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Does Türkiye Have a Demographic Dividend? NUTS 2 Analysis

Seda Ertürk[1,a,*], Selçuk Koç[2,b]

[1]*Economics, Social Sciences Instituties, Kocaeli University, Umuttepe, Türkiye*
[2]*Economics, Political Science Faculty, Kocaeli University, Umuttepe, Türkiye*
**Corresponding author*

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ABSTRACT

As the population in Turkey continues to age, the share of the working-age population in the total population has also started to decline. However, the fact that the share of the working-age population is at most 2/3 while the country's population is ageing may occur a demographic window of opportunity and a demographic dividend for economic growth. In this study, the demographic dividend for 2023-2050 in NUTS 2 regions of Turkey with different fertility rates is calculated by projection analysis. According to the results of the study, it is estimated that Turkey entered the demographic dividend process in 2023 and may peak in 2036-2037. This trend is expected to persist until 2050. An analysis of NUTS 2 regions suggests that certain areas, such as TR31 (İzmir) and TR62 (Adana-Mersin), are projected to achieve the highest demographic dividend. This trend is expected to persist until 2050. An analysis of NUTS 2 regions suggests that certain areas, such as TR31 (İzmir) and TR62 (Adana-Mersin), are projected to achieve the highest demographic dividend. This trend is expected to persist until 2050. An analysis of NUTS 2 regions suggests that certain areas, such as TR31 (İzmir) and TR62 (Adana-Mersin), are projected to achieve the highest demographic dividend.

Keywords: Demographic dividend, Demographic window of opportunity, Population ageing

Türkiye'nin Demografik Temettüsü Var mı? Düzey 2 Analizi

Süreç

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ÖZ

Türkiye'de nüfus yaşlanmaya devam ettikçe, çalışma çağındaki nüfusun toplam nüfus içindeki payı da azalmaya başlamıştır. Ancak ülkenin nüfusu yaşlanırken çalışma çağındaki nüfusun payının en fazla 2/3 olması demografik bir fırsat penceresi oluştururken ekonomik büyüme için bir demografik temettü elde edeceği anlamına gelebilir. Bu çalışmada Türkiye'nin farklı doğurganlık oranlarına sahip NUTS 2 bölgelerinde 2023-2050 yılları için demografik temettü projeksiyon analizi ile hesaplanmaktadır. Çalışmanın sonuçlarına göre, Türkiye'nin 2023 yılında demografik temettü sürecine girdiği ve 2036-2037 yıllarında zirve yapabileceği tahmin edilmektedir. 2050 yılına kadar bu sürecin devam edeceği tahmin edilmektedir. NUTS 2 bölgeleri incelendiğinde bazı bölgelerin TR31 (İzmir) ve TR62 (Adana-Mersin) en yüksek demografik temettü elde etmesi öngörülmektedir. Bu bölgelerde temettünün 2050 yılına kadar devam edileceği tahmin edilirken, doğurganlık oranının düşük seyrettiği TR83 (Samsun, Tokat, Çorum, Amasya) bölgesinde 2044 yılına kadar süreceği ve demografik fırsat penceresinin kapanacağı öngörülmektedir. Bu bulgulara göre, Türkiye'nin demografik fırsat penceresinden en iyi yararlanabilmesi için beşeri sermaye yatırımlarını artırması, iş gücüne katılımı teşvik eden politikalar geliştirmesi gerektiğini ortaya koymaktadır. Aksi durumda, yaşlanan nüfusa sahip olan Türkiye için ekonomik büyüme potansiyelinin azalacağı düşünülmektedir.

Anahtar Kelimeler: Demographic dividend, Demographic window of opportunity, Population ageing

[a] sedaerturk41@gmail.com 0000-0001-5505-8750 [b] selcukkoc@kocaeli.edu.tr 0000-0001-7451-2699

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Introduction

In the history of the world, countries have been experiencing changes with various population growth rates. Thompson (1929:961), analysing the demographic data of countries for the last 200 years, stated that the population went through 3 types of demographic transformation groups. In the first group, in countries with high fertility and high mortality rates, the increase in the fertility rate faster than the mortality rate leads to an increase in the population growth rate. The second group is the decline in both fertility rates and mortality rates, but mortality rates reduce as fast or faster than fertility rates, bringing about the same or lower population growth rate. The third group of demographic transformation is one in which both fertility and mortality rates are lower than the second group. This is the demographic transformation that occurs when fertility rates are kept under control. This leads to negative population growth, in other words, to a reduction in population.

The demographic transition between age groups poses many social and economic opportunities as well as social and policy challenges, especially for a country with an aging population (Gomez and deCos, 2008:351; Ertürk and Koç, 2023:). The economic and social benefits derived from demographic changes are referred to as the demographic dividend or window of opportunity (Islam, 2020:1). In fact, these two concepts are used with different meanings in the literature. The demographic window of opportunity arises from the increase in the working-age population during the transition from high fertility rates to low fertility and mortality rates. This situation arises due to the insufficiency of the working-age population, particularly the labour force participation of women who did not participate in the labour market before. The participation of new individuals in the labour force creates a potential situation for the realization of demographic dividends through increased savings and investments for economic growth (Lee, et al. 1997:13; Bloom and Williamson, 1998: 429; Mason, 2003:8). The concept of "demographic dividend", first used by Bloom, et al. (2003:25), represents the third group of the demographic transition that emerged when analysing the demographic transition in East Asia.

A demographic window of opportunity occurs at the point where the proportion of the working-age population in the total population reaches the highest output (Vallin, 2005: 150). With the demographic window of opportunity, increased production of goods and services leads to an increase in GDP, which is called the demographic dividend. The demographic dividend arises for two different reasons. The first one is the decline in expenditures due to the decreasing number of children, while the second one is the change in consumption patterns due to the ageing of the population and the increase in life expectancy, leading to more savings.

The so-called demographic window of opportunity for economic growth covers a period of several decades (Crombach and Smits, 2022:172). The dividend, whose per capita income is calculated to depend on labour productivity and the proportion of the labour force, is calculated from the difference between the growth rate of the working-age population and the growth rate of the overall population. If this difference is positive, the growth rate of per capita income increases even if the growth rate of labour productivity does not change (Navaneetham and Dharmalingam, 2012:287) and the first demographic dividend is realized. The second demographic dividend is an incentive for individuals to save and accumulate assets in old age due to expectations of a longer life and an extended retirement period (Mason and Kinugasa, 2008: 395; Mason and Lee, 2006: 12; 2007: 4). Unlike the first demographic dividend, the second demographic dividend is permanent due to capital deepening and higher per capita income (Ogawa, et al., 2009: 146).

Demographic dividend arises in periods when the working age segment of the population grows and the young and old dependent population decreases. During this period, more people can join the labour force, raising savings and investment rates, resulting in higher per capita income and accelerated economic growth. The demographic dividend offers a great opportunity for economic development, particularly for developing countries. If this process is well utilised, the long-term economic performance of the country can improve significantly. However, if this opportunity is missed, countries may not be able to turn their demographic structure into an advantage (Bloom, et al., 2013:11). Moreover, the demographic dividend should be supported not only by the increase in the working-age population but also by economic and social policies. In this context, strategies in areas such as education, health and labour market policies can play a key role in benefiting from the demographic dividend (Mason, 2005:97). In the absence of economic and social reforms that support the growth of the working-age population, the demographic dividend opportunity may be missed. This change in the demographic structure may be reversed by an increase in the population reaching retirement age, and increasing economic burdens (Lee and Mason, 2006: 17).

As the consequences of the fertility-death ratio and reduced mobility, the demographic dividend is illustrated by an increase in the working population and a high support ratio. If the high support ratio is supported by inclusive public policies and investment in relevant sectors, the demographic transition will conclude with a demographic dividend. In this case, the demographic transition may result in sustainable development; otherwise, the demographic transition may end badly. Barsukov (2019:171) tried to identify the countries that have achieved and missed the demographic dividend according to the World Population Projection prepared by the United Nations in 2015. Although determining the demographic dividend, he states that it will be realized in a situation where the ratio of the non-productive population (population under 15 and over 65) to the productive population is 1 to 2 or less and the share of the productive population is 66.6% or higher. Accordingly,

Barsukov (2019:172), who categorizes countries into red, green and yellow groups[1] , assigns Turkey to the yellow group.

Figure 1 indicates the natural population growth and its determinants in Turkey. From the 1960s onwards, the mortality rate has shown a decreasing trend, ranging between 2% and 0.51%, with a slight increase during the Covid-19 period. The fertility rate declined rapidly from a peak of 4.42% in 1961. As a consequence, the natural rate of population growth has correspondingly fallen to a low and stable level and was at its lowest point during the relevant period.

After 2007, the growth rate increased slightly until 2018, but returned to a downward trend, also due to the impact of COVID-19. The considerable increase in life expectancy and the steady reduction in fertility and mortality rates reflect the ageing of the population. With further ageing of the population, i.e. an increase in the proportion of the oldest old, the mortality rate can be expected to continue to rise, which is another factor pulling down the population growth rate.

According to the main scenario in the projection of TurkStat (2023), Turkey's population is projected to increase until the mid-2050s and then begin to decline, falling below 77 million in 2100. When the age structure of the population is analysed, the population will keep going age and 1 out of every 3 people is expected to be elderly in 2075. The proportion of the working age population is expected to be 61.9% in 2050, 55.9% in 2075 and 54.6% in 2100. The total fertility rate, which was 2.38 in 2001, stagnated at the replacement level of 2.10 between 2003 and 2014, and then declined sharply to 1.51 in 2023. The elderly dependency ratio, which refers to the number of elderly people per 100 people of working age, raised from 12.9% in 2018 to 15.0% in 2023. According to population projections, the elderly dependency ratio is projected to be 19.6% in 2030, 25.3% in 2040, 37.5% in 2060 and 43.6% in 2080.

The first demographic dividend brings out when changes in the age structure interact with the production and consumption life cycle (Cai, 2016:2). To examine age-related structural transitions in Turkey, the classification into children (0-14), youth (15-64) and 65 and over is considered to correspond to life cycle stages and the impact of the population in different age groups on the overall economy. Since the child population (0-14) is dependent on adults for consumption, they spend on health and education. Youth (15-64) spend on health and education but have different consumption patterns. The population in the 15-64 age group has various consumption patterns, the younger population (25-49) saves little as they consume most of what they earn. The middle-aged population (50-59) is likely to earn more and therefore save more. The majority of seniors aged 60+ are dependent on others to meet their consumption needs. The macroeconomic performance of any country therefore depends on the relative size of the population at different life cycle stages. In this context, projections suggest that the proportion of the elderly population will exceed 15 percent in the first half of 2030 and the demographic window of opportunity will close (TurkStat, 2023).

Taking a look at Turkey's population pyramids in 1960 and 2023 in Figure 2, there is a clear shift in the age distribution of the population from productive to older ages. As this shift progresses, the advantage of having a population concentrated in productive ages will disappear as this concentration disappears. The second demographic dividend arises to the extent that consumers and policymakers are forward-looking and respond effectively to projected demographic changes.

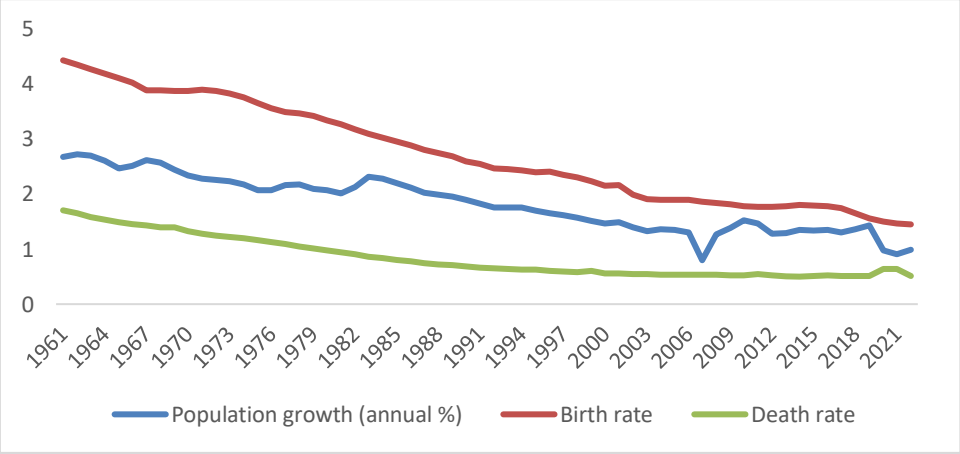

Figure 1. Demographics Variables of Turkey

* Data are taken from the World Bank Database and the authors' own calculations.

[1] Countries that have finished generating the demographic dividend are referred to as the red group. Countries that have achieved the demographic dividend are referred to as the yellow group and countries that will achieve the demographic dividend are referred to as the green group.

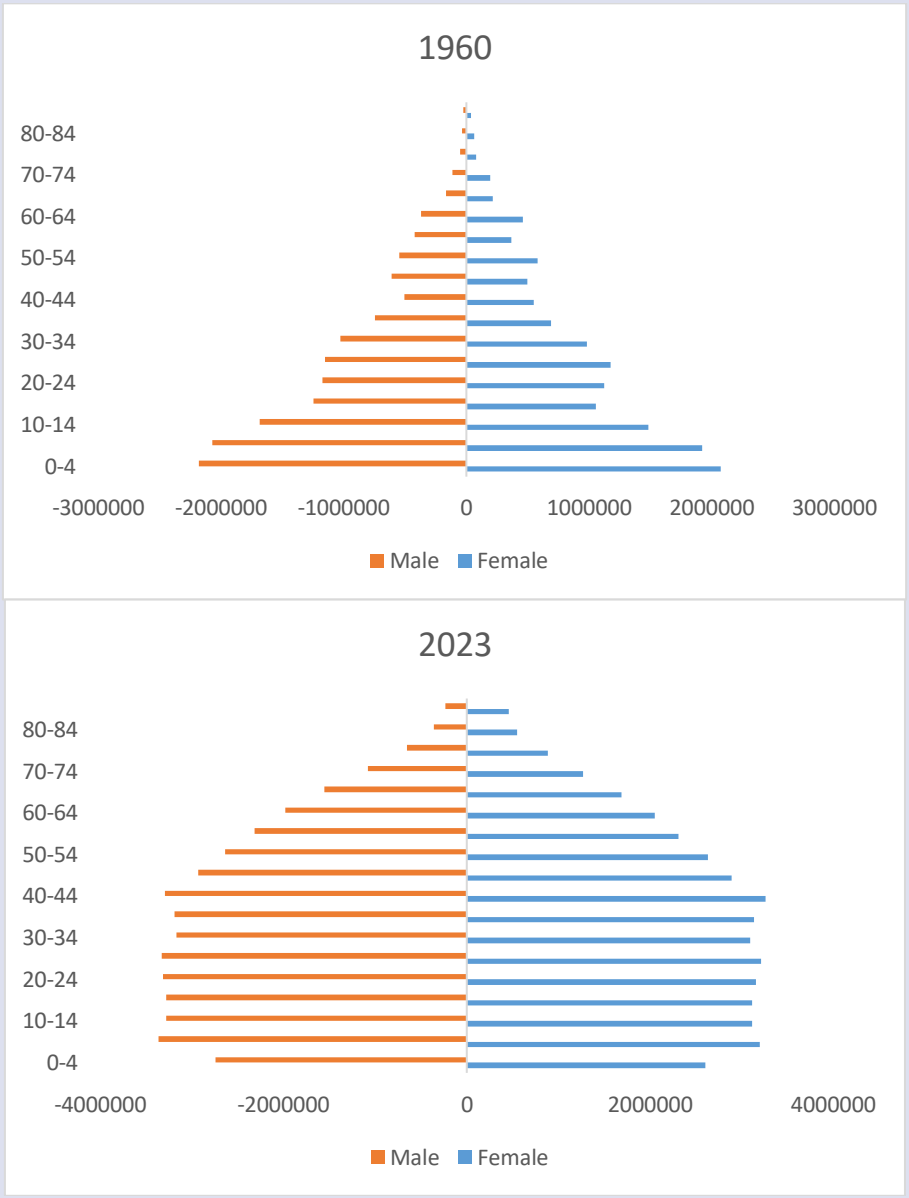

Figure 2. Population Pyramids of Turkey

* Data are taken from TURKSTAT Database and are the authors' own calculations.

Figure 2 shows that Turkey's population has been young and fast growing for many years. It has been among the countries that can utilise the economic growth opportunity with its young population advantage. However, with the decline in fertility rates in recent years, this structure has deteriorated and the demographic dividend gains importance for Turkey in this period. Turkey can turn this opportunity into economic development by increasing the labour force participation of its working age population and strengthening its investments in education and health. However, it can be argued that this opportunity has not been fully exploited due to deficiencies in labour force participation rates, employment policies and education reforms. In particular, the lack of necessary reforms regarding women's participation in the labour force and general labour policies may have caused Turkey to miss this opportunity.

There is a certain 'demographic window' period to benefit from the demographic dividend. This refers to the period when the young and working-age population is growing but the elderly dependent population is not yet very large. According to TurkStat (2023) projections, this window is approximately closed in Turkey. İn addition, the increase in the proportion of the elderly population and the relative decline in the young population suggest that Turkey has missed this opportunity. Therefore, an article addressing the question of why Turkey may have missed the demographic dividend opportunity can be an important guide both for evaluating the current situation and for what should be done in the future.

Turkey's demographic structure and dividend opportunity evaluation process show differences and similarities when compared to other developing countries. Countries such as South Korea, Singapore and China have successfully utilised the demographic dividend

opportunity and achieved rapid economic development (Kim, 1996:28; Lee and Lee, 2013: 646; Cai, 2020:30). An article on why Turkey has not achieved a similar success compared to these countries can make a considerable contribution to the international literature.

The consequence of that, a study on the demographic dividend for Turkey is of great importance for the economic and social development of the country. The possibility of missing the demographic opportunity may have critical consequences for economic growth, social welfare and policies. Therefore, the aim of such a study is to properly analyse Turkey's demographic transition process, to reveal why this opportunity may have been missed and to provide a roadmap for what needs to be done in the future.

Considering the above information, the basic hypothesis of this study is whether Turkey has missed the demographic dividend opportunity considering the current socioeconomic conditions? The contribution of this study to the literature will be that it will be the first study in this field, realizing that such a study has not been conducted in Turkey before. Accordingly, following the introduction, the material and methodology will be explained and the results will be discussed. Finally, this study will be concluded with a general evaluation.

Literature Review

The expected improvements in economic growth as a result of demographic transition may not always be valid. The extent to which countries will benefit from the demographic transition depends on the policies that create the most favourable conditions (Cooper, 2008: 100). Many institutions have developed policy instruments, notably the African Union Commission (2018:215), which states that the demographic dividend can be generated by strengthening a country's labour force (Bloom and Canning, 2003:4), education (Bloom, et al., 2001:4), health (McNicoll, 2006:3) and good governance (Bloom et al., 1998:260). These policies have focused on designing strategies that can harness the benefits of the demographic dividend (Chen and Li, 2023:5). This allows countries to benefit more from the demographic dividend when certain preconditions are met (Bloom, et al., 2017:68; Shekar, et al., 2016:3).

Investments in human capital are among the leading policies that can be implemented for countries to achieve demographic dividends. Lee and Mason (2010:160) examined the impact of investments in human capital development. According to the study, they show that declines in the fertility rate and declines in the dependency ratio initially led to sharp increases in economic growth. Although, when this growth is not directed towards policies to support human capital investment, the demographic dividend will mitigate over the years. Ahmad and Khan (2019:753) also investigated the impact of age and changes in human capital on the economic growth of 67 developing countries from 1960 to 2014. It was found that human capital has a positive effect on economic growth, but it was concluded that economic growth may vary between different income groups of countries. In this context, the impact of human capital investment on economic growth may become an important driver of economic growth by increasing labour productivity, even if the impact of human capital investment on economic growth is different among different income groups.

In addition to reaping demographic dividends, behavioural effects can also be observed in the process of population ageing, affecting consumption, savings, investments, public expenditures and technological progress. Mason and Kinugasa (2008: 398) argue that demographic change is an important part of economic growth in East Asia and show that it accounted for about 92% of the increase in saving rates between 1965 and 1995. Mason and Lee (2006: 17) show that a longer life anticipation and a smaller family size led people to save more to support themselves in old age. As a consequence of this saving pattern, more savings can contribute to more investment and hence result in a higher growth rate.

The reduction in consumption as the population ages, the decline in the income of older individuals and the tendency to save as a precautionary measure after retirement lead to a weakening of the overall consumption capacity (Cai, 2020:31-32). However, consumption patterns are likely to change as countries age. Increased expenditures of older individuals on health services have positively affected economic growth (Wang, 2011:1536; Amiri and Ventelou, 2012:541; Gerdtham, et al., 1992:63; Braendle and Colombier, 2016:1051).

The demographic dividend varies according to the policies implemented by countries regarding the ageing population, labour force participation, health and education. An important area is whether the realisation of the demographic dividend varies according to the income levels of countries. In this respect, demographic dividend differs in developed and developing countries. Although there are numerous scientific studies on the simulation of the demographic dividend, they do not address the dimensionality in developed regions (Woldegiorgis, 2023: 381). Dobrokhleb, et al. (2022: 184) argue that, according to their analyses in various developed countries, demographic dividends are characterised by a marked differentiation in the formation and use of dividends, which is due to cultural, social and economic determinants. The analysis of data on the proportion of the population aged 25-64 years concluded that in Russia, Moldova, Belarus, Ukraine, Armenia, Azerbaijan, Lithuania, Latvia and Estonia, the proportion of people of working age in the total population peaked in the 2020s. In this context, they stated that they are in the process of achieving demographic dividends. In the long term, after 2030, their absolute and relative numbers will decline. They noted that in countries where the working-age population will soon predominate (Kyrgyzstan, Turkmenistan, Uzbekistan, Tajikistan), it is necessary to promote the use of demographic dividend in the economy, introducing institutions that motivate people to

save and invest in the development of human potential. It was stated that Uzbekistan is in the early stages of the demographic dividend, and that this demographic dividend can be used to benefit from investment in human capital and the socio-economic development of youth and women. Demographic dividend refers to a period in a country's economic development when changes in population structure contribute to economic growth, and these opportunities varies according to the social, economic, and demographic policies of the countries. Labor force participation rates, education, and health policies are the main factors that determine how much demographic dividend can be utilized. While this process is managed efficiently in developed countries thanks to better organized labour markets and human capital investments, it is suggested that this potential may not be fully realized in developing countries due to policy deficiencies. Bloom, Canning, and Sevilla (2003) state that developing countries can seize economic growth opportunities following rapid population growth, but these opportunities should be supported by human capital development policies such as education and health investments. Lee and Mason (2006) emphasize that labour market dynamics are the basis of this difference. In addition, it is stated that income inequalities and female labour force participation rates play an important role (Bloom and Williamson, 1998). In this process, the increase in the ageing population and the pressures on social security may threaten economic gains (Birdsall, vd., 2001). Consequently, it is critical to implement the right social and economic policies to benefit from the demographic dividend.

According to TurkStat (2023) projections, it is thought that the demographic dividend has been missed. However, when the literature is examined, there is no comprehensive demographic dividend analysis specific to Turkey. In this context, this study aims to correctly analyze Turkey's demographic transition process, to reveal why this opportunity may have been missed, and to provide a roadmap for what needs to be done in the future.

Material and Method

This study is based on the method applied in Navaneetham and Dharmalingam (2012:286) to calculate the demographic dividend in NUTS 2 regions (26 regions)[2] of Turkey between 2010 and 2050. The demographic dividend is derived from the difference between the growth rate of the working-age population aged 25-59 and the total population, indicating that it occurs when the growth rate of producers exceeds the growth rate of consumers.

$$\frac{Y}{N} = \frac{Y}{L} * \frac{L}{N} \qquad 1$$

In Equation 1, Y is income, N is total population and L is total labour force. In Equation 1, derivatives are taken to obtain growth rates. Therefore, the demographic dividend will depend on the growth rate of income per capita g_y , growth rate of income per labour forcegz, growth rate of labour forcegl and growth rate of total populationgn. For the calculation of the demographic dividend, the growth rate will take the form of Equation 2:

$$g_y = g_z + g_l - g_n \qquad 2$$

There is an important difference between Navaneetham and Dharmalingam (2012:286), who calculate the demographic dividend for different periods in South Asian countries, and the methodology to be applied in this study. This difference is that Navaneetham and Dharmalingam (2012:287) used projections by taking data from a single year, whereas this study uses linear regression analysis using data from 2007-2023. The main reason for using linear regression analysis in projection is that it offers a very simple and fast application by using historical data when projecting on time series data. It is a method that can be used as a first step in basic analyses such as economic growth and population projections, especially when the data set is small and in short-term projection applications (Wooldridge, 2023:3). The main reason for using linear regression in this study, which may be inadequate in processes with complex dynamics such as population projections (Bloom and Williamson, 1998), is that it has data limitations. In addition, it has been stated that linear regression can be used in population projections and linear regression can be used in short-term forecasts (Eberhardt, 1987:103). A simple linear regression model is given in Equation 3.

$$\hat{y} = \beta_0 + \beta_1 X_1 + B_2 X_2 + \beta_3 X_3 \qquad 3$$

$\hat{y}$ estimated growth rate, independent variables are the variables in Equation 2 respectively $g_z, g_l \; and \; g_n$. The estimated growth rate for each year is applied to the population in the current year in Equation 4 and population projection is made:

$$Population_{t+1} = Population_t * \left(1 + \frac{\hat{y}}{100}\right) \qquad 4$$

Jupyter Notebook 6.4.12 was used to forecast the future growth rate of the population and to calculate projections for 2020-2050. The data in the projection, i.e. income per capita, labour force population and total population for the years 2020- 2023, are taken from the Turkish Statistical Institute (TURKSTAT).

The economic support ratio is used to calculate the demographic dividend. The economic support ratio was first defined by Cutler, et al. (1990:8) as the ratio of the working age population to all consumers. The economic support ratio is differentiated according to the hypotheses of the studies in the literature. In some studies, Ha and Lee (2016:28) used the definition of Cutler, et al. (1990:8), while in some studies, Navaneetham and Dharmalingam (2012:288) calculated the support ratio as the ratio of the working-age population to the dependent population

[2] NUTS-2 Regions and the provinces covered are given in Appendix 1

(sum of 0-14 and 65+ population). Since this study follows the method of Navaneetham and Dharmalingam (2012:288), the calculation of the economic support ratio remains the same and the demographic dividend of Turkey's Level 2 regions in 2020-2050 is calculated in Equation 5:

$$DD = SR * \frac{\hat{y}}{100} \qquad 5$$

where DD, demographic dividend, SR is the economic support ratio[3].

Findings and Discussion

Turkey was divided into 26 regions in 2002 for basic development planning purposes under the convergence objective of the EU harmonization policy. Figure 3 presents the demographic dividend projections of Turkey's NUTS 2 regions until 2050. In 2023, Turkey is categorized as a country with an ageing population with a dependency ratio of 10.2. Thus, the demographic dividend is likely to increase after 2023. After 2025, Turkey will see a gradual increase in the demographic dividend, which is anticipated to peak in 2036-2037. Until 2050, the demographic dividend will be zero after 2050.

Turkey has included the demographic dividend process in 2023. This marks a critical period for Turkey's economic growth for the reason that the working-age population is growing faster than the dependent population. By 2023, Turkey's working-age population is still high relative to the total population, allowing the demographic dividend process to begin. From 2025 onwards, a gradual increase in Turkey's demographic dividend rate is observed. This increase is the result of a larger share of the working-age population. The active participation of the young and productive population in the labour force will constitute an important opportunity for economic growth and welfare increase in this period. With increased savings and investments, economic development can accelerate.

Figure 3 expresses that the demographic dividend process will **peak in 2036-2037**. During this period, the proportion of the working-age population will be at its highest level and the dependent population will be at its lowest. Turkey will have the most convenient conditions for economic growth during this peak period. In these years, when investments and labor force participation are at their highest, the growth rate of the Turkish economy is expected to increase significantly.

The demographic dividend process will go on till 2050, after which it will gradually diminish to zero. This can be explained by the ageing and retirement of the working-age population. As the elderly dependency ratio increases, the growth rate of the working-age population will decline and the productive population in the economy will be replaced by the elderly dependent population. This will weaken the potential for economic growth. After 2050, new challenges will emerge for Turkey; pension expenditures will increase and burdens on health and social security systems will grow.

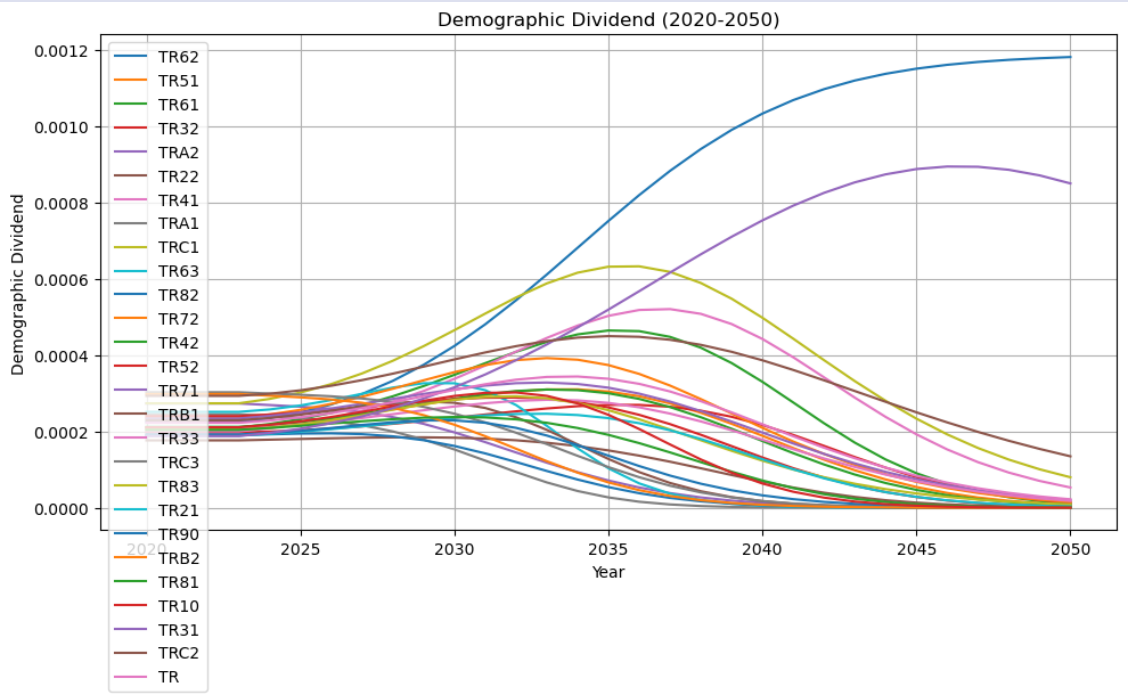

Figure 3. Results of Demographic Dividend

[3] For more detailed information about the method, see Navaneetham and Dharmalingam (2012).

While the demographic dividend in most regions in Turkey is close to the Turkish average, TR62 (Adana-Mersin) and TR31 (Izmir) are the regions with the highest dividend and are projected not to close in 2050. When we look at the basic economic characteristics of these regions, we see that the unemployment rate is low and the labour force participation rate is below Turkey's average. However, these regions are also among the provinces with a high elderly population. TR83 (Samsun, Tokat, Çorum and Amasya) region is anticipated to achieve a demographic dividend above Turkey's average until 2044, and a demographic dividend very close to Turkey's average after 2044. However, with the increase in the elderly population in the region, the demographic dividend is also projected to progress at a rate equivalent to the Turkey's average until 2050.

The demographic dividend process takes place at different speeds in different regions of Turkey. The Figure 3 expresses that some regions (TR62 and TR31) are more advantageous in terms of demographic dividend. They stand out as regions that exhibit **a demographic dividend above Turkey's average** and where this dividend process is not expected to end even in 2050. As these regions have a high proportion of young and productive population, they also have a high potential for economic growth. However, the elderly population is also expected to increase rapidly in these regions, so public policies need to be adjusted accordingly.

TR83 region will provide a demographic dividend above Turkey's average until 2044; however, it will decline to a level close to Turkey's average after this date. This means that the young population in the region will age and join the dependent population over time and the demographic dividend will decrease.

The demographic dividend creates a window of opportunity to boost economic growth. However, this window of opportunity is limited to a short period of **a few decades** and needs to be used effectively. Turkey entered this window of opportunity in 2024, when the study was conducted, and it is critical that public policies are organized to support the working-age population in this process, which is expected to peak in 2036-2037.

The economic support ratio, which is the determinant of the demographic dividend, is presented in Figure 4. Regions with fertility rates below Turkey's average are regions with low fertility rates. Regions that are above Turkey's average are regions with high fertility rates. Especially after 2030, the difference between regions below and above the average is expected to widen.

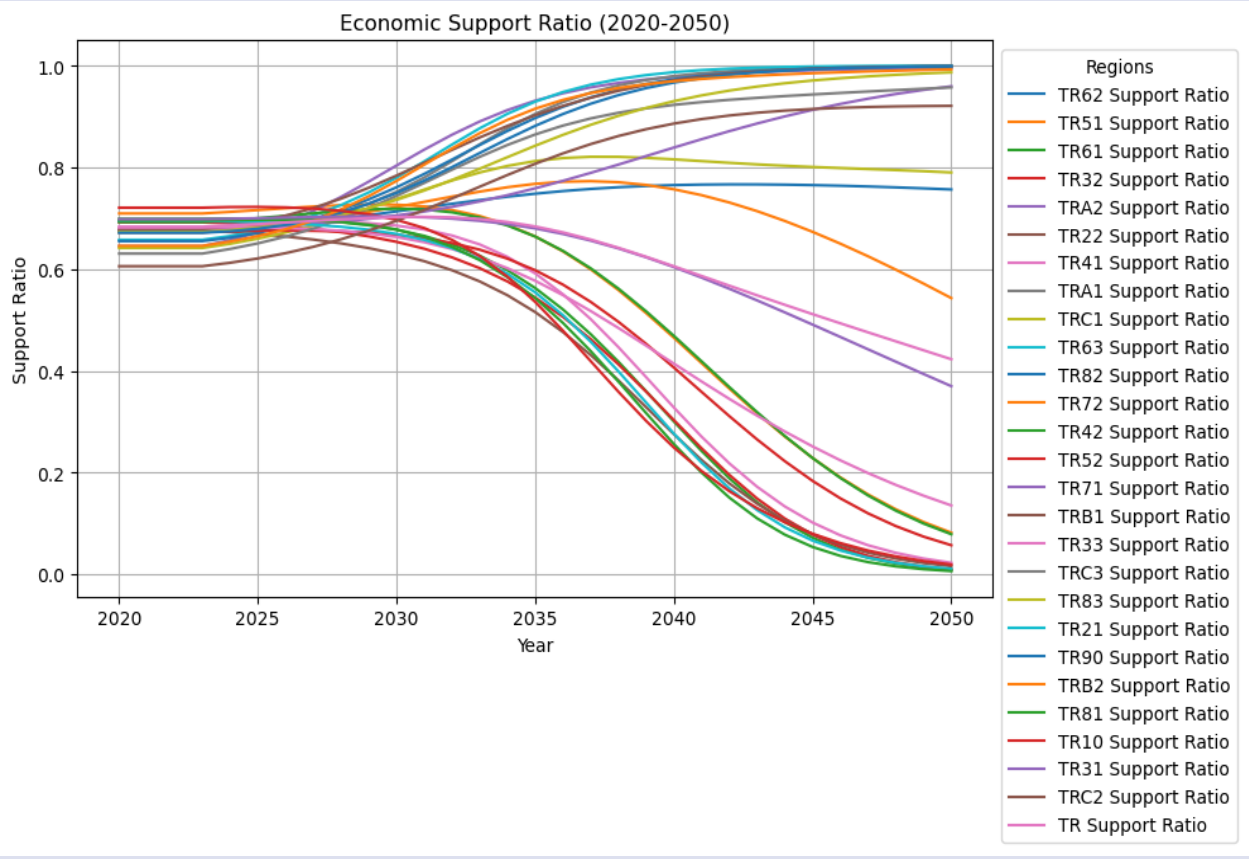

Figure 4. Results of Economic Support Ratio

The economic support ratio is a critical indicator for analysing Turkey's economic growth capacity. It is calculated as the ratio of the working-age population (15-64 years) to the dependent population (0-14 years and over 65 years). A high economic support ratio means that more workers take care of fewer dependents, leading to increased savings, investment and economic growth. Figure 4 clearly shows that there are regional differences in the economic support ratio in different regions of Turkey.

Regions below the national average represent areas with low fertility rates. In these regions, the rate of economic support is low because the young population has decreased and the elderly population has increased. Low fertility rates will bring about a reduction in the working age population and an increase in the elderly dependency ratio in these regions in the long run. In these regions with low economic support, the potential for economic growth may remain limited. This problem is particularly pronounced in countryside areas and non-industrialized regions.

In contrast, regions that are above Turkey's average include those with relatively high fertility rates. In these regions, the economic support ratio is high, meaning that the young and working-age population is higher than the dependent population. This provides opportunities for economic growth in these regions in the short and medium term. However, the high fertility rate implies that in the future the growing young population will need education and employment, which may put pressure on public resources.

It is also projected that after 2030, the gap between regions above and below Turkey's average will widen. This means that in regions with low fertility rates, the ageing population will accelerate further, giving rise to a decline in the youth population and hence in economic support. Conversely, in regions with high fertility rates, a high youth dependency ratio will increase the demand for the working-age population. However, this will require significant investments and public policies to sustain economic growth.

The decline in the economic support ratio over time will be particularly rapid in regions with low fertility rates. In order for Turkey to cope with this demographic shift, there are primary policy instruments that need the attention of policymakers. First, investments in education and health can help the young population to participate in the economy as a more productive labour force. Second, as the elderly population grows, the pressure on social security systems will increase. Therefore, reforms that encourage labour force participation of older individuals or restructure the pension system will be needed (Ertürk and Koç, 2023a:887).

Conclusion

This study analyzes the effects of changes in Turkey's demographic structure on economic growth and focuses on the country's demographic dividend process. It is concluded that Turkey has entered the demographic dividend process as of 2023, which will peak in 2036-2037 and continue until 2050. However, after 2050, the demographic dividend will disappear due to the decline in the working-age population and the increase in the elderly dependency ratio. The demographic dividend and demographic window of opportunity results of this study are consistent with the results of the United Nations (2010), which prepared population projections of countries according to various age groups.

Regional analysis suggests that some regions such as Izmir (TR31) and Adana-Mersin (TR62) may benefit from the demographic dividend for a longer period of time, while other regions such as Samsun, Tokat, Çorum, Amasya (TR83) may have a shorter dividend period. This suggests that economic growth may vary in different regions of Turkey depending on the population structure.

In order to make the most of the demographic dividend, Turkey is required to increasing investments in human capital, encouraging labour force participation and developing social policies for the ageing population. Moreover, being prepared for the challenges that will arise with the closing of the demographic window of opportunity is critical for long-term sustainable economic growth. In this context, Turkey's effective use of existing demographic opportunities and the implementation of the necessary policies will be decisive for economic development.

In regions where the demographic dividend is low or ends early, there is likely to be an internal migration of individuals who do not want to experience a loss of welfare towards regions where the dividend continues. Therefore, it is clear that the demographic dividend will lead to socioeconomic consequences in addition to its economic consequences.

Contribution Rates and Conflicts of Interest

Etik Beyan	Bu çalışmanın hazırlanma sürecinde bilimsel ve etik ilkelere uyulduğu ve yararlanılan tüm çalışmaların kaynakçada belirtildiği beyan olunur.	**Ethical Statement**	It is declared that scientific and ethical principles have been followed while carrying out and writing this study and that all the sources used have been properly cited
Yazar Katkıları	Çalışmanın Tasarlanması: SK (%60)-SE(%40) Veri Toplanması: SK(%30)-SE(%70) Veri Analizi: SK (%10)-SE(%90) Makalenin Yazımı: SK (%80)-SE(%20) Makalenin Gönderimi ve Revizyonu: SK (%80)-SE(%20)	**Author Contributions**	Research Design: SK (%60)- SE(%40) Data Collection: SK(%30)-SE(%70) Data Analysis: SK (%10)-SE(%90) Writing the Article: SK (%80)-SE(%20) Article Submission and Revision: SK (%80)-SE(%20)
Etik Bildirim	iibfdergi@cumhuriyet.edu.tr	**Complaints**	iibfdergi@cumhuriyet.edu.tr

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Etik Kurul	Etik kurul iznine ihtiyaç bulunmamaktadır	**Ethics Committee**	Ethics committee approval is not required.

References

African Union Commission. (2018). *Africa's Development Dynamics 2018 Growth, Jobs and Inequalities: Growth, Jobs and Inequalities*. OECD Publishing.

Ahmad, M., & Khan, R. E. A. (2019). Does demographic transition with human capital dynamics matter for economic growth? A dynamic panel data approach to GMM. *Social Indicators Research*, *142*, 753-772.

Amiri, A., & Ventelou, B. (2012). Granger causality between total expenditure on health and GDP in OECD: Evidence from the Toda–Yamamoto approach. *Economics letters*, *116*(3), 541-544.

Barsukov, V. N. (2019). From the demographic dividend to population ageing: World trends in the system-wide transition. *Economic and Social Changes: Facts, Trends, Forecast*, *12*(4), 167-182.

Birdsall, N., Kelley, A. C., & Sinding, S. (Eds.). (2001). *Population matters: demographic change, economic growth, and poverty in the developing world*. OUP Oxford.

Bloom, D. E., & Canning, D. (2003). How Demographic Change can Bolster Economic Performance in Developing Countries. *World Economics*, *4*(4), 1-14.

Bloom, D. E., & Williamson, J. G. (1998). Demographic transitions and economic miracles in emerging Asia. *The World Bank Economic Review*, *12*(3), 419-455.

Bloom, D. E., Canning, D., & Sevilla, J. (2001). Economic Growth and the Demographic Transition. *NBER Working Paper*, (w8685).

Bloom, D. E., Humair, S., Rosenberg, L., Sevilla, J. P., & Trussell, J. (2013). *A demographic dividend for sub-Saharan Africa: Source, magnitude, and realization* (No. 7855). IZA Discussion Papers.

Bloom, D. E., Kuhn, M., & Prettner, K. (2017). Africa's prospects for enjoying a demographic dividend. *Journal of Demographic Economics*, *83*(1), 63-76.

Bloom, D. E., Sachs, J. D., Collier, P., & Udry, C. (1998). Geography, demography, and economic growth in Africa. *Brookings papers on economic activity*, *1998*(2), 207-295.

Bloom, D., Canning, D., & Sevilla, J. (2003). *The demographic dividend: A new perspective on the economic consequences of population change*. Rand Corporation.

Braendle, T., & Colombier, C. (2016). What drives public health care expenditure growth? Evidence from Swiss cantons, 1970–2012. *Health Policy*, *120*(9), 1051-1060.

Cai, F. (2016). Demographic transition, demographic dividend, and Lewis turning point in China. In *Debating the Lewis turning point in China* (pp. 17-29). Routledge.

Cai, F. (2020). The second demographic dividend as a driver of china's growth. *China & World Economy*, *28*(5), 26-44.

Chen, X., & Li, J. (2023). Facilitating knowledge-driven economic and social development: The significance of demographic transformation in tourism villages in China. *Journal of the Knowledge Economy*, 1-29.

Cooper, R. N. (2008). Global imbalances: globalization, demography, and sustainability. *Journal of Economic Perspectives*, *22*(3), 93-112.

Crombach, L., & Smits, J. (2022). The demographic window of opportunity and economic growth at sub-national level in 91 developing countries. *Social Indicators Research*, *161*(1), 171-189.

Cutler, D. M., Poterba, J. M., Sheiner, L. M., Summers, L. H., & Akerlof, G. A. (1990). An aging society: opportunity or challenge?. *Brookings papers on economic activity*, *1990*(1), 1-73.

Eberhardt, L. L. (1987). Population projections from simple models. *Journal of Applied Ecology*, 103-118.

Ertürk, S., & Koç, S. (2023). The Transition of Fertility Rates in the World: Regime Switching Model. Karamanoğlu Mehmetbey Üniversitesi Sosyal Ve Ekonomik Araştırmalar Dergisi, 25(45), 1324-1335.

Ertürk, S., & Koç, S. (2023a). *Calculation of Cost of Early Retirement in Turkey*. 47th EBES Congress, Berlin

Gerdtham, U. G., Søgaard, J., Andersson, F., & Jönsson, B. (1992). An econometric analysis of health care expenditure: A cross-section study of the OECD countries. *Journal of health economics*, *11*(1), 63-84.

Gomez, R., & De Cos, P. H. (2008). Does population ageing promote faster economic growth?. *Review of Income and Wealth*, *54*(3), 350-372.

Ha, J., & Lee, S. H. (2016). Demographic dividend and Asia's economic convergence towards the US. *The Journal of the Economics of Ageing*, *8*, 28-41.

Islam, M. M. (2020). Demographic transition in Sultanate of Oman: emerging demographic dividend and challenges. *Middle East Fertility Society Journal*, *25*(1), 7.

Kim, I. K. (1996). Demographic transition and population aging in Korea. *Korea journal of population and development*, 27-40.

Lee, R. D., Mason, A., & Miller, T. (1997). Saving, wealth, and the demographic transition in East Asia. *Population change and economic development in East Asia: challenges met, opportunities seized, Stanford University Press.*

Lee, R., & Mason, A. (2006). What is the demographic dividend?. *Finance and development*, *43*(3), 16.

Lee, R., & Mason, A. (2010). Fertility, human capital, and economic growth over the demographic transition. *European Journal of Population= Revue Europeenne de Demographie*, *26*(2), 159.

Lee, Y. Y., & Lee, S. S. Y. (2013). Policy implications for inclusive growth in the Republic of Korea. *Korea and the World Economy*, *14*(3), 607-651.

Lutz, W., & Kc, S. (2010). Dimensions of global population projections: what do we know about future population trends and structures?. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *365*(1554), 2779-2791.

Mason, A. (2003). Population change and economic development: what have we learned from the East Asia experience?. *Applied Population and Policy*, *1*(1), 3-14.

Mason, A. (2005, August). Demographic transition and demographic dividends in developed and developing countries. In *United Nations expert group meeting on social and economic implications of changing population age structures* (Vol. 31, No. 5). New York: United Nations, Population Division.

Mason, A., & Kinugasa, T. (2008). East Asian economic development: two demographic dividends. *Journal of Asian economics*, *19*(5-6), 389-399.

Mason, A., & Lee, R. (2006). Reform and support systems for the elderly in developing countries: capturing the second demographic dividend. *Genus*, 11-35.

Mason, A., & Lee, R. (2007). Transfers, capital, and consumption over the demographic transition. *Population aging, intergenerational transfers and the macroeconomy*, *6*, 128-162.

McNicoll, G. (2006). Policy lessons of the East Asian demographic transition. *Population and Development Review*, *32*(1), 1-25.

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

Ogawa, N., Mason, A., Chawla, A., & Matsukura, R. (2010). Japan's unprecedented aging and changing intergenerational transfers. In *The economic consequences of demographic change in East Asia* (pp. 131-160). University of Chicago Press.

Pool, I. (2007). Demographic dividends: Determinants of development or merely windows of opportunity. *Ageing Horizons*, *7*(2007), 28-35.

Ross, J. L., & Iannotta, J. G. (Eds.). (2002). *Equality of Opportunity and the Importance of Place: Summary of a Workshop*. National Academies Press.

Shekar, M., Yazbeck, A., Hasan, R., & Bakilana, A. (2016). *Population and development in the Sahel: policy choices to catalyze a demographic dividend*. World Bank.

Thompson, W.S. (1929): "Population." *American Journal of Sociology* 34 (6), 959-75.

United Nations. Department of Economic and Social Affairs. (2013). *World Population Prospects: The 2010 Revision, Volume II-Demographic Profiles*. UN.

Vallin, J. (2005). The demographic window: an opportunity to be seized. *Asian Population Studies*, *1*(2), 149-167.

Wang, K. M. (2011). Health care expenditure and economic growth: Quantile panel-type analysis. *Economic modelling*, *28*(4), 1536-1549.

Wooldridge, J. M. (2023). Simple approaches to nonlinear difference-in-differences with panel data. *The Econometrics Journal*, *26*(3), C31-C66.

Yip, P. S., Cheung, K. S., Law, S. C., Chi, I., & Robine, J. M. (2010). The demographic window and economic dependency ratio in the Hong Kong SAR. *Asian Population Studies*, *6*(2), 241-260.

Appendixes-1

Appendix1: NUTS2 Regions

NUTS-2 Regions	The Provinces
TR62	Adana, Mersin
TR51	Ankara
TR61	Antalya, Isparta, Burdur
TR32	Aydın, Denizli, Muğla
TRA2	Ağrı, Kars, Iğdır, Ardahan
TR22	Balıkesir, Çanakkale
TR41	Bursa, Eskişehir, Bilecik
TRA1	Erzurum, Erzincan, Bayburt
TRC1	Gaziantep, Adıyaman, Kilis
TR63	Hatay, Kahramanmaraş, Osmaniye
TR82	Kastamonu, Çankırı, Sinop
TR72	Kayseri, Sivas, Yozgat
TR42	Kocaeli, Sakarya, Düzce, Bolu, Yalova
TR52	Konya, Karaman
TR71	Kırıkkale, Aksaray, Niğde, Nevşehir, Kırşehir
TRB1	Malatya, Elazığ, Bingöl, Tunceli
TR33	Manisa, Afyon, Kütahya, Uşak
TRC3	Mardin, Batman, Şırnak, Siirt
TR83	Samsun, Tokat, Çorum, Amasya
TR21	Tekirdağ, Edirne, Kırklareli
TR90	Trabzon, Ordu, Giresun, Rize, Artvin, Gümüşhane
TRB2	Van, Muş, Bitlis, Hakkari
TR81	Zonguldak, Karabük, Bartın
TR10	İstanbul
TR31	İzmir
TRC2	Şanlıurfa, Diyarbakır