jobs, but also for their social lives. Therefore, while making educational reforms, the core curriculum of the countries with top world rankings in education can be examined and implemented in Turkey after making necessary adjustments, considering the socio-cultural structure of the country.

VII.1.1.2. Labor Market and Structural Transformation in Turkey and Policy Suggestions

Labor force participation rates in Turkey have been low compared to various country groups. In 2015, the labor force participation rate for 15-64 age group in Turkey was 56.1 percent. The same rate for the same year for OECD countries, EU (28

[30] According to Council of Higher Education, the number of state universities was 68 in 2006. This number reached to 104 in 2013. Similarly, in 2006 the number of foundation universities was 25. In 2013 the number almost tripled and increased to 71 according to Çetinsaya, 2014.

countries) and G7 countries was 71.3 percent, 72.7 percent and 73.6 percent respectively according to OECD data. The gap between Turkey and these country groups for labor force participation rate was between 15.2 to 17.5 percent points, which was significantly big. Considering the data, the labor force participation rate in Turkey is currently an important issue that needs to be handled by the economy authorities in the country.

While considering labor force participation rates, it might be useful to consider the rates for 15-19 and 20-24 age group separately, as these two age groups are the first two age groups entering the labor force. 15-19 age group is a key factor in observing the increase in educational attainment level over time. Also, while the decrease in labor force participation rates for 15-19 age group can be considered as an improvement in educational attainment of the young population, the increase in labor force participation rates of 20-24 age group can be considered as an improvement in the involvement of the new graduates in the labor market. Youth unemployment is also an important issue to be solved, as the period of unemployment for this age group extends, the labor quality of the potential young work force decreases, because of the loss of unused skills and knowledge over time. This situation might create a downward pressure for labor productivity in the future, when this unemployed young population is hired and included in the production side of the economy.

Increasing labor force participation rate is one of goals that need to be achieved, in order to maintain economic growth in a population with a substantial share of working age population. At this point, the age structure of the working force is of the first order of importance, while focusing on increasing the participation rates in the labor market. Authorities committed themselves to increase overall labor force participation rates have to consider and determine the age groups with low participation rates and create new policies regarding improving the participation rates for these age groups. In this respect, policy makers of the country should determine the age groups, for which the labor force participation rates are considerably low, and focus on increasing the participation rates for these age groups by comprehending the obstacles to employment and developing solutions to overcome these obstacles.

The maladjustments in the demand and supply side of the labor market results in unemployment. In Turkey, lack of employees for vacancies in labor market and unemployed high qualified workforce are among major problems of the labor market. The lack of a mechanism is felt to combine unemployed educated youth with the companies in need for new employees. The lack of a well-balanced connection between education and labor market and failure of maintaining vocational training in accordance with the necessity of labor force are described as the two major factors causing imbalance of demand and supply in the labor market and resulting in unemployment and open positions by Republic of Turkey, Ministry of Development in 2010 (Tansel, 2012). In this respect building up a mechanism, which enables the connection between job-seekers, especially among young age groups, and employers looking for the right candidates for the vacancies is one of the solutions to the unemployment problem in Turkey.

In addition, for a growing economy the allocation of the employment has also a crucial role. According to OECD report "Economic Survey of Turkey 2016", the employment is concentrated in less productive firms in Turkey[31]. Shifting employment in more productive firms is expected to contribute more to economic growth in the country.

While considering improving the labor force participation rates, it is beneficial to take into account the decomposition of the participation rates among sectors of the economy. Focusing on more value-added sectors will contribute more on the economic growth in the country. In this respect, in order to increase the labor force in non-agricultural sectors or shift underemployment in agricultural sectors to non-agricultural sectors, the qualifications of the new-entries should be satisfying the needs of these

[31] Productivity gains were less than 20 percent in Turkey in 2013, while it was around 60 percent in USA and more than 30 percent in EU countries for the latest available year according to Andrews and Cingano, 2014 and OECD calculations.

non-agricultural sectors, including education levels and skills. On the other hand growth rates of gross domestic product of non-agricultural sectors has to be considerably greater compared to gross domestic product of agricultural sectors, so that sufficient number of new job openings can be possible to attract labor force from agricultural sectors and reduce the labor force growth in these sectors. Moreover, in case of significant population increase, the workforce going in the agricultural sectors will tend to be increasing too, if the industrialization of the economy is inadequate. In that case, the new job openings in non-agricultural sectors have to be increased in order to absorb the new entries in labor market and accordingly dampen the entries in agricultural sectors.

From a similar perspective, the solutions to the underemployment problem in an economy can be listed as;

- Controlling population increase,
- Increasing level of output in agricultural sectors,
- Reducing the work force in agricultural sectors,
- Creating more job opportunities in non-agricultural sectors.

The required level of growth in non-agricultural sectors to reverse the movement in the agricultural sectors and accordingly stabilize the increase in agricultural work force has to be calculated. In this context, the size of new entries especially aged between 15 -24 has to be measured which will not exceed the size of losses and retirements in these sectors (Gordon, 1969).

The targets related to employment (especially articles 61[32] and 64[33] stated in the Medium Term Programme (2017-2019) prepared by Ministry of Development of the Republic of Turkey seems to be in line with the previously mentioned suggestion in this chapter.

However, the sustainability of similar targets related to employment in the following years has a crucial role in reaching desired employment levels and composition as in the advanced economies. According to World Bank data, in 2014 the employment in agriculture as the percentage of total employment in both high income countries and OECD countries were 3.17 percent, while it was 19.7 percent in Turkey for the same year. The employment in agriculture in Turkey is currently more than six times compared to these two country groups. In addition, agriculture (value added) as the percentage of GDP was 8.01 percent in Turkey in 2014, which was around 1 percent points and 6.5 percent points over the value for upper middle income countries and high income countries respectively. These numbers indicate the continuing importance of agriculture sector in Turkey in terms of the share of employment in total employment and the level of output as percentage of GDP. On the way to becoming a high income country, Turkey has to diminish the importance of the agriculture in the whole economy gradually.

VII.1.1.3. Health System in Turkey and Policy Suggestions

Health is also one of the factors that need to be considered and improved in order to maintain sustainable economic growth. This can be done by two main channels. First one is increasing quality and accessibility of the health services in Turkey. This will result in a healthier labor force and consequently increasing the quality of the labor in Turkey. According to the previous studies in literature, improving the health status of not only the working age population but also young and old dependent

[32] *"… an additional 2,609 thousand people are expected to be employed in the non-agricultural sector. During this period, the total employment is expected to increase by 2,318 thousand people."*
[33] *"The share of agriculture in the employment, which is expected to be 19.3 percent in 2016, is estimated to decrease to 16.8 percent in 2019."*

population have positive effects on economic growth and development. In this respect, policy maker in Turkey should focus on increasing the service quality in heath and its accessibility considering the regional differences in the country. The second channel is developing an optimum administration system in health sector, which will reduce the unnecessary costs and set priorities wisely so that the most important heath issues will be handled first.

According to the projections made in this thesis by RAPID module, number of health personnel and health institutions required will be increasing steadily over time until 2075. The number of doctors, which was around 141 thousand in 2015 is estimated to reach 266 thousand in 2050 and 337 thousand in 2075. The number of nurses is expected to rise to 682 thousand in 2050 from 153 thousand in 2015. This number is anticipated to reach a value of 991 thousand in 2075. Health centers, is also predicted to expand in number from 30 thousand in 2015 to 74 thousand in 2050 and 91 thousand in 2075. Similarly, the number of hospitals is estimated to increase to 2.87 thousands in 2050 and 3.73 thousand in 2075 from an initial value of 1.53 thousand in 2015. All these numbers are the required values, which are derived to reach the level of health services in today's high income countries around 2050 in general in Turkey. In this context, policy makers in Turkey might make use of these data, while planning their future investments and expenditures in health sector. Increasing the number of health personnel and related institutions will definitely contribute to the quality of the health services provided. Also while making the allocations of these projected health personnel and health institutions, considering regional differences might be useful to decrease the inequality in reaching the health services in Turkey.

According to the population projections developed by DemProj module in this thesis, the total age dependency ratio, which was 49.72 percent in 2015, is projected to increase to 57 percent in 2050 and 67 percent in 2075. On the other hand, while the share of young population (0-14 age group) is projected to decrease to 17.46 percent in 2050 and 14.99 percent in 2075 from an initial value of 25.67 percent in 2015; the share of old population (65 and over), which was 7.54 percent in 2015, is estimated to rise to

19.17 percent in 2050 and 25.16 percent in 2075. In other words, the increase in the total age dependency ratio is predicted to be rising continuously because of the increase in the share of old age population. So, while policy makers setting their priorities in health related issues, it might be beneficial for them to consider the shifts in the prevalence of age related diseases. To be more precise, over the following decades, the prevalence of diseases related to old age population is expected to rise. In this respect, while making regulations regarding health care services for the future, the changes in the most commonly seen diseases in the population should be considered. Continuing to invest and make expenditures on diminishing diseases in the same amounts over time might lead to create unnecessary cost in health or just the opposite, directing health expenditures on the diseases, whose prevalence has been increasing, might help increasing the efficiency of financial resources used in health care services in Turkey.

Moreover, even though the annual health expenditures will be increased steadily over time until 2075, at the end of the period the expenditures is projected to reach to 381 international dollars, remaining below the current levels in high income countries. Therefore, adjustments for the future government budget allocations in favor of the health sector might be necessary in order to increase the quality of the health services provided in the country. It is noteworthy to mention that, according to the well-being indicators stated in “OECD Economic Surveys - Turkey 2016”, the normalized health indicator for Turkey composed of life expectancy and self-reported health had a value of 4, which was 8 for high income OECD countries. This situation points out the need for improving health status in Turkey in the coming decades.

VII.1.1.4. Gender Inequality in Turkey and Policy Suggestions

Gender inequality, which has been observed in Turkey for many years, has various forms. In this chapter, inequalities in terms of education and labor market are taken into consideration.

Gender parity index[34] values regarding secondary and tertiary school enrolment in Turkey has shown significant progress in the recent decades. The index value for secondary school enrolment was increased to 0.97 in 2013 from 0.59 in 1990. In a similar way the index value for tertiary school enrolment, which was 0.50 in 1990, raised to 0.86 in 2013. Even though the progress in these two indicators is noteworthy, they are still below the levels in upper middle income countries. For the same year, the index values for secondary and tertiary school enrolment was 1.18 and 1.03 respectively. In other words, despite the closing gender gap in enrolment ratios, additional improvement is still required to reach the level of the countries in the same income group with Turkey.

In addition to school enrolment ratios, the level of knowledge and skills the students receive during their education is need to be considered while evaluating the gender differences. PISA test results are a good way of doing this analysis. In 2015, in Mathematics, average result for males was 423 points, which was 5 points higher than the females' in Turkey. OECD average for males was 494 and this result was 8 points higher than the females' result. So even though the gender gap in mathematics was smaller in Turkey with respect to OECD average, the results were significantly lower when comparison is made for the same sex. In reading, the gender gap was in favor of females as expected for Turkey, which was parallel to the result for OECD countries in general. While the result was 414 points for males, it was 442 for females in Turkey.

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[34] The Gender Parity Index (GPI) is a socioeconomic index, released by UNESCO, aiming to compare access to education for males and females. Briefly, it is calculated as the ratio of the number of females to the number of males enrolled in a given stage of education such as primary, secondary and tertiary. A GPI with a value of 1 points out equality between females and males. A value less than 1 points out a disparity in favor of males and accordingly a value greater than 1 points out a disparity in favor of females. When compared over time, the GPI indicates progress regarding gender equality in accessing education, which is very useful in checking success in reaching goals.

These results were 65 points and 64 points lower for males and females respectively compared to the OECD average values. In science, the results were slightly different compared to the other test results. The gender gap was again in favor of females in the test, where the result for females was 429 and for males was 422 in Turkey. These results were below the OECD averages, which were 495 points for males and 491 points for females. So in general it can be stated that even though there is not an obvious gender gap in terms of knowledge and skills in education in Turkey, the results are always below the OECD averages and need to be improved for both sexes. However, the gender gap is still significant in other areas such as enrolment ratios at schools. Gender equality in accessing education and ensuring a safe and secure environment at school for females should be one of the goals Turkey must achieve in the near future. In this respect, the school attendance of females should be encouraged and their right to attend the school protected by law if necessary.

Labor force participation is the second important area, in which gender inequality is felt in Turkey. According to World Bank data, in 2014 female labor force participation rate was only 29.30 percent, while it was 70.80 percent for males (15+ population, modeled ILO estimate) in Turkey. As a result, ratio of female to male labor force participation rate was 41.38 percent, which was significantly below the value for upper middle income countries (75.18 percent) for the same year. The gap between the female and male labor force participation rates narrowed for 15-24 age group compared to 15 and above age group. While the gap was 41.50 percentage points for 15 and above age group, it reduced to 26.20 percentage points for 15-24 age group. This difference in the gap for participation rates can be commented as the gap is diminishing for the younger cohorts or gap increases for the older ages as mean age of child-bearing is increasing over time.

Another important aspect in terms of gender inequality in labor force in Turkey, is the allocation of the labor force among sectors. In developing economies industry sector has a significant role for economic growth. Therefore, allocation of the labor force in more value added sectors will contribute to economic growth more strongly.

However, the employment in industry sector in Turkey points out a remarkable difference in terms of male and female employment as shown in Figure VII.1.1.4.1. Considering the industry sector has a more significant role in triggering the economic growth compared to agriculture and service sectors; as percentage of male employment in industry sector is considerably higher compared to female employment, it is expected that in case amount of increase in the labor force participation rates are the same for male and female, the contribution of the increase in male labor force participation rate to the change in GDP per capita is expected to be higher.

Figure VII.1.1.4.1. Employment in Industry for Male and Female (% of Male and Female Employment)

Source: World Bank

The narrowing gender gaps in education also contribute to the narrowing gender gaps in the labor market in the long run. However, these gaps are still significantly big in many countries. Turkey is one of the countries including Saudi Arabia, India and some MENA countries, in which the gender gap in labor force participation rate exceed 40 percentage points. Considering the low proportion of population with tertiary education, Turkey, along with some other countries such as Brazil, Indonesia, Italy and South Africa, is believed to benefit more from additional investments on efficient policies on education and consequently converge to a labor market system with more gender equal conditions. Even though in general gender gaps for young men and women are considerably smaller in OECD countries in general, female NEET[35] rates are remarkably high in Turkey, in addition to some other countries including Brazil, Colombia, Costa Rica, India, Indonesia, Mexico and South Africa. Younger age at first birth and traditional attitudes on the role of women at home are among the common characteristics of these countries with high female NEET rates. In addition, female unemployment rates for working-age group are more than 2 percentage points higher in Turkey and some other countries such as Czech and Slovak Republics, Slovenia and Spain. It must be noted that countries with wide gender gaps in labor force participation cannot manage to promote economic development and these countries have to struggle with rapid population aging (Report on the Implementation of the OECD Gender Recommendations, 2017).

The gender inequality in terms of employment and education among the young people in Turkey can be clearly understood comparing the NEET-rates for young men and women. According to the most recent OECD data available, in 2015 the NEET-rate for 15-19 male age group was 13.3, while it was 24.4 for 15-19 female age group in Turkey. On the other hand, the rate was 6.3 for the same age group for both males and females for the average value of OECD countries. Also the NEET-rate for 20-24 male age group was 18.3, while it was considerably higher for 20-24 female age group, which had a value of 47.6 in 2015. However, the average value for the OECD countries for 20-24 male age group and female age group were 15.5 and 18.3 respectively. The huge

[35] An indicator used for representing the share of young people who are not in education, employment or training.

gap between male and female groups in Turkey is noteworthy, on the contrary to the OECD countries in general.

In order to reduce gender inequality in education and employment and bring the gender gap to moderate values similar to the ones in advance economies, new laws and regulations, policies, monitoring and campaigns might be required in Turkey, in line with the recommendations stated in the recent OECD reports about gender inequality. It must be monitored by the authorities in Turkey that the actions taken so far in order to reduce gender inequality is truly working and girls at school and women at work can reach their real potential as a result of the diminishing barriers in the society against them. Even though there has been some progress regarding maternity and paternity leaves and part time employment opportunities for women in Turkey especially since 2013, there are still many steps to be taken to reach the gender equality levels of the modern societies. Increasing access to Early Childhood Education and Care (ECEC) might also contribute to labor force participation of women with children. New regulations making the attendance to ECEC compulsory or lower the age for attending ECEC are also among policy suggestion in favor of increasing women's participation in the labor force. In addition to the gender gap in labor force participation rates, wage gaps in favor of men are another important issue to be solved. Women in Turkey should have equal rights in the labor market and not only should have be paid equally with men for similar positions but also would have a chance to be hired for decision making position as long as their qualifications fit for the position. In this respect, besides new policies, laws, and regulations, the cultural issues leading to gender inequality must be overcome. On the contrary to the implementation of new policies, laws and regulations, controlling and changing the society's attitude towards women is more challenging and time consuming, which might require effective campaigns and public service ads. Cultural perspective in Turkey also results in unequal sharing of household tasks between men and women and as a consequence leads to inequality in accessing education and entering labor market. In addition, sexual harassment and violence against women is another important issue which remained unsolved so far. New regulations and stronger laws about sexual harassment and violence against women and awareness-raising campaigns and public service ads might contribute the combat against this problem.

VII.1.2. Suggestions Regarding Further Studies

Although this thesis focuses on contribution of demographic advantages arising from shifts in age structures on economic growth, taking into account also the positive effects of various socio-economic factors, such as education, labor and health; development in a country can also be evaluated by some other factors, in addition to economic growth.

According to McMahon (2002), a real economic development cannot exist, without associating the development with improvements in well-being of the society, reduction in poverty and inequality, enhancements in democracy, maintaining preservation of the environment, significant cut in crime rates, protection of human rights and etc (Kavak, 2010). In this respect, sustainable development goals can be a good guide to determine what other factors to include, while evaluating the development concept. From this point of view, examining Sustainable Development Goals and selecting the goals which are closely related to economic development can be beneficial in a further study.

Sustainable Development Goals[36] adopted by world leaders in September 2015 are closely related to the 2030 Agenda for Sustainable Development. These set of goals can be listed as follows;

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[36] Sustainable Development Goals can be considered as a continuation of the Millennium Development Goals and aim not only to do more in fighting and ending poverty in all forms but also to protect the planet and ensure the prosperity for all.

1. No poverty,
2. Zero hunger,
3. Good health and well-being,
4. Quality education,
5. Gender equality,
6. Clean water and sanitation,
7. Affordable and clean energy,
8. Decent work and economic growth,
9. Industry, innovation and infrastructure
10. Reduced inequalities,
11. Sustainable cities and communities,
12. Responsible consumption and production,
13. Climate action,
14. Life below water,
15. Life on land,
16. Peace, justice and strong institutions,
17. Partnership for the goals.

Among these 17 goals, no poverty, zero hunger, good health and well-being, quality education, gender equality, reduced inequality can be taken as major factors in addition to economic growth, while assessing the extent of contribution of demographic advantages.

Even though poverty is becoming a less important issue for Turkey, still some progress can be made in line with the no poverty and zero hunger goals. Good health and well-being of the society can be studied deeper. Gender inequality, which is mention in this thesis in terms of access to education, labor force participation and wage differences, can be investigated using a time-series analysis in a following study. Inequalities in Turkey can be further studied not only in terms of gender but also in terms of regional, ethnical and socio-cultural differences.

The Gini coefficient, which is a very common measurement method of inequality, is calculated as 0.39 for Turkey according to Country Fact Sheet 2017 prepared by OECD. This value is over the average value for OECD countries, which is 0.32. However, both top and bottom earners have benefited from the income growth in Turkey, as stated in this report. According to the comparison of the years 2007 and 2013, real labor income growth increased around 20 percent for the average earners, while it increased around 22 percent for the top 10 percent of the earners. On the other hand, the bottom 10 percent benefited considerably less from the income growth and the increase in real labor income growth stayed as 13 percent for this group (Government at a Glance 2017, OECD). So while evaluating the economic growth, the distribution of the growth among the different income groups of the society with various socio-cultural backgrounds can be considered.

Another point that needs to be considered is the regional differences in Turkey in terms of demographic and socio-economic factors. Being a considerably populated and diversified country, Turkey has a heterogeneous demographic and socio-cultural structure. In this thesis, all of the research done and the findings accordingly are at the national levels. However, the results are expected to show differentiations among regions. First of all, the broad age groups, which are used to determine the beginning and end years of the demographic window, vary among regions as presented in Table VII.1.2.1. and Table VII.1.2.2. As a result, the beginning and end years of the demographic window for each region will be different from each other and the whole country. It is noteworthy to mention that, while making population projections for the regions, in and out-migration projections for the regions play a significant role. Even though international migration can be neglected depending on the country, internal migration should be taken into account while making population projections.

Table VII.1.2.1. Broad Age Groups by Regions - 2016 (Population)

REGION CODE	REGION NAME	0-14 age group	15-64 age group	65+ age group
TR6	Mediterranean	2,536,190	6,850,123	796,463
TR5	West Anatolia	1,720,978	5,400,326	632,127
TR8	West Black Sea	882,008	3,089,093	580,265
TR2	West Marmara	612,004	2,415,872	414,353
TR9	East Black Sea	508,504	1,800,073	337,007
TR4	East Marmara	1,650,264	5,366,978	666,945
TR3	Aegean	2,005,930	7,161,295	1,097,886
TRC	South East Anatolia	3,005,605	5,105,968	397,314
TR1	İstanbul	3,301,723	10,562,075	940,318
TRA	North East Anatolia	633,421	1,401,965	165,982
TR7	Central Anatolia	920,062	2,641,640	386,538
TRB	Central East Anatolia	1,149,093	2,442,178	236,305
TR	Turkey	18,925,782	54,237,586	6,651,503

Source: TurkStat (Address Based Population Registration System)

Table VII.1.2.2. Broad Age Groups by Regions - 2016 (Ratio)

REGION CODE	REGION NAME	0-14 age group	15-64 age group	65+ age group
TR6	Mediterranean	0.25	0.67	0.08
TR5	West Anatolia	0.22	0.70	0.08
TR8	West Black Sea	0.19	0.68	0.13
TR2	West Marmara	0.18	0.70	0.12
TR9	East Black Sea	0.19	0.68	0.13
TR4	East Marmara	0.21	0.70	0.09
TR3	Aegean	0.20	0.70	0.11
TRC	South East Anatolia	0.35	0.60	0.05
TR1	İstanbul	0.22	0.71	0.06
TRA	North East Anatolia	0.29	0.64	0.08
TR7	Central Anatolia	0.23	0.67	0.10
TRB	Central East Anatolia	0.30	0.64	0.06
TR	Turkey	0.24	0.68	0.08

Source: TurkStat (Address Based Population Registration System)

Educational status also varies among regions in Turkey, especially between the eastern and western regions. While western regions have higher educational status, eastern regions have lower educational status compared to other regions. Regions with highest educational status show differentiations, such that Aegean Region has the lowest proportion of illiterate to total population, East Marmara Region has the highest proportion of high school graduate to total population and West Anatolia has the highest proportion of higher education graduate total population. On the other hand, the region with the lowest educational status is always the same, which is the South East Anatolia Region as shown in Table VII.1.2.3.

Table VII.1.2.3. Educational Status by Regions - 2015 (Ratio)

Region Code	Region Name	Population by literacy status (6 years of age and over): Proportion of illiterate/Total	Population by education status (15 years of age and over): Proportion of high school or vocational school at high school level graduate (%)/Total	Population by education status (15 years of age and over) : Proportion of higher education graduate (%)/Total
TR6	Mediterranean	3.30	21.90	13.46
TR5	West Anatolia	2.45	24.55	18.64
TR8	West Black Sea	4.55	19.83	11.70
TR2	West Marmara	2.36	22.71	13.45
TR9	East Black Sea	5.51	23.05	12.67
TR4	East Marmara	2.92	24.90	14.35
TR3	Aegean	2.22	21.77	14.41
TRC	South East Anatolia	7.85	15.96	9.55
TR1	İstanbul	2.45	24.31	17.41
TRA	North East Anatolia	7.25	18.80	10.74
TR7	Central Anatolia	4.22	21.93	12.09
TRB	Central East Anatolia	7.17	19.33	11.04
TR	Turkey	3.78	22.11	14.20

Source: TurkStat

The labor force status of the population also show differentiations among the regions of Turkey. However, compared to broad age groups and educational status, the differentiations in labor force status is considerably less. İstanbul has the highest labor force status with a value of 56.30 percent as expected and it is followed by East Black Sea Region and Aegean Region, whose values are 54.40 and 54.00 respectively. On the other hand, South East Anatolia Region has the lowest labor force participation rate, which is 43.70. It is followed by Central East Anatolia Region and North East Anatolia Region with values of 45.60 and 50.40 respectively.

Table VII.1.2.4. Labor force status by Regions - 2015 (Percentage)

Region Code	Region Name	Labor force status by non-institutional population (15 age and over): Labor force participation rate (%)
TR6	Mediterranean	50.90
TR5	West Anatolia	52.30
TR8	West Black Sea	52.90
TR2	West Marmara	53.20
TR9	East Black Sea	54.40
TR4	East Marmara	51.80
TR3	Aegean	54.00
TRC	South East Anatolia	43.70
TR1	İstanbul	56.30
TRA	North East Anatolia	50.40
TR7	Central Anatolia	50.80
TRB	Central East Anatolia	45.60
TR	Turkey	52.00

Source: TurkStat

Considering the variations in the demographic and socio-economic indicators[37] among regions in Turkey, it can be stated that a region based study by using the methods presented in this thesis can provide important findings. These findings are anticipated to point out major socio-economic trends for the regions and therefore will be valuable for the future policies of the authorities in the country. However, even though socio-economic projections can be made under some assumptions and the demographic window for each region can be determined to some extent, calculating the first demographic dividend value for each region will be more challenging.

[37] Additional demographic and economic indicators are given in Appendix D.

VII.2. Conclusion

In the recent years, development and economic growth are considered to be the same terms with the GDP growth. In this respect, it is important to understand the sources of economic growth. There are three main sources of economic growth. First one is the increase in population and consequently lagged increase in labor force. Second one is the capital accumulation. Finally the last one is technological improvements. The effects of a rapid growing population and consequently a lagged rapid growing work force on economic growth have always been highly controversial. A rapid growing workforce can positively affect economic growth under the condition that the increase in the workforce is absorbable in labor market and the employment of the workforce can generate earnings (Tansel, 2012).

Indeed, according to many studies made regarding age structure of the population and economic growth in literature, the increase in working age population is acknowledged as a chance for economic growth, especially when it is supported by improvements in related socio-economic indicators, such as education, labor force and health. In line with this argument, increase in population is approached in a similar perspective, depending on the level of development of the country.

Highly developed countries experiencing both high rates of economic growth and high income per capita, are believed to utilize the population growth and turn this demographic event into an opportunity to boost economic growth. On the contrary, less developed countries facing low or even negative growth rates and consequently low income per capita, are assumed to see population growth as a burden on economic growth and development in general. At this point, the chance of a less advanced country to make use of the population growth depends to a great extent on its capability of enhancing labor productivity. However, an economy composed of high share of working force employed in agricultural sectors, in which rate of returns are considerably small with respect to their sizes, is not likely to accomplish this challenge (Gordon, 1969).

Considering the second half of the twentieth century, shifts in the age structure of the populations in favor of the working age group, which is one of the most significant demographic factors, had a key role in triggering the economic growth in general for both developing and developed countries. In a following way, in the first half of the twenty first century, the role of the age structure will be of high importance for the developing countries. Nevertheless, the power of shifting age structure on basic macro-economic indicators will be relying on the policies and measurements taken by the authorities to a great extent (Mason, 2005). Implementing the right policies on time will highly contribute to make use of the opportunities and to overcome the challenges that the countries will be facing in the following decades.

The first and the second demographic dividends are the two concepts commonly used to define demographic advantages coming from changes in age structure. Briefly, while first dividend stem from the growing share of working age population, the second dividend arouses from the increase of the share of the old age population. However, it should be underlined that neither of which has a self-driven mechanism. In order to gain first dividend the working age group, which has an increasing share in the population, has to be equipped with high educational attainment and skills. Moreover, new job openings are also required to meet the growing labor supply, in order not to create excess labor supply which can easily lead to an increase in unemployment.

Moreover, the duration of the impact of the first dividend on economic growth can be extended, as long as the increase in income per capita is utilized in investments regarding education and health care systems aiming enhancement of human capital. In addition, using the gains from economic growth to support physical capital accumulation, promote technological improvements and carry out institutional reforms have a key role in the continuation of the first dividend. On the other hand, second dividend is continuous in nature, if capital accumulation by the members of the society, companies and governments is promoted (Mason, 2005).

In this respect, this thesis aims to evaluate demographic advantages arising from changes in age structure in favor of working age population by using the concepts of demographic window and first demographic dividend for Turkey considering a very long time span (1960-2075). In addition to the calculations of timing of these two indicators regarding demographic advantage (demographic window and first demographic dividend), the magnitude of the first demographic dividend is also calculated. Moreover, other country experiences from different geographical regions and income levels are also examined and their experiences are utilized in order to derive which socio-economic indicators have a key role in boosting economic growth. Also the regulations made by these countries to trigger economic growth are used as inputs for the policy suggestion for Turkey. Furthermore, an econometric analysis using multiple linear regression about the contribution of the demographic factors on the economic growth in Turkey for 1970-2015 period is also included in the thesis. In addition, as stated in literature, socio-economic factors which are believed to contribute to the advantages coming from demographic window and first demographic dividend are also taken into account. These socio-economic indicators are grouped under the titles of “education”, “health” and “economics”. Not only past and recent developments but also future projections about these socio-economic indicators are assessed in this thesis. Finally, recommendations for the policy makers and suggestions regarding further studies are highlighted in the last section.

Significant findings and results derived in this thesis can be summarized as follows:

- Turkey entered the demographic window in 2002 and is expected to exit the demographic window in 2040. Accordingly, the timing of the demographic window is 38 years.

- The first demographic dividend started in 1969 and is expected to end in 2031. The first demographic dividend lasts for 62 years.

- The average value of the first demographic dividend so far (1969-2016) is 0.41 percent. The average value is expected to decline to 0.36 percent when the whole period with positive values are considered (1969-2031). The highest value was reached in 1994 and had a value of 0.63 percent. The lowest value is estimated to be reached in 2030 and is expected to have a value of 0.01 percent.

- When two basic demographic indicators, which are used to explain demographic advantages arising from shifts in age structure, are compared; it is seen that first demographic dividend is more meaningful compared to demographic window in terms of explaining the variations on economic growth in Turkey. So accordingly, it can be stated that the first demographic dividend is a better indicator with respect to demographic window in terms of demographic advantages.

- Among 61 countries, whose the first demographic dividend values are calculated by NTA using country base estimates, Turkey is 15 in the rankings in terms of the magnitude of the average value for the first demographic dividend for the period 1960-2015. So it can be commented that Turkey has been exhibiting a good performance in terms of making use of demographic advantages for this period.

- When 10-year periods between the years 1960-2015 are examined separately for Turkey, it can be inferred that Turkey has been making use of demographic dividends, as the difference between GDP per capita growth rate and the total demographic dividend values are always positive and significantly greater than zero.

- Comparing Turkey’s performance with 61 other countries between the years 1960 and 2015 and evaluating Turkey’s the first demographic dividend gains for 10-year periods separately for the same time interval, in general it can be said that Turkey has been doing a good job in terms of making use of demographic advantages resulting from the shifts in its age structure.

- It can be argued that Turkey had been making use of the first demographic dividend especially between the years 1986-1990 and 2001-2005, as in these time periods GDP growth rates were more than 3 percent and the first dividend values were over 0.14 percent, which was the average value of 61 countries for 1960-2015 period.

- Turkey's future performance in making use of demographic advantages depends on many supplementary factors including improvements in education, labor market, health and gender equality, all of which are taken into consideration in this thesis. The greater the extent of the improvements in these areas, the greater the demographic gains achieved. In this respect, it might be beneficial for the authorities in the country to take into account the following findings:

    - School gross enrolment ratios in primary education are close to the ratios in high income countries'. However, there is still a gap in secondary education that needs to be diminished. The gross enrolment ratio for secondary education in Turkey was 100.3 percent in 2013, while it was 105.5 percent for the high income countries for the same year.

    - The gross enrolment ratio for tertiary education reached to 79 percent in 2013, which was a remarkable improvement.

    - However, the quality of education is as important as the enrolment ratios. According to PISA test results in 2015, the performance of Turkish students in mathematics, reading and science were respectively 70 points, 64 points and 68 points below the average value of OECD countries.

- In order to improve the education system in Turkey, examining the education systems of Japan, South Korea, Estonia, Canada and Finland might be useful. The students of all these countries were in the top 10 in the rankings of all three test categories (mathematics, reading and science) in 2015.

- The total number of primary and secondary school age population is expected to decrease after 2030. In this respect, after that year Turkey has a chance of increasing investment per student without increasing the total amount of financial resources for education, which is expected to result in improvements in the quality of education in Turkey.

- Labor force participation rates in Turkey has been low compared to OECD countries, EU (28 countries) and G7 countries. While participation rates in these country groups were 71.3 percent, 72.7 percent and 73.6 percent respectively in 2015, it was only 56.1 percent in Turkey for the same year. In terms of female labor force participation rates, the situation has been worse. According to World Bank data, in 2014 female labor force participation rate was only 29.30 percent in Turkey.

- A solid structural transformation is also required for Turkey. According to World Bank data, in 2014 the employment in agriculture as the percentage of total employment in both high income countries and OECD countries were 3.17 percent. On the other hand, it was 19.7 percent in Turkey, which was more than six times compared to these two country groups for the same year. In addition, according to World Bank data, agriculture (value added) as the percentage of GDP was 8.01

percent for Turkey in 2014, which was 7.20 percent and 1.48 percent for upper middle income countries and high income countries respectively.

- According to projections made by RAPID module in this thesis, which aims to reach the level of health services in high income countries around 2050, the number of doctors, nurses and hospitals required is estimated to be 266 thousand, 682 thousand and 2.87 thousands respectively in 2050. It might be useful to take into account these numbers for the authorities while preparing future budgets.

- According to the population projections developed by DemProj module in this thesis, the total age dependency ratio is projected to increase to 57 percent in 2050. While the share of young population (0-14 age group) is projected to decrease to 17.46 percent in 2050, the share of old population (65 and over) is estimated to rise to 19.17 percent for the same year. The increase in the total age dependency ratio is predicted to be rising continuously because of the increase in the share of old age population. While reconstructing the needs of the health system, authorities might find it useful to consider the changing age structure of the population in Turkey. It is noteworthy to mention that, it is the shifts in the age structure, which reshapes the prevalence of type of diseases commonly seen in a society.

- Gender inequality in education in Turkey is another issue to be considered. Despite the closing gender gaps in enrolment ratios, additional improvement is still required to reach the current level of the upper middle countries. Labor force participation is the second important area, in which gender inequality is felt in Turkey. The ratio of female to male labor force participation rate in Turkey was 41.38 percent in 2014, which was significantly below the value for upper middle income countries (75.18 percent) for the same year. Gender inequality in Turkey is supposed to be one of the priorities of the authorities.

- Finally, it is noteworthy to underline the fact that, Turkey's current age composition was experienced decades ago in high income countries. The share of 0-14 age group in Turkey in 2015 was 25.67 percent and a similar value was observed in 1974 in high income countries. The share of working age population (15-64) in Turkey was 66.79 percent in 2015 and a similar share of working age population was seen in 1988 in high income countries. The share of old age group (65 and over) in Turkey in 2015 was 7.54 percent. This value is lower than the value in high income countries in 1960. For that year the share of old age group was 8.8 percent in high income countries. On the other hand, in high income countries the shares of for 0-14, 16-64 and 65 and over age groups were 16.79 percent, 65.98 percent and 17.23 percent respectively. These values are estimated to be reached in Turkey in 2056, 2041 and 2045 respectively. So even though the demographic window is expected to be closed in 2040 and the first demographic dividend is predicted to turn to negative values after 2031, the broad age composition in Turkey will still be superior to the composition of high income countries in 2015.

Examining the past realizations, especially considering the years, in which both the first demographic dividend and economic growth rates were observed at significant levels; it can be commented that Turkey has been making use of demographic advantages resulting from the changes in the age structures. These demographic advantages are predicted to be continuing for a few more decades. But even after, the age composition in Turkey will continue to be beyond the current age composition in high income countries' in terms of demographic advantages. Under these circumstances, it is in the authorities hands, to make the most of these demographic advantages in the following years. I believe this thesis is a useful material as a guide for the policy makers, who are working hard for a more developed and a wealthier Turkey.

REFERENCES

ADALI T., A. S. TÜRKYILMAZ (2015), Türkiye'deki Suriyeli Nüfusa Yönelik Nüfus Tahminleri, 14. Ulusal Sosyal Bilimler Kongresi, ODTÜ.

AGENOR P. R. (1996), The Labor Market and Economic Adjustment, Staff Papers (International Monetary Fund), Vol. 43, No. 2 (Jun., 1996), pp. 261-335, Palgrave Macmillan Journals on behalf of the International Monetary Fund.

AISEN A. and M. FRANKEN (2010), Bank Credit During the 2008 Financial Crisis: A Cross-Country Comparison, IMF Working Paper, WP/10/47, February 2010, Asia and Pacific Department, International Monetary Fund.

AIYAR S. and A. MODY (2011), The Demographic Dividend: Evidence from the Indian States, IMF Working Paper, WP/11/38.

AKALIN E., M. DURUSU TANRIÖVER ve F. SAYRAN (2012), "Sürdürülebilir Sağlı Sistemi için Kronik Hastalıklar Yönetiminde Elektronik Sağlık Kayıtlarının Rolü", Haziran 2012, Yayın No: TÜSİAD-T/2012- 06/529.

AKIN M. S. (2005), Education and Fertility: A Panel Data Analysis for Middle Eastern Countries, The Journal of Developing Areas, Vol. 39, No. 1 (Autumn, 2005), pp. 55-69, College of Business, Tennessee State University.

AKIN A., K. ERSOY (2012), 2050'ye Doğru Nüfusbilim ve Yönetim: Sağlık Sistemine Bakış, Yayın No: TÜSİAD-T/2012-11/533, TUSIAD ve Birleşmiş Milletler Nüfus Fonu (UNFPA), İstanbul.

ALONSO, A., C. ECHEVARRIA and K. C. TRAN (2004), Long-Run Economic Performance and the Labor Market, Southern Economic Journal, Vol. 70, No. 4 (Apr., 2004), pp. 905-919, Southern Economic Association.

ALVAN A. and B. N. GHOSH (2010), Productivity and Growth in Turkish Manufacturing Industry: 1980-2001, The Journal of Developing Areas, Vol. 43, No. 2 (Spring, 2010), pp. 187-219, College of Business, Tennessee State University.

APERGIS N. and P. PADHI (2013), Health expenses and economic growth: convergence dynamics across the Indian States, International Journal of Health Care Finance and Economics, Vol. 13, No. 3/4 (December 2013), pp. 261-277, Springer.

ARISOY İ. (2012), The Impact of Foreign Direct Investment on Total Factor Productivity and Economic Growth in Turkey, The Journal of Developing Areas, Vol. 46, No. 1 (Spring 2012), pp. 17-29, College of Business, Tennessee State University.

ARNOTT R. D. and D. B. CHAVES (2012), Demographic Changes, Financial Markets and the Economy, Financial Analysts Journal, Vol. 68, No. 1 (January / February 2012), pp. 23-46, CFA Institute.

ARORA S. (2001), Health, Human Productivity, and Long-Term Economic Growth, The Journal of Economic History, Vol. 61, No. 3 (Sep., 2001), pp. 699-749, Cambridge University Press on behalf of the Economic History Association.

ARSLAN İ. and S. VAN WIJNBERGEN (1993), Incentives, Exchange Rate Policy and Export Growth in Turkey, The Review of Economics and Statistics, Vol. 75, No. 1 (Feb., 1993), pp. 128-133, The MIT Press.

BABATUDE M. A. (2012), An analysis of the Growth – Health Relationship in Nigeria, A paper presented at the center for the study of Africa economic development, Dakar, Senegal.

BAILEY, M. (2006), More Power to the Pill: The Impact of Contraceptive Freedom on Women's Labor Supply, Quarterly Journal of Economics, Vol. 121.

BALINO T.. and A. UBIDE (1999), The Korean Financial Crisis of 1997 – A Strategy of Financial Sector Reform, IMF Working Paper, WP/99/28, March 1999, International Monetary Fund, Monetary and Exchange Affairs Department.

BASU, A. M. (2011), Demographic Dividend Revisited: The Mismatch between Age and Economic Activity-Based Dependency Ratios, Economic and Political Weekly, Vol. 46, No. 39 (September 24-30, 2011) pp. 53-58, Economic and Political Weekly.

BERTINELLI L. and B. ZOU (2008), Does Urbanization Foster Human Capital Accumulation?, The Journal of Developing Areas, Vol. 41, No. 2 (Spring, 2008), pp. 171-184, College of Business, Tennessee State University.

BLANCHARD O. and J. F. JIMENO (1995), Structural Unemployment: Spain versus Portugal, The American Economic Review, Vol. 85, No. 2, Papers and Proceedings of the Hundredth and Seventh Annual Meeting of the American Economic Association, Washington, D.C. January 6-8, 1995 (May, 1995), pp. 212-218, American Economic Association.

BLOOM D. and D. CANNING (2003), Contraception and the Celtic Tiger, The Economic and Social Review, Vol. 34, No. 3, Winter, 2003, pp. 229-247.

BLOOM D. and D. CANNING (2005), Global Demographic Change: Dimensions and Economic Significance, Harvard Initiative for Global Health, Working Paper Series, Program on the Global Demography of Aging, Working Paper No. 1, April 2005.

BLOOM D., D. CANNING and J. SEVILLA (2002), The Demographic Dividend: A New Perspective on the Economic Consequences of Population Change. Santa Monica, California: RAND, MR– 1274.

BLOOM D., D. CANNING and P. MALANEY (1999), Population Change and Economic Development: The Great Debate Revisited, Consulting Assistance on Economic Reform II (CAER II), Discussion Paper No. 46, November 1999.

BLOOM D., D. CANNING and P. MALANEY (2000), Demographic Change and Economic Growth in Asia, Population and Development Review, Vol. 26.

BLOOM D. and J. E. FINLAY (2008), Demographic Change and Economic Growth in Asia, Working Paper Series, PGDA Working Paper No. 41, September 2008, Program on the Global Demography of Aging.

BLOOM D. and J. G. WILLIAMSON (1998), Demographic Transition and Economic Miracles in Emerging Asia, The World Bank Economic Review, Vol. 12, No. 3 (Sep., 1998), pp. 419-455, Oxford University Press.

BOSERUP E. (1981), Population and Technological Change: A Study of Long-Term Trends, University of Chicago Press, Chicago.

BOVER O., P. GARCIA-PEREA, P. PORTUGAL and P. B. SORENSEN (2000), Labor Market Outliers: Lessons from Portugal and Spain, Economic Policy, Vol. 15, No. 31 (Oct. 2000), pp. 379-428, Wiley on behalf of the Centre for Economic Policy Research, Center for Economic Studies and the Maison des Sciences de l’Homme.

BUĞRA A. (2010), Toplumsal Cinsiyet, İşgücü Piyasaları ve Refah Rejimleri: Türkiye'de Kadın İstihdamı, TÜBİTAK Proje No: 108K524, Eylül 2010, İstanbul.

BUVINIC M., M. DAS GUPTA and U. CASABONNE (2009), Gender, Poverty and Demography: An Overview, The World Bank Economic Review, Vol. 23, No. 3 (2009), pp. 347-369, Oxford University Press.

CHANDRASEKHAR C. P., J. GHOSH and A. ROYCHOWDHURY (2006), The 'Demographic Dividend' and Young India's Economic Future, Economic and Political Weekly, Vol. 41, No. 49 (Dec. 9-15, 2006), pp. 5055-5064.

COLLINS S. M., W. A. PARK (1989), External Debt and Macroeconomic Performance in South Korea, p. 121-140, The National Bureau of Economic Research, University of Chicago Press.

COSTA D. L. (1996), Health and Labor Force Participation of Older Men, 1900-1991, The Journal of Economic History, Vol. 56, No. 1 (Mar., 1996), pp. 62-89, Cambridge University Press on behalf of the Economic History Association.

CUARESMA J. C., W. LUTZ and W. SANDERSON (2013), Is the Demographic Dividend an Education Dividend?, Demography (2014) 51: 299-315, DOI 10.1007/s13524-013-0245-x, 4 December 2013.

ÇALIŞKAN Ş., M. KARABACAK, O. MEÇIK (2013), Türkiye'de Eğitim-Ekonomik Büyüme İlişkisi: 1923-2011 (Kantitatif Bir Yaklaşım) [Relationship Between Education and Economi Growth in Turkey: 1923-2011 (A Quantitative Approach)], Yönetim Bilimleri Dergisi, Cilt: 11, Sayı: 21, ss. 29-48, 2013.

ÇETINSAYA G. (2014), Büyüme, Kalite, Uluslararasılaşma: Türkiye Yükseköğretimi İçin Bir Yol Haritası, Yükseköğretim Kurulu Yayın No: 2014/2, 1. Baskı, Mayıs 2014, Eskişehir.

DIEBOLT C. and F. PERRIN (2013), From Stagnation to Sustained Growth: The Role of Female Empowerment, The American Economy Review, Vol. 103, No. 3, Papers and Proceedings of the One Hundred Twenty-Fifth Annual Meeting of the American Economic Association (May 2013), pp. 545-549, American Economic Association.

DIEP M. A. T. and N. T. HOAI (2015), Demographic Factors and Economic Growth: The Bi-Directional Causality in South East Asia, The Ninth Vietnam Economists Annual Meeting, Da Nang City, 11-12th August 2015.

DINTRANS P. V. (2014), Demographic Transition and Public Policy: Chile 1850-2000, Revista de Analisis Economico, Vol. 29, No. 1, pp. 77-110 (April 2014).

DRUMMOND P., V. THAKOOR, and S. YU (2014), Africa Rising: Harnessing the Demographic Dividend, IMF Working Paper, WP/14/143, African Department, International Monetary Fund.

DUFLO E. (2012), Women Empowerment and Economic Development, Journal of Economic Literature, Vol. 50, No. 4 (DECEMBER 2012), pp. 1051-1079, American Economic Association.

EHRLICH P. (1968), The Population Bomb, Ballentine, New York.

ELOUNDOU-ENYEGUE P. M., Harnessing a Demographic Dividend: Challenges and Opportunities in High and Intermediate Fertility Countries, United Nations Department of Economic and Social Affairs Population Division Expert Paper No. 2013/7.

ERUS B. and N. AKTAKKE (2011), Impact of Healthcare Reforms on Out-of-Pocket Health Expenditures in Turkey for Public Insurees, The European Journal of Health Economics, Vol. 13, No. 3 (June 2012), pp. 337-346, Springer.

FAHEY T., J. FITZGERALD and B. MAITRE (1998), The Economic and Social Implications of Demographic Change, Journal of the Statistical and Social Inquiry Society of Ireland, Vol. XXVII, Part V, March 26, 1998, The Economic and Social Research Institute.

FANG C. and D. WANG (2005), China's Demographic Transition: Implications for Growth, ANU Press.

FEYRER J. (2007), Demographics and Productivity, The Review of Economics and Statistics, Vol. 89, No. 1 (Feb., 2007), pp. 100-109, The MIT Press.

FIELDS G. S. (1994), Changing Labor Market Conditions and Economic Development in Hong Kong, the Republic of Korea, Singapore, and Taiwan, China, The World Bank Economic Review, Vol. 8, No. 3 (Sep., 1994), pp. 395-414, Oxford University Press.

FRY M. and A. MASON (1982), The Variable Rate of Growth Effect in the Life-Cycle Model, Economic Enquiry, Vol. 20.

FUREDI F., Population and Development, A Critical Introduction, Page 75, St. Martin's Press, New York.

GAFAR J. S. (1988), Economic Growth and Economic Policy: Employment and Unemployment in Jamaica, 1972-1984, The Journal of Developing Areas, Vol. 23, No. 1 (Oct., 1988), pp. 63-84, College of Business, Tennessee State University.

GALOR O. and D. N. WEIL (1996), The Gender Gap, Fertility, and Growth, The American Economic Review, Vol. 86, No. 3 (Jun., 1996), pp. 374-387, American Economic Association.

GERALD J. F. (2006), The Story of Ireland’s Failure- and Belated Success, October 15, 2006.

GLEWWE P. and H. H. DANG (2011), Was Vietnam’s Economic Growth in the 1990s Pro-Poor? An Analysis of Panel Data from Vietnam, Economic Development and Cultural Change, Vol. 59, No. 3 (April 2011), pp. 583-608, The University of Chicago Press.

GORDON J. B. (1969), Labor Mobility and Economic Growth: The Central American Experience. Costa Rica and El Salvador, Economic Development and Cultural Change, Vol. 17, No. 3 (Apr., 1969), pp. 319-337, The University of Chicago Press.

GRIBBLE J. N. (2012), South Korea’s Demographic Dividend, November 2012, Population Reference Bureau.

GRIBBLE J. N. and J. BREMNER (2012), Achieving a Demographic Dividend, Population Bulletin, Population Reference Bureau, Vol. 67, No. 2, December 2012.

GÜNSOY G., S. TEKELI (2015), Nüfusun Yaşlanması ve Ekonomik Büyüme İlişkisi: Türkiye Üzerine Bir Analiz, Amme İdaresi Dergisi, Cilt 48, Sayı 1, Mart 2015, s. 35-87.

HAKKERT R. (2007), The Demographic Bonus and Population in Active Ages, Research Paper 7, IPEA/UNFPA Project RLA5P201: Regional Support to Population and Development in the Implementation of the MDGs in the LAC Region, Brasilia DF, October 2007.

HAMMER B., A. PRSKAWETZ and I. FREUND (2015), Production Activities and Economic Dependency by Age and Gender in Europe: A Cross-Country Comparison, The Journal of Economics of Ageing, J Econ Ageing 2015 Apr; 5: 86-97, doi: 10.1016/j.jeoa.2014.09.007.

HANUSHEK E. A. and D. D. KIMKO (2000), Schooling, Labor Force Quality and the Growth of Nations, American Economic Review, 90 (5), 1184-1208.

HANUSHEK E. A. and L. WOESSMANN (2007), Education, Quality and Economic Growth, Washington, D.C., The World Bank.

HARDIMAN N. (2003), Politics and Markets in the Irish 'Celtic Tiger' Experience: Choice, Change, or Coincidence?, ISSC Discussion Paper Series, ISSC WP 2003/14, Institue for the Study of Social Change.

HEADEY D. D. and A. HODGE (2009), The Effect of Population Growth on Economic Growth: A Meta-Regression Analysis of the Macroeconomic Literature, Population and Development Review, 35 (2): 221 - 248, (June 2009).

HIGGINS, M. (1998), Demography, National Savings, and International Capital Flows, International Economic Review, Vol. 39.

HINDE A., Demographic Methods, Page 159-164, Arnold.

HOŞGÖR Ş., A. TANSEL (2010), 2050'ye Doğru Nüfusbilim ve Yönetim: Eğitim, İşgücü, Sağlık ve Sosyal Güvenlik Sistemlerine Yansımalar, TÜSİAD ve Birleşmiş Milletler Nüfus Fonu (UNFPA), İstanbul.

JAMES K. S. (2008), Glorifying Malthus: Current Debate on ‘Demographic Dividend’ in India, Economic and Political Weekly, Vol. 43, No. 25 (Jun. 21-27, 2008), pp. 63-69, Economic and Political Weekly.

JOSHI S. and P. Schultz (2004), Family Planning as an Investment in Development: Evaluation of a Program’s Consequences in Matlab, Bangladesh, Mimeo, Yale University.

JULIAN S. (1981), The Ultimate Resource, Princeton University Press, New Jersey.

KAVAK Y. (2010), 2050’ye Doğru Nüfusbilim ve Yönetim: Eğitim Sistemine Bakış, Yayın No: TÜSİAD-T/2010-11/506, TÜSİAD ve Birleşmiş Milletler Nüfus Fonu (UNFPA), İstanbul.

KAVAK Y. (2011), Türkiye’de Nüfus ve Eğitim: Uzun Vadeli (2010-2050) Nüfus Projeksiyonları ve Eğitim Sistemine Yansımaları, Milli Eğitim, Sayı 192, Güz/2011.

KAVAK Y. (2011), Türkiye’de Yükseköğretimde Büyüme: Yakın Geçmişe Bakış ve Uzun Vadeli (2010-2050) Büyüme Projeksiyonları [Growth of the Higher Education in Turkey: An Overview to Last Decade and Long-Term (2010-2050) Growth Projections], Yüksek Öğretim Dergisi 2011, 1(2): 95-102.

KELKAR G. (2011), Gender and Productive Assets: Implications for Women's Economic Security and Productivity, Economic and Political Weekly, Vol. 46, No. 23 (JUNE 4-10, 2011), pp. 59-68, Economic and Political Weekly.

KELLEY A. and R. SCHMIDT (1996), Saving, Dependency, and Development, Journal of Population Economics, Vol. 9.

KIM D. S. (1994), The Demographic Transition in the Korean Peninsula, 1910-1990: South Korea and North Korea Compared, Korea Journal of Population and Development, Volume 23, Number 2, December 1994.

LEE S. H. (2008), Comments on Intergenerational Transfers, Age Structure and Macroeconomics, WEAI 83rd Annual Conference, Honolulu, USA, July 2, 2008, National Transfer Accounts.

LEE R. and A. MASON, (2006), What is the Demographic Dividend?, Finance and Development, quarterly Magazine of the IMF, September 2006, Volume 43, Number 3.

LEHMIJOKI U. and T. PALOKANGAS (2006), Political Instability, Gender Discrimination, and Population Growth in Developing Countries, Journal of Population Economics, Vol. 19, No. 2 (Jun., 2006), pp. 431-446, Springer.

LIN J. Y. (2009), Economic Development and Structural Change, Lecture at Cairo University, Cairo, Egypt, November 5, 2009.

MALMBERG B., Age Structure Effects on Economic Growth - Swedish Evidence.

MARTINEZ-VAZQUEZ J. and B. TORGLER (2009), The Evolution of Tax Morale in Modern Spain, Journal of Economic Issues, Vol. 43, No. 1 (Mar., 2009), pp. 1-28, Taylor & Francis, Ltd.

MASON A., Demographic Transition and Demographic Dividends in Developed and Developing Countries, Department of Economics, University of Hawaii at Manoa and Population and Health Studies, East-West Center, NIA, R01-AG025488-01.

MASON A. (2001), Population Change and Economic Development: What Have We Learned from the East Asia Experience?, The Meetings of Western Economics Association International, San Francisco, July 5-9, 2001.

MASON A. (2005), Demographic Dividends: The Past, the Present and the Future, November 12, 2005, The Joint International Conference of the 21st Century COE Program of Kobe University and the Japan Economic Policy Association (JEPA).

MASON A. (2013), Overview of Demographic Dividend, Demographic Dividend Working Group, Barcelona, Spain June 5-8, 2013.

MASON A. (2013), National Transfer Accounts and the Demographic Dividend: An Overview, National Transfer Accounts, July 23, 2013, World Bank, Washington, D.C.

MASON A., ed. (2001), Population Change and Economic Development in East Asia: Challenges Met, Opportunities Seized, California, Stanford University Press.

MASON A. and T. KINUGASA (2008), East Asian Economic Development: Two Demographic Dividends, J Asian Econ. 2008 November, 19(5-6): 389-399 doi: 10.1016/j.asieco.2008.09.006, National Institute of Health.

MASON A. and, R. LEE (2006), Reform and Support Systems for the Elderly in Developing Countries: Capturing the Second Demographic Dividend, Genus, LXII(2), pp.11–35.

MASON A., R. LEE, M. ABRIGO and S. LEE (2017), Support Ratios and Demographic Dividends: Estimates for the World, Technical Paper, No. 2017/1, United Nations, Population Division.

MCMAHON W. (2002), Education and Development: Measuring the Social Benefits, New York, Oxford University Press.

MCNICOLL G. (1997), Population and Poverty: A Review and Restatement, Working Papers, 1997, No. 105, Policy Research Division, Population Council.

MCNICOLL G. (2005), Population and Sustainability, Working Papers, 2005, No. 205, Policy Research Division, Population Council.

MINH N. T. (2009), Dynamic Demographics and Economic Growth in Vietnam, CEPR Working Paper, WP-04/2009 Centre for Economic and Policy Research, College of Economics, Vietnam National University Hanoi.

Ministry of Development, Medium Term Programme (2017-2019), October 2016.

Ministry of Development, Economic and Social Indicators (1950-2014), July 2015, 8. Section: Developments in Social Indicators, Page 243-271.

MITRA S. and R. NAGARAJAN (2005), Making Use of the Window of Demographic Opportunity: An Economic Perspective, Economic and Political Weekly, Vol. 40, No. 50, (Dec. 10-16, 2005), pp. 5327-5332, Economic and Political Weekly.

MOIR H. (1976), Relationship between Urbanization Levels and the Industrial Structure of the Labor Force, Economic Development and Cultural Change, Vol. 25, No. 1 (Oct., 1976), pp. 123-135, The University of Chicago Press.

National Research Council (1986), Population Growth and Economic Development: Policy Questions, National Academy Press, Washington.

OECD Economic Surveys - Turkey, July 2016, Overview, www.oecd.org/eco/surveys/economic-survey-turkey.htm

OECD Employment Outlook 2017, "How does Turkey compare?", OECD Directorate for Employment, Labor and Social Affairs.

OECD Government at a Glance 2017, Country Fact Sheet, Turkey, www.oecd.org/gov/govataglance.htm

OĞUZ G. (1995), Industrialization Experience of Turkey in a Global Context, The American Journal of Economics and Sociology, Vol. 54, No. 3 (Jul., 1995), pp. 369-371, American Journal of Economics and Sociology, Inc.

OIZUMI K. (2011), How Long will China's Demographic Dividend Continue? – A Question with Implications for Sustainable Economic Growth – Pacific Business and Industries Vol. XI, 2011 No. 39.

ONIS Z. (2009), Beyond the 2001 Financial Crisis: The Political Economy of the New Phase of Neo-Liberal Restructuring in Turkey, Review of International Political Economy, Vol. 16, No. 3, Finance (Aug., 2009), pp. 409-432, Taylor & Francis, Ltd.

OZTURK I. and A. ACARAVCI (2010), Testing the Export-Led Growth Hypothesis: Emprical Evidence from Turkey, The Journal of Developing Areas, Vol. 44, No. 1 (Fall 2010), pp. 245-254, College of Business, Tennessee State University.

PARK D. and J. PARK (2010), Drivers of Developing Asia's Growth: Past and Future, ADB Economics Working Paper Series, No. 235, November 2010, Asian Development Bank.

PATXOT C., E. RENTERIA, M. S. ROMERO and G. SOUTO (2009), The Impact of Changes in Population Age Structure on the Economic Growth of Spain, XXVI IUSSP Conference, Marrakesh 27 Sept – 2 October 2009.

PERSSON J. (2002), Demographics, Human Capital, and Economic Growth: A Study of U.S. States 1930-2000, FIEF working paper.

PHANG H. S., Demographic Dividend and Labor Force Transformations in Asia: The Case of the Republic of Korea, Korea Labor Institute.

POOL I. (2004), Demographic Dividends, Window of Opportunity and Development: Age Structure, Population Waves and Cohort Flows, CICRED Seminar, Paris, 23-26 February 2004.

POOL I. (2007), Demographic Dividends: Determinants of Development or Merely Windows of Opportunity?, Ageing Horizons Issue No 7, 28–35, Oxford Institute of Ageing.

PRSKAWETZ A., J. SAMBT (2014), Economic Support Ratios and the Demographic Dividend in Europe, Demographic Research, Volume 30, Article 34, Pages 963-1010, Published 1 April 2014.

PSACHAROPOULOS G. (2006), The Value of Investment in Education: Theory, Evidence, and Policy, Journal of Education Finance, 32:2, Fall, 113-136.

PSACHAROPOULOS G. and H. A. PATRINOS (2004), Returns to Investment in Education: A Further Update, Education Economics, 12 (2): 111-134.

PUIG N. and R. CASTRO (2009), Patterns of International Investment in Spain, 1850-2005, The Business History Review, Vol. 83, No. 3 (Autumn, 2009), pp. 505-537, The President and Fellows of Harvard College.

QUEIROZ B. L., C. M. TURRA (2010), Window of Opportunity: Socioeconomic Consequences of Demographic Changes in Brazil, ResearchGate.

RENTERIA E., G. SOUTO, I. MEJIA-GUEVARA and C. PATXOT (2016), The Effect of Education on the Demographic Dividend, Population and Development Review 42(4): 651-671 (December 2016).

RENTERIA E., G. SOUTO, I. MEJIA-GUEVARA and C. PATXOT (2016), The Impact of Education on the Demographic Dividend, Ageing Europe – An Application of National Transfer Accounts for Explaining and Projecting Trends in Public Finances, Working Paper 3/2016.

RODRIGUEZ-WONG L. and J. A. M. DE CARVALHO (2004), Age Structural Transition in Brazil – Demographic Bonuses and Emerging Challenges, Committee for International Cooperation in National Research in Demography (CICRED) Seminar.

ROWLAND D. T., Demographic Methods and Concepts, Page 16-24, Oxford University Press.

ROY S. K. and S. ROY (2014), Demographic Dividend in India: A Synoptic View, International Journal of Business and Administration Research Review, Vol.2, Issue.4, (Jan-March, 2014), pp. 166-175.

SANCHEZ-ROMERO M. (2013), The role of demography on per capita output growth and saving rates, Journal of Population Economics, Vol. 26, No. 4 (October 2013), pp. 1347-1377, Springer.

SANCHEZ-ROMERO M., G. ABIO, C. PATXOT and G. SOUTO (2016), Contribution of Demography to the Spanish Economic Growth from 1850 to 2000, April 29, 2016.

SANDOVAL L. (2012), The Effects of Education on Brazil's Economic Development, Global Majority E-Journal, Vol. 3, No. 1 (June 2012), pp. 4-19.

SCHULTZ T. P. (2009), The Gender and Intergenerational Consequences of the Demographic Dividend: An Assesment of the Micro and Macro Linkages between the Demographic Transition and Economic Development, The World Bank Economic Review, Vol. 23, No. 3 (2009), pp. 427-442, Oxford University Press.

SHORTER F. C., M. MACURA (1982), Trends in Fertility and Mortality in Turkey, 1935-1975, Panel on Turkey, Committee on Population and Demography Assembly of Behavioral and Social Sciences National Research Council, Report No. 8, National Academy Press, Washington, D.C.

SO D. and P. T. O VIET NAM (2003), An Overview of Population and Development in Vietnam, Population Reference Bureau and the Vietnamese National Committee for Population and Family Planning, February 2003.

TANSEL A. (2012), 2050'ye Doğru Nüfusbilim ve Yönetim: İşgücü Piyasasına Bakış, Yayın No: TÜSİAD-T/2012-11/536, TÜSİAD ve Birleşmiş Milletler Nüfus Fonu (UNFPA), İstanbul.

T.C. Kalkınma Bakanlığı, İşgücü Piyasasındaki Gelişmelerin Makro Analizi, Ekonomik Modeller ve Stratejik Araştırmalar Genel Müdürlüğü, Ekonomik ve Stratejik Araştırmalar Dairesi, 2017-II.

United Nations (2004), World Population Monitoring 2003: Population, education and development, UN Department of Economic and Social Affairs, Population Division.

United Nations (2004), World Population to 2300, UN Department of Economic and Social Affairs, Population Division.

United Nations, World Population Prospects (2015 Revision), Key Findings and Advance Tables, Department of Economic and Social Affairs Population Division, ESA/P/WP.241.

United Nations, World Economic Situation and Prospects 2017, Pages 1-57 UN/DESA, UNCTAD, ECA, ECE, ECLAC, ESCAP, ESCWA and UNWTO.

VAN DER VEN R. and J. SMITS (2011), The Demographic Window of Opportunity: Age Structure and Sub-National Economic Growth in Developing Countries, Nijmegen Center for Economics (NiCE) Institute for Management Research Radboud University Nijmegen, NiCE Working Paper 11-102, April 2011.

VINCELETTE G. (2010), Growth Accounting Presentation, Economic Policy and Debt Department, The World Bank, January 2010, JVI, Vienna.

WEIL D. N. (1999), Population Growth, Dependency and Consumption, The American Economic Review, Vol. 89, No. 2, Papers and Proceedings of the One Hundred Eleventh Annual Meeting of the American Economic Association (May, 1999), pp. 251-255, American Economic Association.

WOESSMANN L. and G. SCHÜTZ (2006), Efficiency and Equity in European Education and Training Systems, Analytical Report for the European Commission prepared by the European Expert Network on Economics of Education (EENEE) to accompany the Communication and Staff Working Paper by the European Commission, 26 April 2006.

World Bank Country Overview – Vietnam
(http://www.worldbank.org/en/country/Vietnam/overview)

World Bank Report, Female Labor Force Participation in Turkey: Trends, Determinants and Policy Framework, Report No 48508-TR, November 23, 2009, Human Development Sector Unit, Europe and Central Asia Region, T.R. Prime Ministry, State Planning Organization and Worldbank.

ZHANG J. (2002), Urbanization, Population Transition and Growth, Oxford Economic Papers, Vol. 54, No. 1 (Jan., 2002), pp. 91-117, Oxford University Press.

ZHANG, J. and J. ZHANG (2005), The Effect of Life Expectancy on Fertility, Saving, Schooling and Economic Growth: Theory and Evidence, The Scandinavian Journal of Economics, Vol. 107, No. 1 (Mar., 2005), pp. 45-66, Wiley on behalf of the Scandinavian Journal of Economics.

APPENDIX A

ADDITIONAL COUNTRY COMPARISON TABLES AND FIGURES

Education

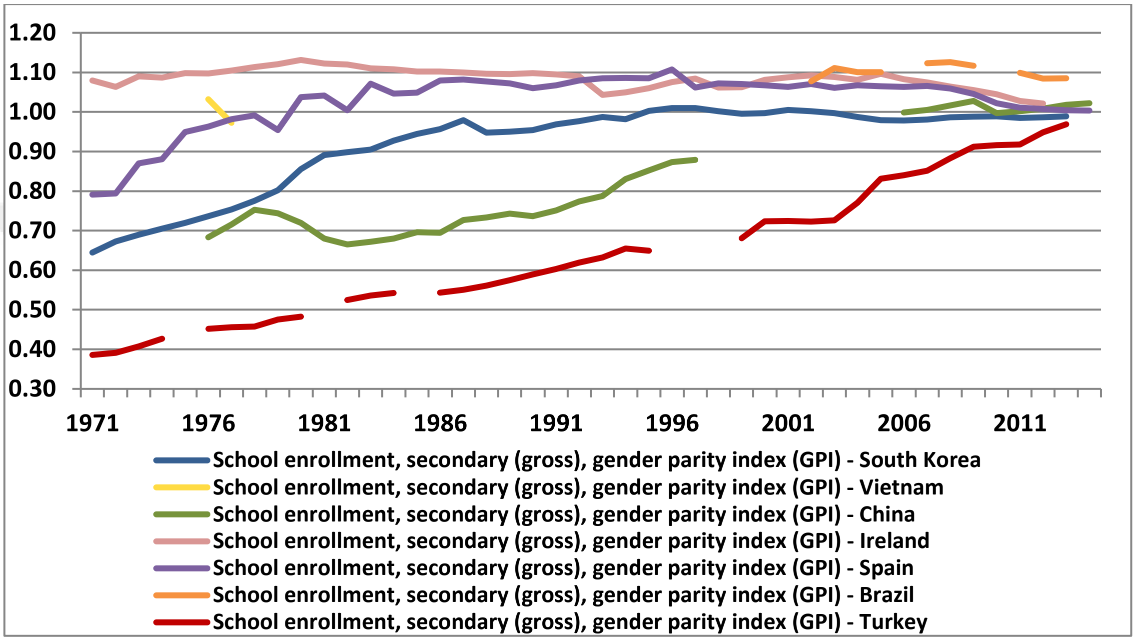
Government Expenditure on Education (% of GDP)

*	Government expenditure on education, total (% of GDP) - South Korea	Government expenditure on education, total (% of GDP) - China	Government expenditure on education, total (% of GDP) - Ireland	Government expenditure on education, total (% of GDP) - Spain	Government expenditure on education, total (% of GDP) - Brazil	Government expenditure on education, total (% of GDP) - Turkey
1978	N/A	1.97	5.07	2.24	N/A	4.35
1979	2.90	2.17	5.29	2.34	N/A	2.92
1981	2.77	1.96	5.74	N/A	N/A	2.21
1982	6.08	2.05	5.39	N/A	N/A	1.75
1983	4.18	2.09	5.45	N/A	N/A	2.65
1984	3.91	2.01	5.29	N/A	N/A	2.03
1985	3.89	2.02	5.25	N/A	N/A	1.74
1986	3.55	2.08	5.31	N/A	N/A	1.51
1993	3.70	1.66	5.12	4.26	N/A	3.37
1994	3.05	1.99	5.19	4.50	N/A	3.42
1995	2.97	1.85	4.88	4.45	4.47	2.25
1998	3.43	1.85	4.29	4.30	4.74	0.00
1999	3.45	1.90	4.14	4.27	3.78	2.96
2000	N/A	N/A	4.14	4.18	3.94	2.59
2001	3.90	N/A	4.09	4.12	3.84	2.71
2002	3.79	N/A	4.11	4.14	3.74	2.82
2003	4.13	N/A	4.20	4.17	N/A	2.96
2004	4.12	N/A	4.49	4.15	3.97	3.12
2006	3.97	N/A	4.55	4.17	4.87	2.86

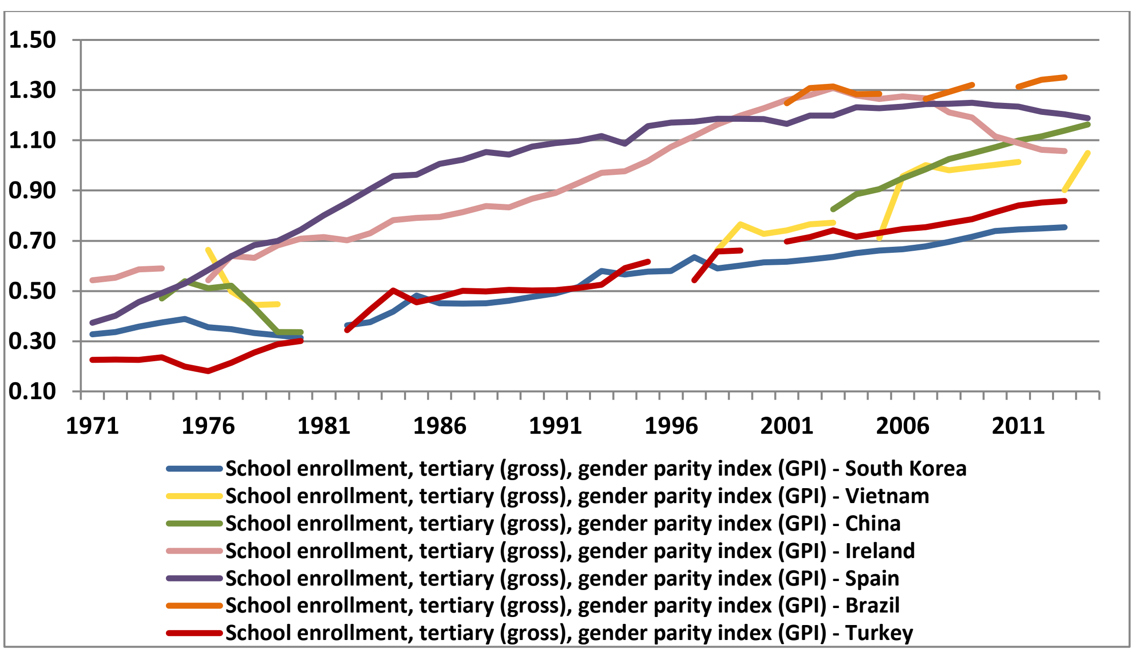
** Years are selected considering the data availability for Turkey in order to compare Turkey with the selected countries.*

Gender and Inequality

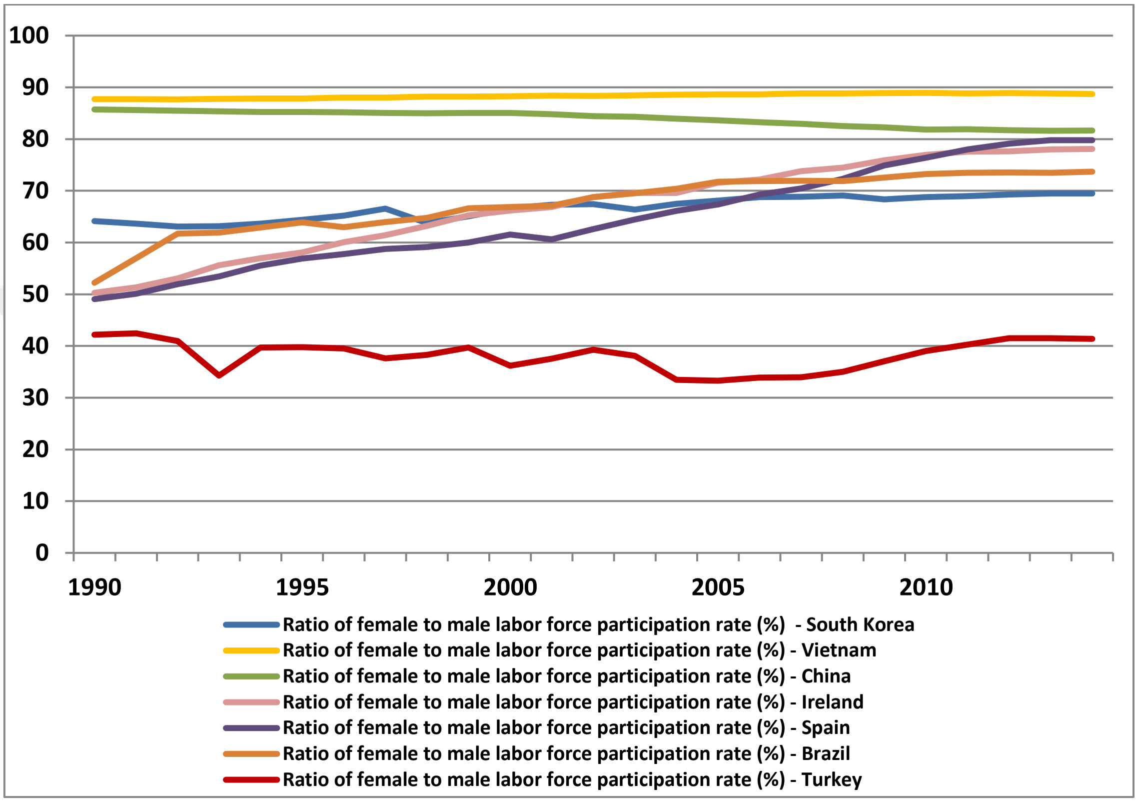
Gender Parity Index (School Enrolment - Secondary)



Gender Parity Index (School Enrolment - Secondary)

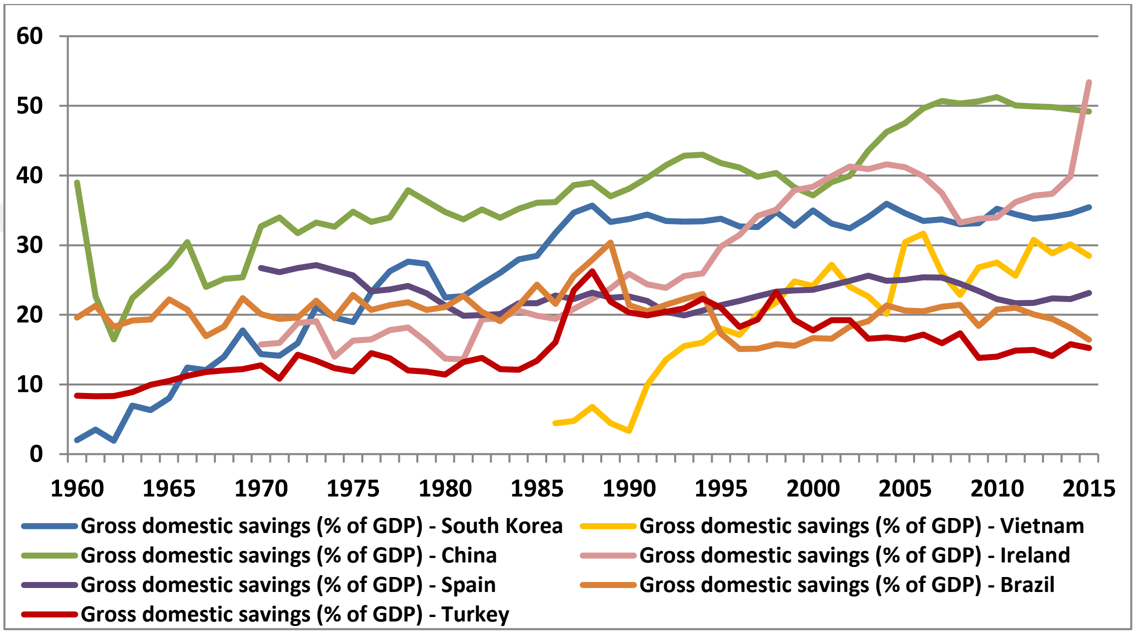


Ratio of female to male labor force participation rate

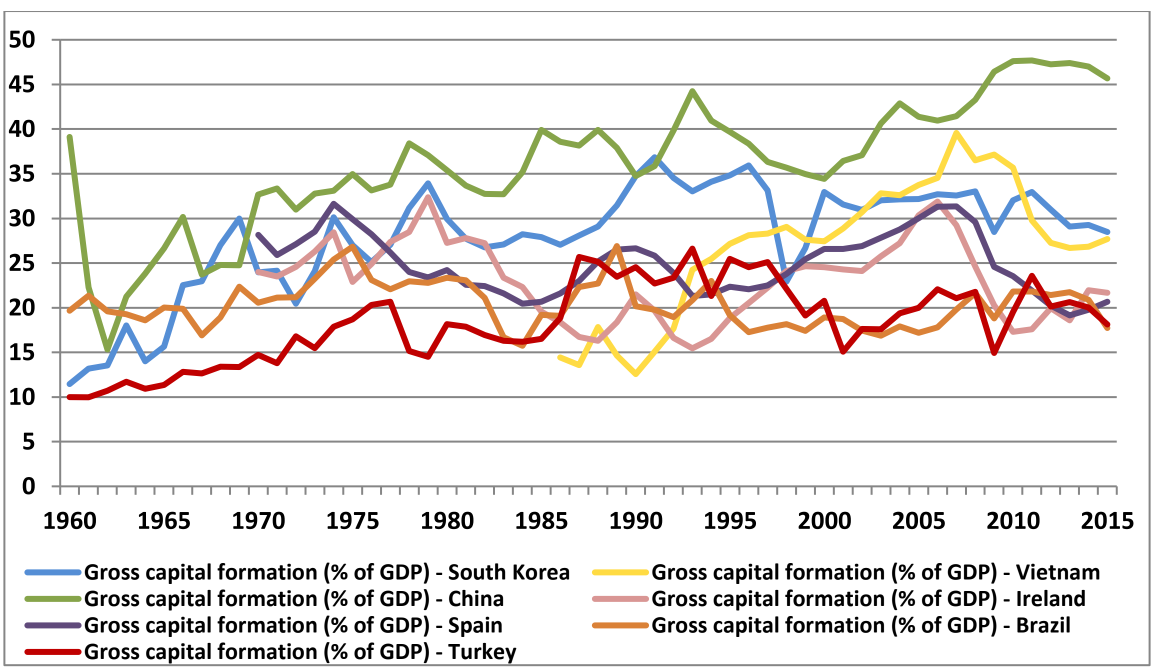


Economy

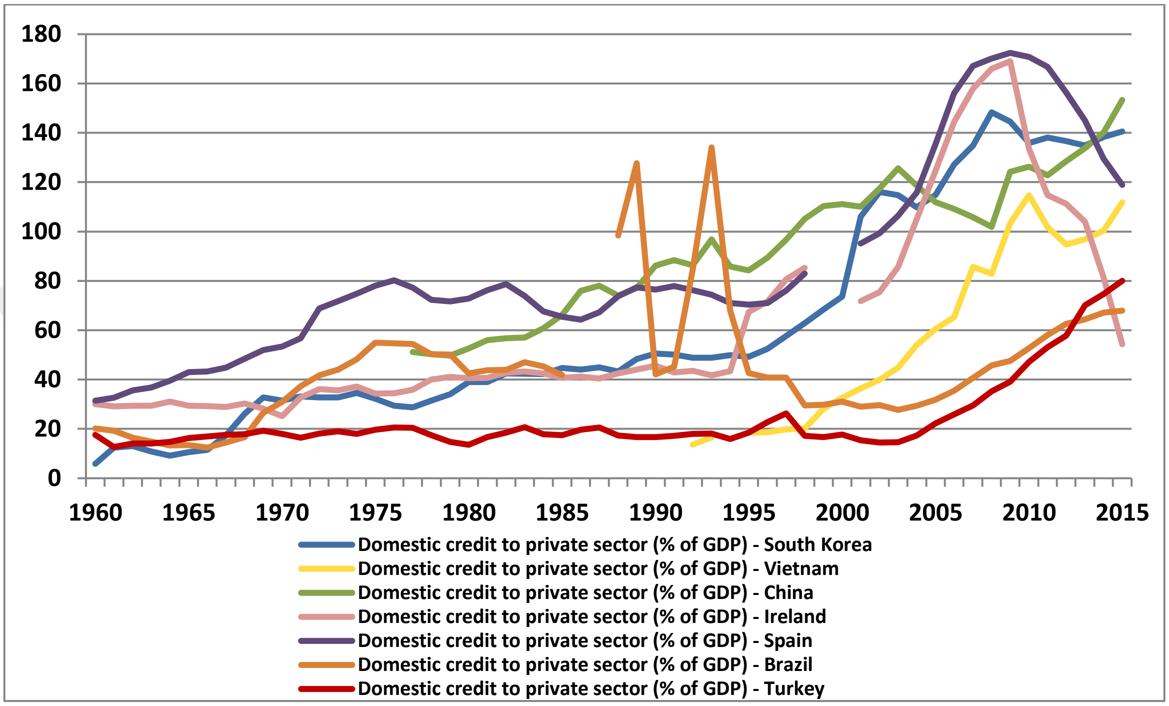
Gross domestic savings



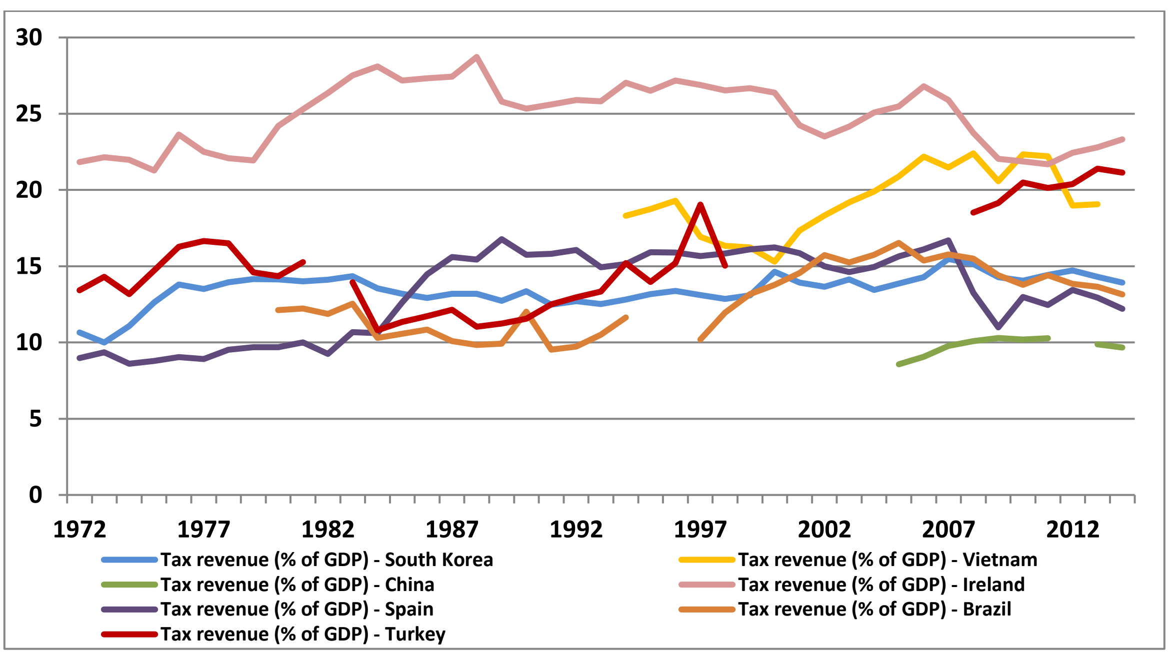
Gross capital formation



Domestic credit to private sector

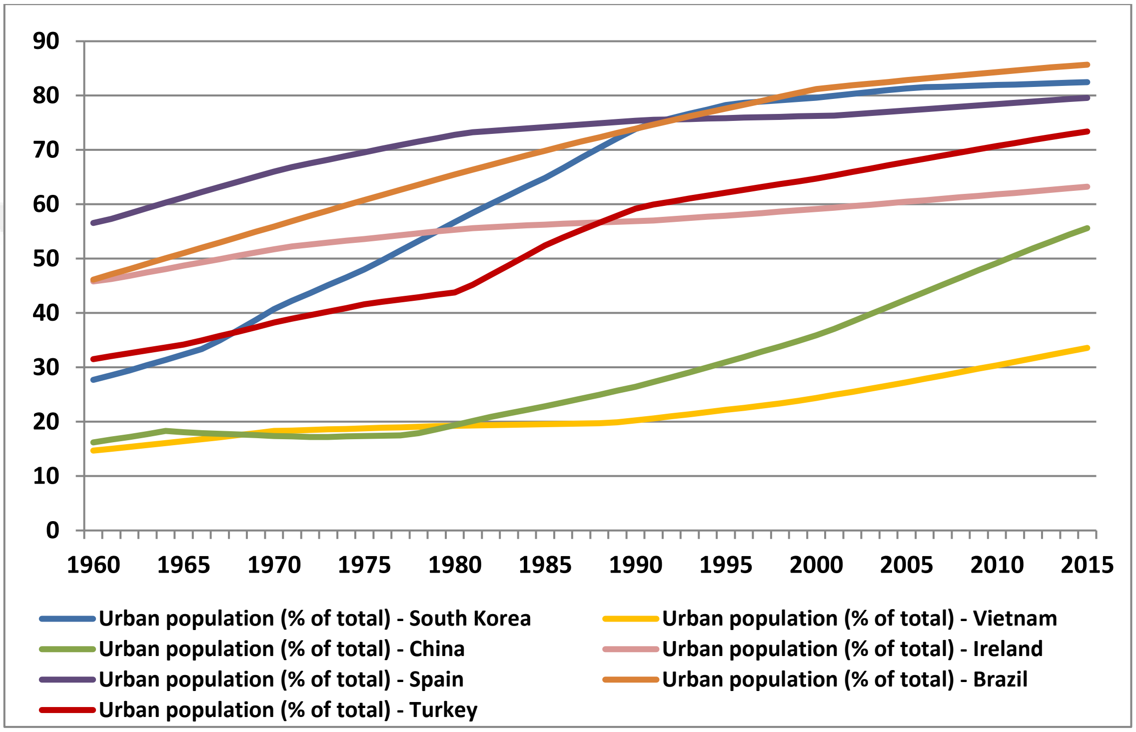


Tax revenue



Modernization

Urbanization



APPENDIX B

MULTIPLE LINEAR REGRESSION ANALYSIS METHOD

Multiple linear regression analysis is a method used to interpret the strength of the relationship between a response or dependent variable and two or more explanatory or independent variables. As the independent variables show correlation to some extent, it is more appropriate to use the word explanatory. In other words, multiple linear regression analysis seeks to explain the variance in response variable with the variances in the explanatory variables chosen. It is important to underline that the response variable has to be continuous-level data, which is in the form of interval or ratio scale. On the other hand, explanatory variables can be in the form of continuous, binary and categorical data.

Assumptions of Multiple Linear Regression Analysis:

When the multiple linear regression analysis is run, following assumptions have to hold in order to satisfy the accuracy of the method. Assumptions checked can be listed as;

1. **Minimum Required Number of Observations:**

   Minimum requirement for number of observations can be defined as 5 observations per explanatory variable. However, it is recommended to have 20 observations for each explanatory variable in the regression equation.

2. **Multicollinearity among Explanatory Variables:**

   Explanatory variables must not show multicollinearity, which means high correlation between each other. Multicollinearity causes issues in determining which explanatory variable contributes and to what extend to the variation of the response variable. So the correlations between each of the explanatory variables are needed to be checked. Pearson's correlation coefficients for the explanatory variables are advised to be smaller than the value 0.7.

Tolerances values, which are defined as the percentage of the variance of that specific explanatory variable that cannot be explained by the other explanatory variables, should be greater than 0.3. When the tolerance values are very small and close to zero, multicollinearity problem arouses. In that case, the standard error terms of the regression coefficients are inflated. In order to check for this problem, variance inflation factors (VIF) are used. VIF values should be smaller than 2.

Zero order, partial and part correlations can be checked for all of the explanatory variables included in the models. A sharp decrease in the correlation values while passing through from zero order to partial and part correlations indicates a possible multicollinearity problem.

Also, eigenvalues and condition index, which are given by the collinearity diagnostics, can also be checked against multicollinearity. Small eigenvalues, which are close to zero, point out that the explanatory variables are highly intercorrelated. In such a case, small changes in the data might result in large changes in the estimated coefficients. On the other hand, condition index values higher than 15 can be taken as a warning of collinearity. The index values are higher than 30, mean a serious collinearity problem. The condition index values are calculated by simply taking the square roots of the ratios of the largest eigenvalue to each of the individual eigenvalues.

3. Homoscedasticity:

The variance of the unobservable error term ε should be constant and consequently should be unconditional on explanatory variables. In other words, along the best fit line of the regression the variance values of the residual is expected to remain close. In order to test this assumption, the scatterplot of the standardized residuals versus standardized predicted values are checked. The distribution of the points on the scatterplot are supposed to be random; meaning there are not only no signs of a linear increasing or decreasing trend, but also no narrowing or widening shape of dots along the x axis.

4. Serial Correlation or Autocorrelation:

The impact of serial correlation or autocorrelation on standard errors and efficiency of estimators is bigger compared to heteroskedasticity problem. In addition, in case of serial correlation, the test for heteroskedasticity will not be valid. So, it is essential to solve serial correlation problem first, before running tests for heteroskedasticity.

In time series data, serial correlation is commonly seen. In case of serial correlation, error terms in time series are transferred from one to the other among periods. In other words, error term in one period can be correlated with error term in the previous period. If there is serial correlation among the error terms, then;

$\text{Cov}(u_i, u_j) \neq 0$, for $i \neq j$

Serial correlation is usually in first-order form, where the error in a period is carried over to the next period. Serial correlation can also be in second-order form, if the error is transferred from one period to two periods later. Serial correlation whose forms are higher than two is also possible but very rarely observed.

The k_{th} order serial correlation can be formulized by an autoregressive process as in Equation 1;

$$AR(k) : u_t = \rho_1 * u_{t-1} + \rho_2 * u_{t-2} + \ldots + \rho_k * u_{t-k} + v_t \quad \text{[Equation 1]}$$

The generalized formulation for a first order autoregressive process in multiple linear regression model can be expressed as given in Equation 2 and Equation 3;

$$y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i1} + \ldots + \beta_{(p-1)} x_{i(p-1)} + \varepsilon_i \quad \text{[Equation 2]}$$

$$\varepsilon_i = \rho \, \varepsilon_{i-1} + u_i \quad \text{[Equation 3]}$$

Serial correlation might lead to several problems, such as;

- In a time series when there is positive correlation and an explanatory variable which is growing by time,
  - Standard errors are smaller than they really are.
  - R^2 is bigger than it should be.
- T-statistics are expected to be larger than they really are.
- Coefficients of the regression can be statistically significant even though they should not be.
- Ordinary Least Square estimates can be inefficient and so the forecasts based on them.

In SPSS, to test for serial correlation, a plot for the residuals can be displayed or Durbin-Watson test can be run.

Durbin-Watson Test:

It is a test that checks whether there is an autocorrelation among the residuals of the multiple linear regression models used. Especially when time series data is used, positive autocorrelation among residuals from an ordinary least square regression is commonly seen. The null hypothesis of the Durbin Watson test states that the residuals do not exhibit autocorrelation, which can be presented as below using the autocorrelation parameter ρ.

H_o: ρ = 0

It should be noted that if ρ = 0, it means that $\varepsilon_t = u_t$. This equation can be interpreted as, the error terms ε_t are independent since the disturbance terms u_t are independent.

While calculating the Durbin-Watson test statistics, which is denoted as D, the residuals of the ordinary least squares regression functions are derived simply subtracting fitted values from the observed values of the response variable and then D value is calculated as shown in Equation 4 and Equation 5;

$e_t = y_t - \hat{y}_t$ [Equation 4]

$D = \frac{\sum_{t=2}^{n}(e_t - e_{(t-1)})^2}{\sum_{t=1}^{n} e_t^2}$ [Equation 5]

where;

n: number of observations,

e_t: residual at time t,

$e_{(t-1)}$: residual at time (t-1).

In Durbin-Watson statistics, as exact boundaries are not easy to form, the test has lower and upper bounds which are denoted as d_L and d_U respectively. The decision rule for accepting or rejecting the null hypothesis can be defined as;

If $D > d_U$, then accept H_0,

If $D < d_L$, then reject H_0,

If $d_L \leq D \leq d_U$, then the test is inconclusive.

When the calculated D value is small, it can be stated that the consecutive error terms are close to each other in magnitude, pointing out a positive correlation. In other words, the denominator of the ratio has to be small for a small test statistics, meaning the difference in consecutive error terms is also small, which indicates a positive correlation with the autocorrelation parameter $\rho > 0$.

In the study, two sets of Durbin-Watson significance tables are used to test for the autocorrelation problem. Tables from Savin and White (1977) are, used for the models including an intercept. In these tables, the number of observations ranges from 6 to 200 and number or explanatory variables is between 1 and 20. On the other hand, tables from Farebrother (1980) are used for regression models, in which no intercept is included. In tables from Farebrother (1980), the number of observations is from 2 to 200 and number of explanatory variables is between 0 and 21. While using the tables, cross-references are made using number of observations and number of explanatory variables used in the models, in order to determine tabulated bounds to evaluate the null hypothesis.

5. **Multivariate Outliers:**

   In the data no significant outlier should remain. These outliers can adversely affect the regression line, resulting in reduced accuracy of the regression equation and its statistical significance. This problem can be overcome by using casewise diagnostics. The residual statistics table produced by casewise diagnostics can be used for detecting the outliers. Mahalanobis distances and Cook's distances can be checked for this procedure and it is advised to take out the observations exceeding the maximum values for these distances. Mahalanobis distance is supposed to be less than the critical chi-square value with degrees of freedom, which is equal to the number of predictors. The critical α value is taken to be equal to 0.01. On the other hand, Cook's distance should not be greater than 1.

6. **Distribution of the Residuals:** The residuals of the regression equation are desired to have a normal distribution. The histogram of the standardized residual values, which is expected to be in general normally distributed with a mean value of approximately zero, is used to check for this assumption.

Multiple Regression Model:

The MLR model for the response variable (y), for its n number of observations (y_1, y_2, …, y_n) and (p-1) number of explanatory variables (x_1, x_2,…, $x_{(p-1)}$), each with n number of observed values (x_{11}, x_{21}, …, $x_{(p-1)n}$) can be written as presented in Equation 6;

$y_i = \beta_0 + \beta_1 x_{11} + \beta_2 x_{21} + \beta_j x_{ji} + \ldots + \beta_{(p-1)} x_{(p-1)n} + \varepsilon_n$

$(i = 1, \ldots, n \text{ and } j = 1, \ldots, (p-1))$ [Equation 6]

where;

y_i: The response variable with n number of observations,

β_0: The constant of the regression equation,

β_j: The regression coefficients for (p-1) number of explanatory variables,

x_j: The (p-1) number of explanatory variables, each with n number of observations,

ε_i: The residual or error term for each n number of observations of the response variable.

However for the following equations a more general form of regression equation will be taken into account which is given by Equation 7.

$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_j x_j + \ldots + \beta_{(p-1)} x_{(p-1)} + \varepsilon$

$(j = 1, \ldots, (p-1))$ [Equation 7]

The regression coefficients of the explanatory variables indicate the estimated change in the response variable resulted from a unit change in the explanatory variable, under the condition that all other explanatory variables are remain constant. Least squares method is the most common one which is used for the calculation of the regression coefficients. For each case, the difference between the observed response variable and the calculated response variable value is defined as the residual or the error term. The expected characteristics of the error term of the regression equation are explained briefly in the assumptions part.

The meanings of the regression coefficients can also be expressed mathematically by taking partial derivatives of the mean response with respect to explanatory variables as shown in Equation 8.

$$\beta_j = \frac{\partial E\{Y\}}{\partial X_j} \quad (j = 1, \ldots, (p-1)) \qquad \text{[Equation 8]}$$

where;

β_i: The (p-1) number of regression coefficients,

E {Y}: Mean response;

X_j: The (p-1) number of explanatory variables,

Ordinary least squares regression model aims to minimize the total sum of squared error (SSE), which is the sum of the squared values of difference between the predicted and the observed values of the response variable. Similarly, the sum of squares of the regression (SSR) is calculated by summing up the squares of the difference between each predicted value and the mean of the observed values of the response variable. The total sum of squares (SST) can be derived by adding SSR with SSE. The mathematical impression for sum of squares is shown Equation 9, 10, and 11 as following;

$$\text{SSR} = \sum_{i=1}^{n}(\hat{y}_i - \bar{y})^2 \qquad \text{[Equation 9]}$$

SSE = $\sum_{i=1}^{n}(\hat{\varepsilon})^2$ [Equation 10]

SST = $\sum_{i=1}^{n}(y_i - \bar{y})^2$ [Equation 11]

The variability in observed response variable can be divided into two parts, which are the variability in explanatory variables and the variability in error terms. The related formulation can be shown as following in Equation 12;

SST = SSR + SSE [Equation 12]

The mean squares of MSR and MSE can be calculated by dividing the sum of squares of regression and the sum of squares of the error by their degrees of freedom, which is (p-1) for the sum of squares of the regression and (n-p) for the sum of squares of the error. The related formulations are shown in Equation 13 and 14 as following;

MSR = $\frac{\mathrm{SSR}}{(\mathrm{p}-1)}$ [Equation 13]

MSE = $\frac{\mathrm{SSE}}{(\mathrm{n}-\mathrm{p})}$ [Equation 14]

Testing the Significance of the Regression Model:

The statistical significance of the model is tested by examining whether one or more of the explanatory variables included in the regression model can explain the variation in the response variable. The null hypothesis (H_0), which can be denoted as in Equation 15, argues that none of the explanatory variables has an effect on the response variable.

$H_0: \beta_1 = \beta_2 = \ldots = \beta_{(p-1)} = 0$ [Equation 15]

If the null hypothesis is rejected, then it can be stated that at least one of the explanatory variable is useful in explaining the variation in the response variable.

F test is run for testing the significance of the overall model can be formulated as in Equation 16.

$$F_0 = \frac{\frac{SSR}{(p-1)}}{\frac{\mathrm{SSE}}{(n-p)}} = \frac{\mathrm{MSR}}{\mathrm{MSE}}$$ [Equation 16]

If a significance level of 95 percent is accepted; then the related α value should be taken as 0.05, which is the case for the regression analysis in this study. While testing the significance of the overall model, the F distribution, which is sometimes called as the null distribution, is needed to check whether the null hypothesis can be rejected. The two parameters related to the F distribution are the degrees of freedom of the numerator and the denominator in the F ratio shown in Equation 16. The third and the last parameter of F distribution is (1 – α) value. Taking into account all these, the conditions to reject or accept null hypothesis can be summarized as following;

If $F_0 \leq F\ (1 - \alpha;\ p\text{-}1;\ n\text{-}p)$, then accept H_0,

If $F_0 > F\ (1 - \alpha;\ p\text{-}1;\ n\text{-}p)$, then reject H_0.

Alternatively, the significance of the overall model can be tested by comparing the probability value, also called as the p-value, from the F distribution with α value which is taken as 0.05 for the regression analysis of this study. So the null hypothesis is accepted or rejected by checking the following criteria:

If p-value ≤ α (0.05), then reject H_0,

If p-value > α (0.05), then not reject H_0.

The Coefficient of Multiple Determination:

R^2, which is named as the coefficient of multiple determination, identifies to what extent the model is successful in explaining the variation in the response variable. In other words, R^2 indicates how much of the variation in response variable can be attributed to the variations in the explanatory variables of the model. The formulation of the coefficient of multiple determination can be shown as in Equation 17.

$$R^2 = \frac{SSR}{SST} = 1 - \frac{SSE}{SST} \qquad (0 \leq R^2 \leq 1) \qquad \text{[Equation 17]}$$

The value of R^2 can neither be negative nor bigger than 1, as the value of sum of squares of regression cannot exceed the value of total sum of squares and both sum of squares cannot have negative values. A similar term, which is the coefficient of multiple correlation, is denoted as R and its value is equal to the positive square root of the coefficient of multiple determination.

It is important to note that when a new variable is added into the multiple linear regression model, the R^2 increases under the condition that the added variable is not a linear function of one of the other variables. As the main purpose of the regression model used is understanding the causes of the variations of the response variable, adding only the related variables in the model will be more meaningful.

Testing the Significance of Each Explanatory Variable in the Regression Model:

Besides testing the significance of the model, the significance of each of the explanatory variable has to be tested in order to avoid adding statistically insignificant variables to the model. The null hypothesis assumes that the contribution of the variable to the model is not significant and it should not be in the model. The null hypothesis can be denoted as in Equation 18.

H_0: $\beta_j = 0$ [Equation 18]

By using test statistics, or shortly t statistics, the significance of the β_j values of each of the explanatory variables are checked. By test statistics the t-values are calculated in order to evaluate the accuracy of the null hypothesis. T-values are derived by the following formula represented in Equation 19.

$$t_{\mathrm{b}_j} = \frac{\mathrm{b}_j}{SE_{bj}} \qquad j = 1, \ldots, (p-1) \qquad \text{[Equation 19]}$$

where;

t_{b_j}: t-statistics for each unbiased estimates of β_j for j = 1, …, (p-1),

b_j: unbiased estimates of β_j for j = 1, …, (p-1),

SE_{bj}: Standard error of b_j.

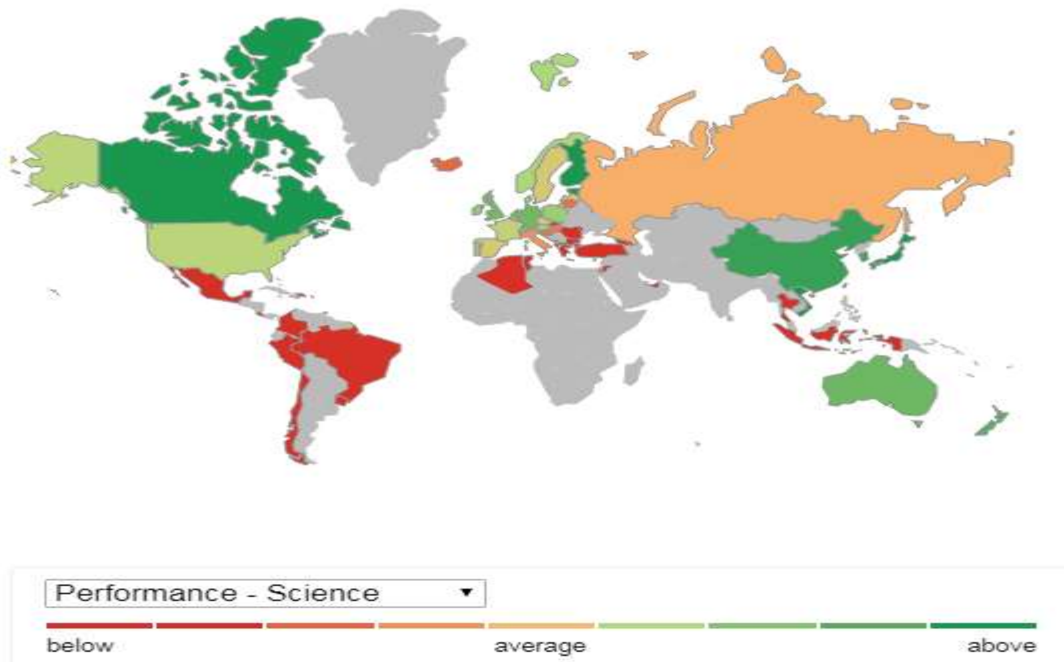
T distribution has (n–p) degrees of freedom for n number of observations and (p-1) number of explanatory variables. Following criteria is applied while evaluating acceptance or rejection of the null hypothesis.

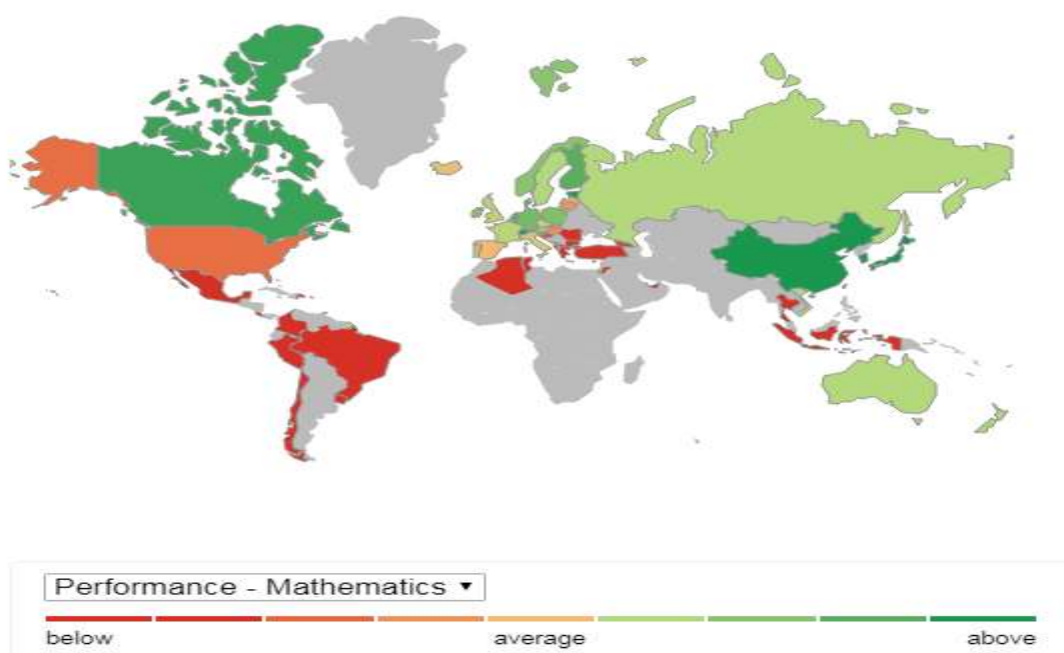
If $|t_j| < t_{(1-\alpha/2;\, n-p)}$, then accept H_0

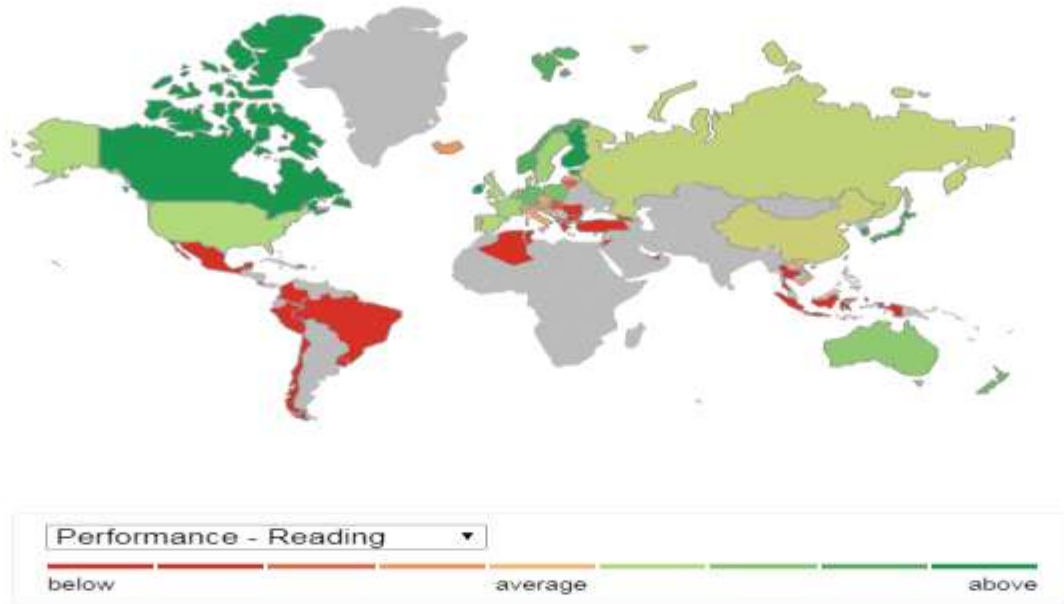
In SPSS outputs, the p values for each of the explanatory variables are evaluated in order to check whether the variables included in the model has a meaningful addition. The p values lower than 0.05 allow the rejection of the null hypothesis. The smaller the p value, the more meaningful the addition of the variable in the regression model.

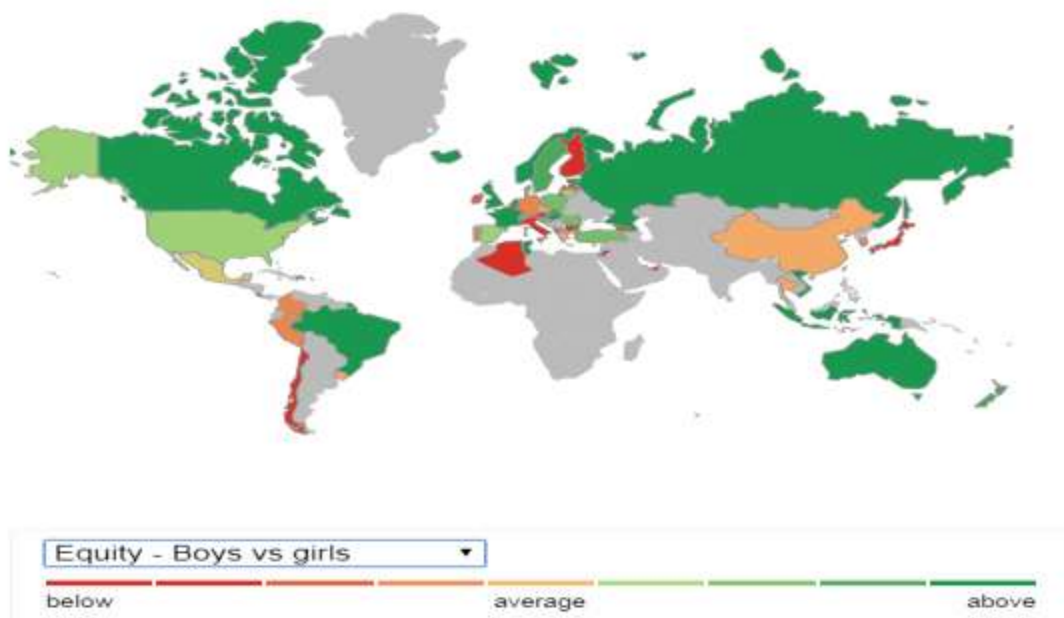
APPENDIX C

PISA TEST RESULTS 2015









Source: OECD Web Site (www.oecd.org/pisa/)

APPENDIX D

ADDITIONAL DEMOGRAPHIC AND ECONOMIC INDICATOR TABLES

Life Expectancy at Birth by Cities (Both Sexes)

Region Name	Life expectancy at birth	Region Name	Life expectancy at birth	Region Name	Life expectancy at birth
Adana	77.40	Elazığ	78.50	Mardin	80.30
Adıyaman	79.50	Erzincan	79.10	Mersin	78.30
Afyonkarahisar	77.00	Erzurum	77.30	Muğla	80.50
Ağrı	75.60	Eskişehir	77.50	Muş	77.50
Aksaray	78.20	Gaziantep	76.70	Nevşehir	77.60
Amasya	77.80	Giresun	80.10	Niğde	78.40
Ankara	79.40	Gümüşhane	79.90	Ordu	79.80
Antalya	79.20	Hakkari	77.30	Osmaniye	78.60
Ardahan	76.60	Hatay	77.90	Rize	79.60
Artvin	79.30	Iğdır	78.30	Sakarya	77.50
Aydın	78.70	Isparta	78.70	Samsun	78.10
Balıkesir	77.60	İstanbul	78.70	Şanlıurfa	77.40
Bartın	77.60	İzmir	78.80	Siirt	77.90
Batman	78.70	Kahramanmaraş	79.10	Sinop	78.60
Bayburt	77.50	Karabük	78.50	Şırnak	78.00
Bilecik	77.70	Karaman	79.00	Sivas	77.80
Bingöl	77.80	Kars	77.70	Tekirdağ	77.10
Bitlis	77.50	Kastamonu	77.50	Tokat	77.60
Bolu	79.20	Kayseri	78.00	Trabzon	79.80
Burdur	78.60	Kilis	75.00	Tunceli	80.50
Bursa	77.50	Kırıkkale	77.10	Uşak	78.00
Çanakkale	77.70	Kırklareli	77.10	Van	75.60
Çankırı	78.20	Kırşehir	78.20	Yalova	78.60
Çorum	78.30	Kocaeli	77.90	Yozgat	77.80
Denizli	78.80	Konya	78.10	Zonguldak	77.90
Diyarbakır	78.20	Kütahya	76.90	Türkiye	78.00
Düzce	77.70	Malatya	78.80		
Edirne	77.70	Manisa	77.40		

Source: TurkStat

Labor Force Participation by Cities (15+, Both Sexes)

Region Name	Labor force participation (%)	Region Name	Labor force participation (%)	Region Name	Labor force participation (%)
Adana	43.70	Elazığ	42.50	Mardin	41.90
Adıyaman	51.70	Erzincan	47.40	Mersin	46.00
Afyon	47.10	Erzurum	47.20	Muğla	54.60
Ağrı	49.00	Eskişehir	41.80	Muş	50.30
Aksaray	53.80	Gaziantep	43.90	Nevşehir	53.40
Amasya	48.50	Giresun	49.60	Niğde	52.90
Ankara	44.60	Gümüşhane	45.00	Ordu	54.20
Antalya	53.60	Hakkari	41.20	Osmaniye	43.30
Ardahan	61.70	Hatay	45.80	Rize	47.60
Artvin	58.30	Iğdır	56.80	Sakarya	45.50
Aydın	49.20	Isparta	50.00	Samsun	49.20
Balıkesir	48.70	İstanbul	48.10	Şanlıurfa	45.20
Bartın	49.00	İzmir	46.60	Siirt	42.90
Batman	40.80	K.Maraş	46.10	Sinop	49.60
Bayburt	57.40	Karabük	40.90	Şırnak	42.10
Bilecik	46.70	Karaman	49.90	Sivas	44.10
Bingöl	47.50	Kars	51.40	Tekirdağ	52.70
Bitlis	49.20	Kastamonu	55.20	Tokat	48.10
Bolu	47.10	Kayseri	43.10	Trabzon	51.40
Burdur	51.30	Kilis	50.70	Tunceli	55.10
Bursa	48.20	Kırıkkale	38.80	Uşak	53.60
Çanakkale	49.90	Kırklareli	54.00	Van	43.20
Çankırı	49.00	Kırşehir	46.50	Yalova	46.80
Çorum	46.60	Kocaeli	45.90	Yozgat	49.40
Denizli	52.30	Konya	45.70	Zonguldak	48.70
Diyarbakır	40.40	Kütahya	45.60	Türkiye	47.50
Düzce	53.60	Malatya	45.20		
Edirne	56.20	Manisa	52.10		

Source: TurkStat (Population and Housing Census 2011)

Employed Population by Economic Activity by Cities (15+)

Region Name	Agriculture (%)	Industry (%)	Services (%)
Adana	19.00	28.60	52.40
Adıyaman	50.80	18.40	30.80
Afyon	40.40	22.50	37.10
Ağrı	35.80	28.00	36.10
Aksaray	42.20	22.00	35.80
Amasya	46.30	14.90	38.80
Ankara	4.80	22.20	73.00
Antalya	27.10	13.60	59.30
Ardahan	66.20	3.80	30.00
Artvin	40.10	14.70	45.20
Aydın	32.80	21.40	45.80
Balıkesir	39.70	19.00	41.30
Bartın	36.30	26.50	37.20
Batman	26.50	23.50	50.00
Bayburt	50.00	14.40	35.60
Bilecik	21.30	37.10	41.70
Bingöl	35.00	20.70	44.30
Bitlis	43.60	13.70	42.70
Bolu	29.80	22.70	47.50
Burdur	46.30	17.80	35.80
Bursa	14.40	42.60	43.00
Çanakkale	38.80	17.50	43.80
Çankırı	45.10	16.30	38.50
Çorum	37.40	27.00	35.60
Denizli	29.30	32.30	38.40
Diyarbakır	23.60	25.20	51.30
Düzce	32.10	33.30	34.60
Edirne	35.60	16.00	48.40

Employed Population by Economic Activity by Cities (15+) - Continued

Region Name	Agriculture (%)	Industry (%)	Services (%)
Elazığ	28.50	20.10	51.40
Erzincan	38.60	12.50	48.80
Erzurum	45.30	13.30	41.40
Eskişehir	15.50	32.40	52.10
Gaziantep	16.30	37.50	46.20
Giresun	46.10	17.00	37.00
Gümüşhane	38.20	17.50	44.30
Hakkari	19.50	9.70	70.80
Hatay	25.30	24.30	50.30
Iğdır	49.00	12.30	38.70
Isparta	40.80	14.70	44.50
İstanbul	0.70	36.70	62.60
İzmir	11.80	30.30	57.90
K.Maraş	31.80	31.70	36.50
Karabük	15.00	26.80	58.20
Karaman	39.70	25.10	35.20
Kars	48.30	15.40	36.30
Kastamonu	52.80	12.70	34.50
Kayseri	14.60	36.70	48.70
Kilis	42.90	16.50	40.60
Kırıkkale	21.20	21.50	57.30
Kırklareli	25.00	31.00	44.00
Kırşehir	38.60	19.90	41.50
Kocaeli	4.40	44.10	51.50
Konya	31.60	23.80	44.50
Kütahya	39.00	25.70	35.30
Malatya	34.00	20.20	45.70
Manisa	40.70	25.10	34.20

Employed Population by Economic Activity by Cities (15+) - Continued

Region Name	Agriculture (%)	Industry (%)	Services (%)
Mardin	32.80	17.40	49.80
Mersin	32.00	19.60	48.40
Muğla	31.10	14.70	54.20
Muş	56.20	14.40	29.40
Nevşehir	42.60	14.20	43.20
Niğde	47.50	18.40	34.10
Ordu	48.80	20.10	31.10
Osmaniye	25.80	29.60	44.50
Rize	36.30	23.80	39.90
Sakarya	25.20	31.70	43.20
Samsun	38.90	20.80	40.30
Şanlıurfa	47.60	14.50	37.80
Siirt	31.70	16.30	52.00
Sinop	35.20	26.00	38.80
Şırnak	15.70	14.50	69.80
Sivas	37.80	21.80	40.30
Tekirdağ	15.40	46.60	38.10
Tokat	49.10	16.30	34.60
Trabzon	36.70	19.50	43.80
Tunceli	21.60	7.80	70.60
Uşak	39.50	26.40	34.10
Van	26.10	33.40	40.50
Yalova	11.70	29.00	59.20
Yozgat	48.80	18.40	32.90
Zonguldak	26.20	30.40	43.50
Türkiye	22.70	27.20	50.10

Source: TurkStat (Population and Housing Census 2011)

APPENDIX E

THESIS/DISSERTATION ORIGINALITY REPORT

HACETTEPE UNIVERSITY
INSTITUTE OF POPULATION STUDIES
THESIS/DISSERTATION ORIGINALITY REPORT

HACETTEPE UNIVERSITY
INSTITUTE OF POPULATION STUDIES
TO THE DEPARTMENT OF DEMOGRAPHY

Date: 02/11/2017

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