

## **NEW REGIONAL DEFINITION AND SPATIAL ANALYSIS OF REGIONAL INEQUALITIES IN TURKEY RELATED TO THE REGIONAL POLICIES OF EU<sup>1</sup>**

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**ABSTRACT:** Increasing interest in regional inequalities can be easily observed not only within countries but also among countries, related to globalization process and trade agreements. While the European Union has also focused on issues on regional development, inequalities and convergence, the enlargement of the EU makes this issue very significant, especially considering the role of structural funds in the integration process. In this context, Turkey has also proposed several projects to assist in the adjustment process in anticipation of eventual EU membership. One of them has been to define NUTS regions in order to adjust to the regional statistical system of the EU and establish a set of comparable data. In this paper, regional inequalities are examined in terms of within and between inequalities for NUTS regions in Turkey from 1980 to 2001. This paper compares the properties of spatial convergence using the new NUTS regional classification in contrast to earlier regional definitions. While the general trend in regional inequalities did not change, analysis with the NUTS regions reveals far less intra-regional inequality.

### **1. INTRODUCTION**

Regional inequalities and the spatial dimension or effects of growth have become more significant and many studies emphasizing these issues have appeared recently in the literature. Reducing “spatial disparities” has been an essential part of the integration and cohesion process in the EU since 1972. The concept of cohesion is explained as the degree to which disparities in economic welfare between countries and regions within the Union are socially and politically tolerable (Keane, 1999).

For practical reasons which have to do with the data availability and the implementation of regional policies, the EU has established the nomenclature of territorial units for statistics (NUTS). This geographical classification system provides a single uniform breakdown of territorial units for the production of EU regional statistics. According to the European Regional Statistics Reference Guide (European Commission, 2002), the definition of a region depends on two main aspects such as the delimitation of space on the basis of one or more criteria and use for administrative purpose at a level below that of the nation state. The system is also helpful for the identification of disadvantaged or less developed regions in order to direct development objectives and funds of the EU.

The new concept of region spans multiple political jurisdictions and

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<sup>1</sup> I would like to thank Geoffrey J.D. Hewings for his valuable contribution.

collaboration among cities or states (Sweet, 1999). With the advent of globalization, regional policy in most countries has become more focused on international competitiveness. As national barriers are lowered, "city regions" are the real arenas for global economic competition. For the purpose of reducing interregional inequalities, regional policy has to be adjusted not only to enhance international competitiveness but to raise the competitive level of backward regions as well.

The enlargement process of the EU has generated lengthy debates about regional development policy and the problems of regional disparities. Cohesion policies stress the need to enhance the economic performance of the lower-income countries over a sustained period; and for this reason there has been an increasing interest on the nature and duration of interregional disparities between regions within member states and between member states. When using any classification of regions, the level of detail increases as the degree of spatial or geographical disaggregation increases (Keane, 1999). Thus, disparities between the regions are wider than those between member states of EU. Some authors argue that factor movements will tend towards equalization and lead to economic convergence between existing and new members following the tenets of neoclassical theory. On the other hand, alternative theories emphasize the polarization process whereby the attractiveness of dynamic rich regions (core) is reinforced at the expense of less dynamic ones, leading to wider income disparities. From this point of view, satisfactory EU growth policies provide no guarantee that the gap between the successful and the unsuccessful regions will not widen. On the one hand, one of the stated EU goals is for the newly member states to catch up with the EU level of per capita income. However, while this may happen, there is no guarantee that the considerable disparities that now occur among the regions within these new member countries will decrease over time.

If the integration process will not help the backward regions without any intervention, there will be a need for some form of regional intervention mechanism to achieve a reduction of inequalities throughout the EU (Keane, 1999). For example, the purpose of the Structural Funds is to assist regions in achieving the living standards and productivity levels of the richer EU regions by bringing about faster economic growth than in the core regions. After 1999, the resources would be diverted from existing peripheral regions to the potential new EU members as the enlarging process continues.

From an economic point of view, Europe seems to be still divided between the western and more affluent part and the eastern part that is still faced with a lower development level (Petraikos, *et al.*, 2000). On the other hand, there may be development opportunities for some of the peripheral regions. The expansion of EU would shift the economic centre of gravity in Europe eastwards. Economic gains would accrue less to southern and western peripheral regions (McQuaid, 2000). It seems that the approach to Eastern Europe will change with the reorientation of the European Project as a whole away from a single Europe to a patchwork Europe by accepting and valuing local and regional differences (Agnew, 2001).

This paper will provide an opportunity to evaluate the adjustment process related to regional issues, such as the definition of new regional statistical units in Turkey, by examining between and within regional inequalities. In the next section, a summary of regional development issues and policies in Turkey will be provided. In the third section, the methodology of inequality and spatial dependence analysis will be reviewed and the findings of within and between region inequalities will be displayed based on different regional partitions. In the fourth section, the focus will be on the spatial dependence of growth and the relationship between inequalities and spatial dependence in order to explain the role of neighbor effects. The conclusion follows in section five.

## **2. REGIONAL POLICIES IN TURKEY WITH RESPECT TO THE EU ACCESSION**

### **2.1 An Overview of Regional Development Policies and Issues in Turkey**

During the early 1980s, the most intensive effects of liberalization and globalization have been seen in Turkey. The question raised here is whether these processes have affected interregional disparities positively or negatively. After the beginning of policies supporting export activities, there has been considerable structural change and the share of export in GNP has increased. In economic terms, the EU has already emerged as a centre of gravity for Turkey, evident from the fact that the EU routinely absorbs around 50 percent of Turkish exports, well ahead of any other group of countries (DTM-UFT, 2000). The sectoral share of exports yields clues as to the changing economic structure of Turkey since the beginning of 1980s. Trade, transportation and telecommunication sub-sectors have experienced the highest growth rates in the economy in 1990s. In addition to the export figures, the growth of foreign capital- investment is another significant factor in expanding Turkey's links to the world economies as well as a source of structural change. The EU accounts for a major proportion of total foreign capital and its share increased to 60 percent after 1994 (DTM-UFT, 2000).

Turkey has recognized the need for change in the creation of the Seventh Five Year Development Plan (1996-2000). First, 'Integration with the world' is the major theme of the plan. European integration policies are reflected in goals such as 'the development of human resources,' 'structural change projects in infrastructure services,' and 'establishing regional balance' (SPO, 1997). Regional planning and development policies in Turkey together formed a new field at the beginning of 1960s when the First National Development Plan was issued and focused mainly on sector studies without attention to the processes of spatial development. Regional policies have taken place in "Development Plans," but the question is whether regional policies are actually implemented and the degree to which the benefits of regional policy spill over to the peripheral regions. During the planning period in Turkey, two conflicting goals are defined as '*maximizing national income*' on the one hand, and '*reducing interregional disparities*' on the other. But even in the 7<sup>th</sup> Development Plan (1996-2000) (SPO, 2000), it is accepted that no more progress has been made other than the

affirmation of the existence of interregional disparities in the Development Plans promulgated to the present period. The main factors explaining the failure of regional policies can be traced to the absence of administrative capacity and institutionalization in order to implement spatial-regional plans and policies (Eraydin, 2001). With respect to regional development, two main problems should be highlighted, one of them being lagging/less developed provinces and the second the rapid growth of metropolitan regions/cities. The concentration of population and capital in the west is both a cause of and contributes significantly to the magnitude of these problems. After 1980, the spatial reflections of the new policies on export base development and decentralization of industrial activities from metropolitan cities caused industrial expansion in provinces adjacent to metropolitan regions. Moreover, there have been new industrial foci that are specialized in certain sectors due to comparative advantages, while the role of *metropolitan cities* (especially Istanbul), has increased to constitute and control total capital and the business-service sector with respect to increasing international relations and receipts of foreign trade.

In the 3rd Development Plan (1973-77), the definition of “*Priority Provinces for Development*” (PPD) was made to give precedence to those provinces by directing industrial investments towards them in order to reduce interregional disparities in the long term. The first declaration of PPDs was in 1968 with 22 provinces located in the East and South East Anatolia being identified. Since then, the number of PPDs has been frequently changed by political decisions instead of scientific criteria. Finally in 1996, all PPDs were considered as 1st priority provinces and 49 provinces were considered as PPDs in 1998. Considering all PPDs as having the same priority level is not efficient for the regional allocation of public investment but clearly reflects tendencies towards an equity policy.

The analysis of Gezici and Hewings (2004) indicates that PPDs have common characteristics compared to the developed provinces, though they have some differentiations with respect to several indicators. PPDs as backward regions are mainly located in the Black Sea, East and Southeastern Anatolia. Some provinces that are included in the Southeast Anatolia Project (GAP) have positive population change and are receiving relatively more public investment in total, though they do not have adequate per capita investment and have not yet experienced faster GDP growth. The Southeast Anatolia Project is the most important project of the overall regional development policy to give priority after the mid 1980s to the lagging regions that have development potential. The initial purpose of the project was focused on the agriculture sector and infrastructure projects; later, it was transformed into an integrated project for regional socio-economic development.

In the 8th Five Year Development Plan (2000), the failure of policy on PPDs may be explained by factors such as declaration of too many provinces, frequent changes by political decisions, considering all PPDs as having the same priority even they are at the different development levels, and failure to provide integration among the investments (Gezici and Hewings, 2004). Furthermore, public investment could not create sufficient attraction for private investment

towards most of PPDs.

## **2.2 New Agenda for Regional Development in Turkey and Definition of NUTS Regions**

Since the beginning of attention to regional issues and policies in Turkey, the geographical region is the most common regional definition and there are several studies that have explored regional issues in Turkey based on geographical regions. On the other hand, Turkish regions have been classified not only based on Geographical Regions (7 regions); but also Programming Regions (8 regions) and Functional Regions (16 regions) as well. Programming regions were defined in terms of certain criteria with respect to homogeneity and simple agrarian economy for development planning purpose in 1960s. "Functional regions" were defined resulting from an investigation of "*The Hierarchy of Urban Settlements in Turkey*" by the State Planning Organization in 1982. Sixteen regions have been derived from a comprehensive analysis in terms of central place theory and the interactions of the centers. Each functional region has a central province that is supposed to stimulate its region with spillover effects, but this division has not become a common aggregation for either the empirical studies or regional policy initiatives.

Gezici and Hewings (2003) examined a classification of coastal-interior provinces beside geographical regions and functional regions in order to test whether regional inequalities in Turkey were sensitive to the way in which regions were defined. The present paper draws on these findings of inequality analysis based on a new regional definition. For the adjustment and accession process of Turkey to the EU, absence of regional statistical units has been emphasized in the report of EU. In this report (AB-EU, 2002); the requirement of "*preparing national development plans covering integrated regional development plans especially for the PPDs at NUTS 2 level in the period of 2003-2005*" was noted. Therefore, in the report of the Preliminary National Development Plan on the way of the EU, emphasis was placed on the need to accelerate the implementation of regional development policies in order to harmonize with EU policies (SPO-DPT, 2003). For this purpose, establishing the statistical database harmonized with the regional statistical system of EU, making socio-economic analysis of regions and decision making for regional policies, classification of new regional statistical units of Turkey have all been completed in 2002. Therefore, all the statistical data and analysis would be based on new regional statistical units and thus it is now possible to make comparison with the EU and member states (SPO-DPT, 2003).

The first step was the classification of regional statistical units (NUTS) at Level 3, constituted by provinces. The provinces which are neighbours to each other and have similar features with respect to economic, social and geographical conditions are classified as Level 2 and Level 1 by further considering their population and regional development plans (SPO-DPT, 2003). Therefore, the number of units/regions decreases from Level 3 to Level 1 with 81 provinces in the 26 NUTS-2 regions and 12 NUTS-1 regions. NUTS regions are also expected to be the main framework for the administration hierarchy. In

summary, the NUTS regions are established as following:

- Level 3- 81 Provinces
- Level 2- 26 Units (grouping of neighbour provinces among Level 3)
- Level 1- 12 Units (grouping of Level 2 Units).

After establishing NUTS regions, the State Planning Organization prepared a “*Regional Development Strategy, Objectives and Operational Programs*” especially for the 10 Level-2 regions, as a part of Preliminary National Development Plan and as a road map in order to direct regional development activities in Turkey. This report indicates that the national level of GDP per capita is \$US 2146, while the average level of GDP per capita of the 10 Level 2 regions is \$US 1188 in 2001 (SPO-DPT, 2003). It is expected that one of the third of EU fund sources for Turkey will be allocated to the goal of regional development in order to reduce interregional inequalities. For this reason, regional development plans and operational programs have become very significant and SPO-DPT developed a framework of integrated regional development programs, the objectives and strategies for 10 Level 2 regions which are mostly called as PPDs as well and located in the east. Development of human resources, supporting the small and medium size firms, local entrepreneurship, regional development agencies, competitiveness, local participation and governance, public-private partnerships are the main emphases of these strategies following the EU policy (SPO-DPT, 2003).

### 3. EMPIRICAL STUDY

#### 3.1 Methodology and Data

One of the main purposes of this paper is to examine the inequality based on different regional definitions in Turkey not only over time, but also across regions and within regions. The result of this analysis will provide an opportunity to evaluate the regional development pattern of Turkey especially in the context of its possible future admission to the EU. Thus, the pattern will be examined with respect to definition of NUTS regions in Turkey related to the statistical regions of EU<sup>2</sup>. Furthermore the spatial dependence of the level of income and its relationship to regional inequality in terms of GDP per capita will also be examined.

There are empirical studies (Fujita and Hu, 2001; Azzoni, 2001, Lee, 2000; Qingshu and Stough, 2000; Terrasi, 1999) on regional inequalities that have focused on both interregional and intra-regional inequalities by using the Theil Index. The main advantage of the Theil index is that it provides insights into not only between regional inequalities but also within regional inequalities as well, in contrast to other inequality measurements such as coefficient of variation and Gini coefficients. In order to gain insights into the dynamics and the role of regions or smaller spatial units on inequalities, attention should be directed to intra-regional inequalities as well.

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<sup>2</sup> However, the absence of data according to GDP per capita as purchasing power parity makes hard to compare to the EU regions directly.

The index of interregional inequalities is presented as:

$$T = T(y : x) = \sum_{i=1}^n y_i \log \left( \frac{y_i}{x_i} \right) \quad (1)$$

where  $x_i$  = population of province  $i$  relative to the national population, while  $y_i$  =GDP of province  $i$  relative to the national GDP, and  $n$  denotes the number of the regions. By using the Theil index, the sum of interregional and intra-regional disparities can be estimated as:

$$T = \sum_{i=1}^n y_i \log \left( \frac{y_i}{x_i} \right) + \sum_{g=1}^n Y_g T_g (y : x) \quad (2)$$

where the left side is the Theil index measuring the disparity between regions (inter-regional),  $Y_g$  is the region  $g$ 's share of total GDP, and  $T_g(y:x)$  is the Theil index measuring the disparities among provinces (intra-regional or within) in region  $g$ .

However, there is no formal administrative regional unit in Turkey as we mentioned above. In this paper, five alternative partitions are explored in order to analyze inequality from different levels and perspectives: geographical regions, functional regions, coastal-interior regions and regional statistical units (NUTS-1, NUTS-2). While Gezici and Hewings (2003) explored the analysis for three partitions from 1980 to 1997, in this paper, the NUTS regions are the main focus and the period of analysis will be extended to 2001. Hence, the role of spatial scale and its impact on inequality will be the main focus of this paper. In order to test spatial dependence, the well known Moran- $I$  and Moran Scatterplot (Anselin, 1988) were used. Moran's  $I$  provides an indicator for spatial autocorrelation, here interpreted to imply value similarity with locational similarity. A positive autocorrelation occurs when similar values for the random variable are clustered together in space and vice versa (Cliff and Ord, 1981; Upton and Fingleton, 1985). The spatial dependence (global spatial autocorrelation) measure of Moran's  $I$  is represented by equation 3:

$$I_i = \frac{n}{s} \frac{\sum_i \sum_j w_{ij} z_i z_j}{\sum_i z_i^2} \quad (3)$$

$n$  is the number of regions,  $z_i$  and  $z_j$  are the deviation of log of per capita income from the mean of each region,  $w_{ij}$  are the elements of weight matrix  $W(n \times n)$  and it is equal to 1 if  $i$  and  $j$  are neighbours and 0 if they are not;  $s$  is the sum of all elements of  $W$  (spatial weights). A binary contiguity matrix was used adopting the familiar rules. There are two primary constructions used for the binary spatial weight matrix, namely rook and queen. Rook computes only common boundaries, while queen compute both common boundaries and nodes.<sup>3</sup> In the case of our data, there are no impacts on the result by using either rook or queen, because all neighbours have common boundaries rather than nodes.

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<sup>3</sup> For more information about binary weight matrix, see Anselin (1988)

A value of Moran's  $I$  statistic around 1 represent strong and positive spatial autocorrelation, while values around  $-1$  show negative spatial autocorrelation. The Moran scatter-plot provides a way of visualizing spatial association (Anselin, 1996). Four quadrants in the scatter-plot represent different spatial association. The upper right and lower left quadrants correspond to positive spatial association by the presence of similar values in neighbouring locations. The other two quadrants correspond to negative spatial association. The Moran scatter-plot can also be mapped as Moran scatter-plot map.

The provincial GDP time series has been constructed from two different sources. For 1979-86, the data were obtained from the Istanbul Chamber of Industry (ISO, 1988) and for 1987-2001, data are derived from the State Statistics Institute<sup>4</sup>. All nominal data were converted to 1987 constant prices. Population data have been obtained from State Statistics Institute based on official census and interpolated for the years that do not coincide with the census. To avoid the effect caused by the creation of new provinces after 1990, though there are 81 provinces currently, the data set was created based on the former 67 provincial level throughout the 1980-2001 period.

### 3.2 Inequalities based on Different Regional Definitions

Although there is no formal administrative unit at the regional level in Turkey, reducing interregional inequalities has been a major goal during the planning period. Thus, inter-regional inequalities have been one of the main foci of regional studies. The 1987 study of State Institute of Statistics was the first survey covering Turkey as a whole (SIS,1990). The Gini Coefficient was equal to 0.43, while it was 0.49 in 1994 (SIS,1997). Atalik (1990) measured regional income disparities in Turkey for the years 1975 and 1985. For the functional regions, the coefficient of regional income variation moved from 0.32 in 1975 to 0.43 in 1985. Özmucur and Silber (2002), Senesen (2002) and Dogruel and Dogruel (2003) are the some of the recent studies focusing on interregional inequalities based on the geographical regions. Issues of regional inequality can be addressed with aggregation issues as well. Rey (2001) found out that "*the choice of the partition can fundamentally change the inequality decomposition*".

**Geographical regions:** Inequality among the seven geographical regions has been increasing steadily. Although there is a decline of total inequality in the mid 1980s, it has been increasing in 1992 again until 2001 (Figure 1). In the initial year (1980), inequalities could be categorized as 55 percent at the between/inter-regional level, while 45 percent were derived from within/intra-regional level. However this proportion increased for between regions inequality during the analyzed period, but it became 55 percent again in 2001 (Figure 1).

Mediterranean, Southeast Anatolia, Black Sea and East Anatolia are more stable and have relatively lower within region disparities. The Marmara region has the highest share of inequality (28 percent) within region during all analyzed period, while the Black Sea and Southeast Anatolia have relatively lower share of total within inequalities in geographical regions (see Gezici and Hewings,

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<sup>4</sup> ([www.die.gov.tr](http://www.die.gov.tr)).

2003). This result shows that less-developed or poor regions have relatively lower inequalities than richer ones. However, “within region” inequality indicates increasing trend in 2001 (Figure 2).

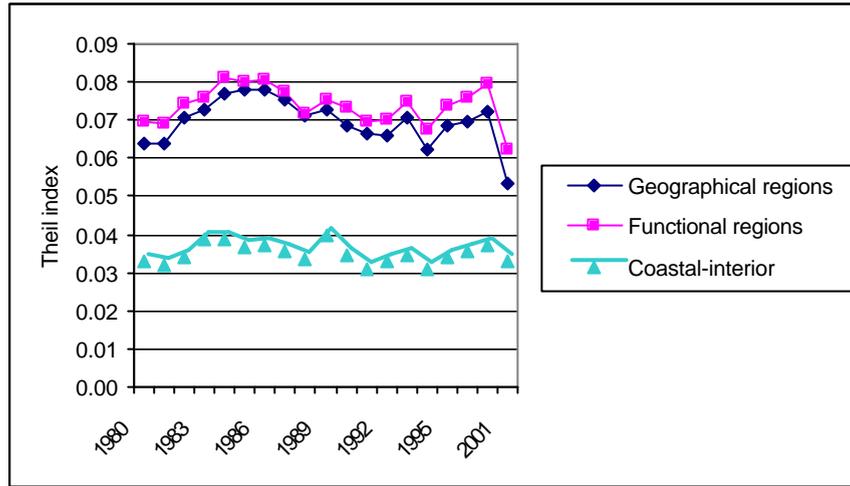


Figure 1. Between Region Inequalities, 1980-2001 (3 different partitions)

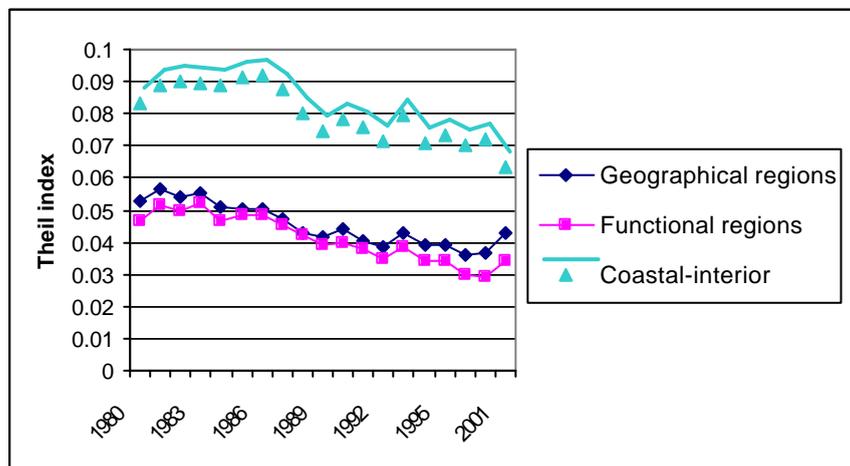


Figure 2. Within Region Inequalities, 1980-2001 (3 different partitions)

**Functional regions:** The Theil index indicates slightly decreasing inequality within regions, while there is increasing inequality between regions, a result similar to the one found for geographical regions. However, there is an inconsistency with the pattern in 2001. Analysis reveals that for functional

regions inequalities between regions account 60 percent of total inequalities in 1980, 73 percent in 1997 and 64 percent in 2001 (Figure 1).

When the focus is on the inequalities within functional regions, it is obvious that the highest inequality is within the Istanbul functional region. Izmir and Ankara functional regions are other regions that have relatively higher within region inequalities. These results are related to the effect of metropolitan/big cities in the corresponding region, but it is also related to the number of provinces in the region.

**Coastal-Interior provinces:** With this partition, the objective was to examine whether there is a relation between geographical position in terms of coastal or interior provinces and inequalities in terms of growth. Although the west and south coasts of Turkey include the most developed provinces, the provinces along the Black Sea coast have basically backward features such as high out-migration, low growth rates, etc. At first, the coastal provinces were the wealthiest in the country in terms of initial advantages like location and transportation opportunities. In Turkey, the inclusion of provinces in the Black Sea region as PPDs<sup>5</sup> to the coastal partition, within region inequalities account 72 percent of total inequalities in 1980, but drop to 66 percent in 2001. Moreover, between-region inequalities have been increasing until 1997, while within region/intra-region inequality accounts for the larger part of total inequalities. In 2001, both between and within region inequalities indicate a declining pattern (Figures 1 and 2).

The hypothesis is that during the period of fast national growth, richer regions receive more benefits than poorer regions and thus it is to be expected that the result would be increasing inequalities. On the other hand, when the national economy slows down, the richer areas could be the first ones to be affected, while the poorer regions experience the negative effects later on. The results of inequality analysis reinforce this hypothesis. The economic crisis in Turkey in the year of 2001 helped relatively poor regions among the coastal provinces with their catching up process, while the provinces at the heart of the economy were slowing down with the downturn in the national economy as a whole.

The analysis will now explore inequalities for NUTS-1 and NUTS-2 regional divisions.<sup>6</sup>

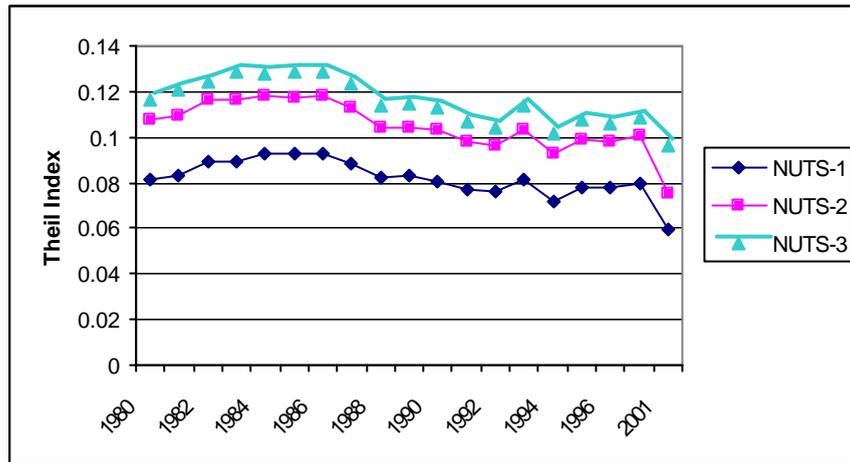
**NUTS-1 region:** Between-region inequalities are increasing until the mid 1980s (Figure 3). After 1987, there is a diminishing trend and the index value is smaller than in 1980, the initial year. The index value indicates that between region inequalities are decreasing in 2001 as well. This decreasing trend of between inequalities can be explained by the national economy during that time. First, in 1999 there was a large earthquake which affected the Marmara region and the most productive provinces at the heart of spatial economic development of the country. Later on, an economic crisis occurred in 2001. Both events

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<sup>5</sup> Backward regions- defined as Priority Provinces in Development by State Planning Organization. For more information Gezici and Hewings (2004).

<sup>6</sup> The appendix to this paper provides a list of NUTS-1-2-3 level regions.

conspired to slow down the national economy and most of the developed regions, thus generating a decreasing trend of inequalities.



**Figure 3.** Between-Region Inequalities, 1980-2001 (NUTS regions)

Within-region inequalities are declining after 1986 after reaching their highest point in 1983. In 2001, after a four-year break, inequalities return to the initial index value (0.036) (Figure 4). With respect to within region inequalities among the 12 regions, the results confirmed those using the geographical and functional regions, namely that rich regions contribute more to the overall inequalities rather than poor ones (Figure 5). Among NUTS-1 regions, the region of Bursa<sup>7</sup> has the highest proportion (39 percent in 2001) and the increasing trend can be related to the earthquake and economic crisis in 1999 and 2001. The earthquake affected almost all provinces in this region and there has been population loss as well. Izmir and Antalya are the other provinces that contribute to the within region inequalities including mostly coastal and developed provinces.

**NUTS-2 regions<sup>8</sup>:** At this spatial scale, between-region (26 regions) inequalities are almost five times larger than within inequalities (Figures 6 and 7). There has been a declining trend parallel to the NUTS-1 regions after 1986 until 1993. Between 1997 and 2001, there is an obvious decrease from 0.10 to 0.07. Within-region inequalities are mostly stable compared to between region inequalities and inequalities of NUTS-1 regions as well. There has been a slight declining trend after 1987. Although there has been an increase in 2001, the index value is still smaller (0.018) than the initial year (0.021). With respect to specific region contributions to the within-region inequalities, Kocaeli region (Bolu, Düzce, Kocaeli, Sakarya, Yalova) provides the highest proportion (53

<sup>7</sup> Bursa, Eskisehir, Bilecik, Kocaeli, Sakarya, Düzce, Bolu, Yalova.

<sup>8</sup> The appendix to this paper provides a list of NUTS-2 level regions.

percent) in 2001, in similar fashion to the results at the NUTS-1 region level (Figure 8).

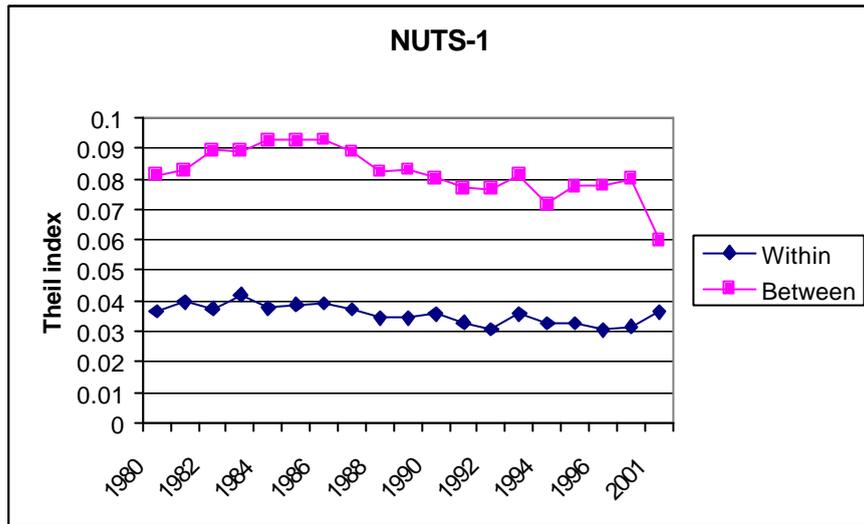


Figure 4. Regional Inequalities based on NUTS-1 Regions, (12 regions) 1980-2001

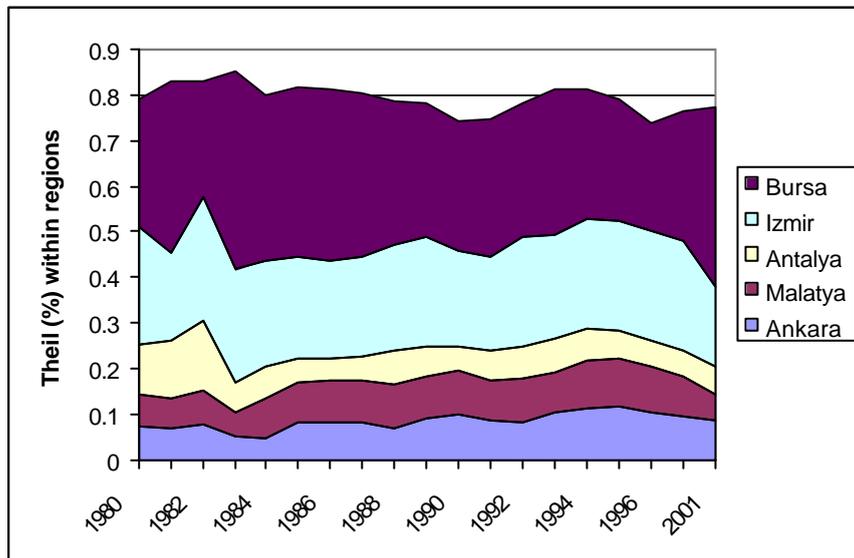
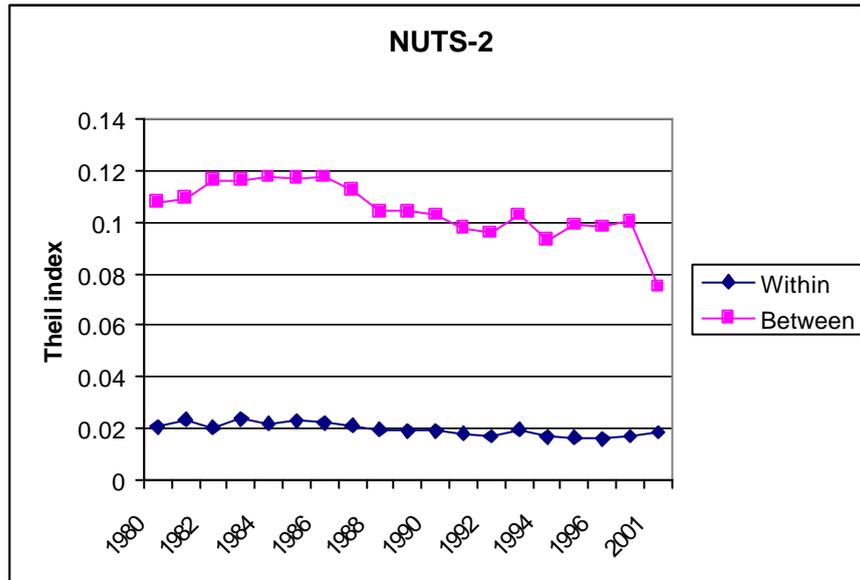


Figure 5. Highest Contributor Regions to Within-Region Inequalities Based on NUTS-1 Regions

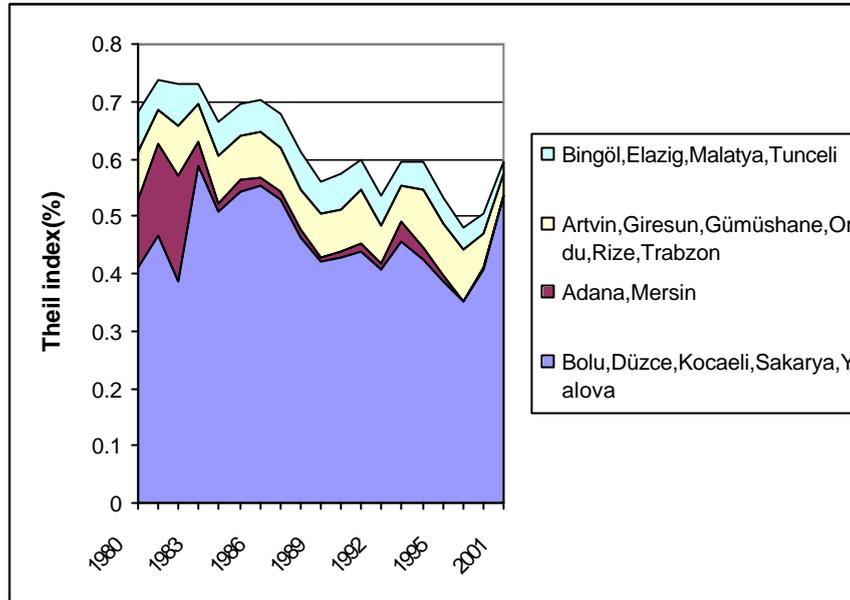


**Figure 6.** Sub-Regions of NUTS-2 Level in Turkey (SPO, 2003)



**Figure 7.** Regional Inequalities based on NUTS-2 Regions (26 regions), 1980-2001

The analysis of NUTS regions indicates that definition of these regions is perhaps more meaningful than the other regional divisions for future policy. Related to the number of provinces and units, inequality index values are changing as we expected. Especially, NUTS-2 regions have mostly similar features, both from economic and political perspectives, within their provinces. This will facilitate establishment of institutions, development policy and plans for less-developed ones since there would appear to be far less heterogeneity within the NUTS1 regions than was the case for the geographical and functional regional systems.



**Figure 8.** Highest Contributor Regions to Within-Region Inequalities based on NUTS-2 Regions

#### 4. SPATIAL AUTOCORRELATION AND REGIONAL INEQUALITIES

How important are the influences of neighbouring regions? In this section, attention is directed to the potential role of spatial spill over effects.

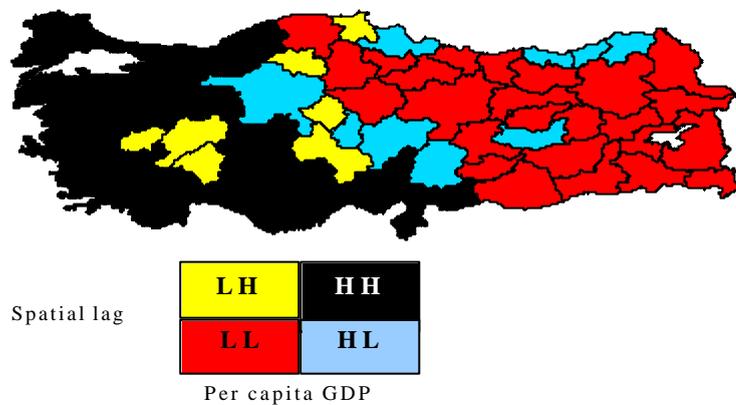
##### 4.1 Spatial Autocorrelation

It is important to look at the spatial patterns of GDP per capita in order to examine spillover effects. If comparison is made of the spatial clustering of both initial and actual GDP per capita, then the dynamism of the poor regions and rich regions can be explained related to their neighbors' dynamism. At this point, if a neighbor relation has a positive effect, spillover effects and complementarities can be assumed. Exploratory Spatial Data Analysis highlights the importance of spatial interactions and geographical locations in regional growth issues. In order to test the spatial dependence of GDP per capita in Turkey, the initial (1980) and final year (2001) variances were examined.

Moran's  $I$  of the log of GDP per capita is increasing from 0.5372 in 1980 to 0.6355 in 1995 and then it is decreasing to 0.5962 in 2001; a randomization assumption is rejected for variables (highly significant) and it means that the distribution of GDP per capita by province is strongly influenced by neighbours.

This highly spatial clustering pattern can be seen in the Moran scatter plot map as well (Figure 9). However, it seems that spatial autocorrelation is

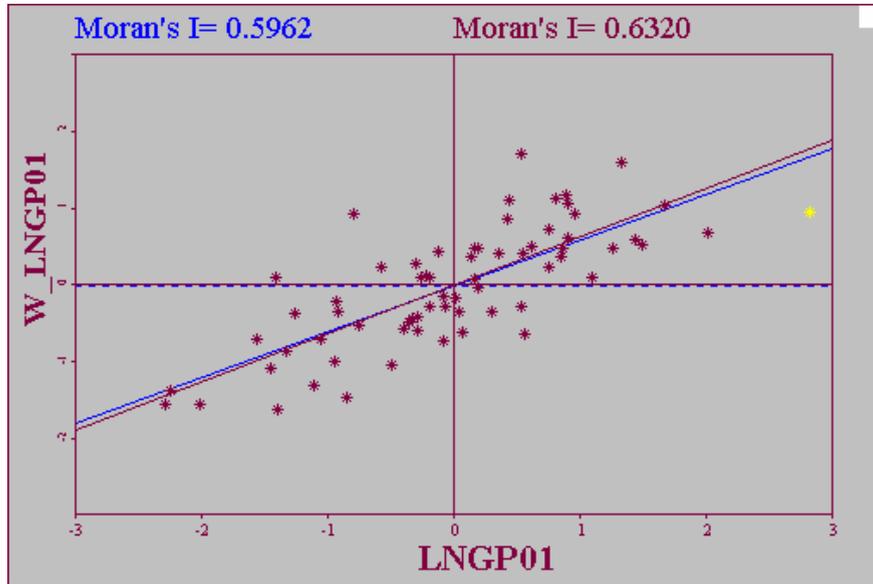
becoming weaker, when the most important outlier is excluded from the scatter plot, as the Moran  $I$  is now 0.6320 (Figure 10). In 1980, 76.12 percent of the provinces show association of similar values with their neighbours, while this ratio increased 80.59 percent in 2001. Considering the provinces which are clustering as HH and LL, both sets of regions are exhibiting spill over effects.



**Figure 9.** Moran Scatter Plot Map for Log of GDP per capita 1980

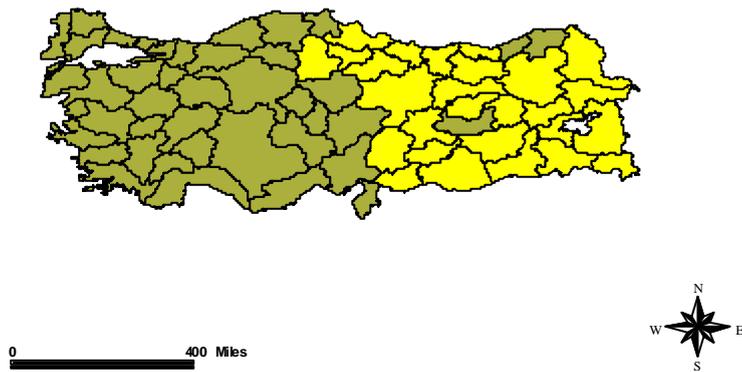
In both years (1980 and 2001), provinces that are clustering as High-High are located in the west and mainly west and south coast. Excluding some provinces in the east which are more dynamic than the others, there is almost no difference in the east provinces categorized as Low-Low over the 20 years. Distribution of GDP per capita still highlights the “spatial peripherality” and “east-west dualism” of regional development pattern in Turkey. (Figure 11).

As a result of our findings, it is claimed that there is a strong spatial autocorrelation for GDP per capita for initial and final years. In the next section, this will be formally tested.



**Figure 10.** Moran Scatter Plot for Log of GDP per capita, 2001

### Less-developed Provinces as "LL"

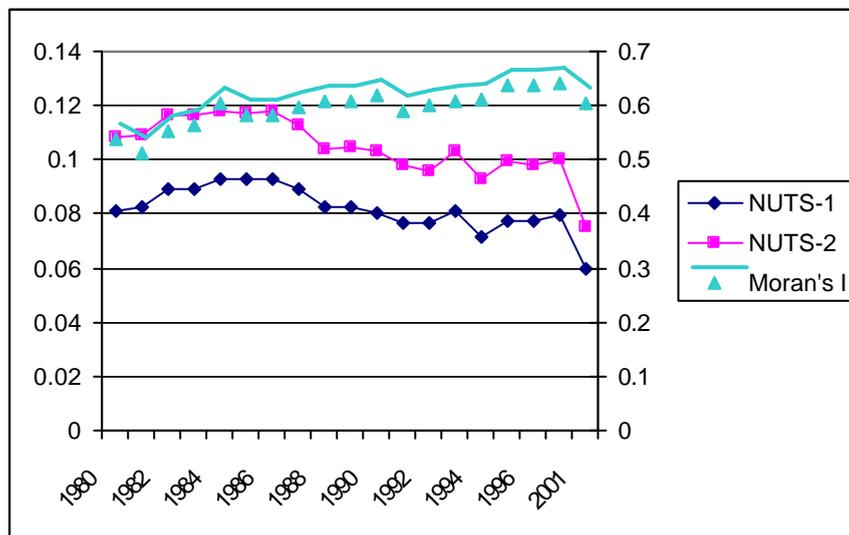


**Figure 11.** Less Developed (eastern) Provinces as Low-Low GDP per Capita in 2001

#### 4.2 Regional Inequality and Spatial Dependence

In this part of the paper, the relationship between regional inequality and spatial autocorrelation in Turkey will be examined. As before, inequality is measured using the Theil index, while spatial autocorrelation is measured by using Moran's *I*. Rey and Montouri (1999) used the coefficient of variation the log of GDP per capita and Moran's *I* in order to present this relationship. According to their findings, in any given year, state income distribution exhibits a high degree of spatial dependence. They offered two explanations: first, an increase in spatial dependence could indicate that each cluster is becoming more similar in terms of convergence. Secondly, "an increase in spatial dependence could also be due to newly formed clusters emerging during a period of increased income dispersion."

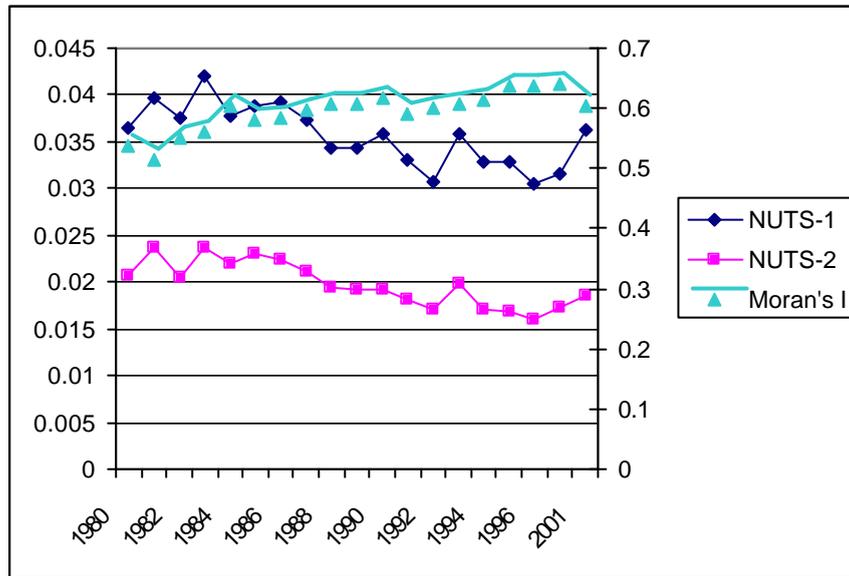
In Turkey, the Theil index is decreasing especially in mid 1980s, while Moran's *I* is slightly increasing over the entire period. Moran's *I* coefficients are highly significant<sup>9</sup> for all years providing support for the hypothesis of spatial dependence, while rejecting a hypothesis of a random distribution of income. While overall inequalities are decreasing (0.116 in 1980 and 0.096 in 2001), spatial dependence is still strong. This finding may be explained by increasing interconnections among provinces over time and the effects of slowing down in national economy in the last period. Furthermore, a comparison between Moran's *I* and both interregional and intra-regional inequalities, reinforces the role of neighbor effects on growth and inequality (Figures 12 and 13).



**Figure 12.** Between-Region Inequalities and Spatial Dependence

<sup>9</sup> z-values are highly significant (less than 1 percent) for all years.

Between region inequalities indicate a declining trend, while within region inequalities are increasing for NUTS-1 and NUTS-2 regions in the last part of the period, similar to the results of geographical and functional regions as well. However, comparison to five different partitions indicates that NUTS-2 regions have the lowest value of Theil index (0.018), while coastal-interior partition indicates the highest value (0.063). In terms of within region inequalities, NUTS-1 regions have some similarities with the functional regions and they have similar index values (0.034 and 0.036). It can be suggested that spatial dependence has a positive effect on within regional inequalities for NUTS-2 regions rather than the other partitions. These findings suggest that the NUTS-2 regions have mostly similar features, economic and political background within their provinces.



**Figure 13.** Within-Region Inequalities and Spatial Dependence

## 5. CONCLUSION

In this paper, new regional statistical units are examined with respect to within and between region inequalities, and spatial or neighbour effects on the growth dynamics in Turkey from 1980 to 2001. This kind of analysis is expected to contribute to the literature on regional issues, especially for evaluating and establishing regional divisions in Turkey.

The concept of cohesion is explained as the degree to which disparities in economic welfare between countries and regions within the European Union are tolerable. As the EU expands, the dilemma becomes one of focusing attention on new member states that tend to have lower per capita levels of welfare than

existing members while not abandoning development strategies that focus on regional inequalities within existing member states.

For the adjustment and accession process of Turkey to the EU, the absence of regional statistical units and associated data and the implementation of regional policies, were noted in the report of the EU. For the purpose of preparing integrated regional development plans especially for less developed regions in the period of 2003-2005, new regional statistical units of Turkey are established in 2002. The aim of this paper is to bring a new insight into the nature and trends of regional inequalities within NUTS regions, providing a comparison with the analysis of Gezici and Hewings (2003) that focused on other regional definitions in use at the time in Turkey. The last comparison was made somewhat more complicated by the 1999 earthquake and the economic crisis in 2001. These events slowed down the national economy and most developed regions, generating a decreasing trend of inequalities. However, the results reveal that the NUTS regions present a more appropriate division of the economy; for example, the NUTS-2 (26 regions) regions have the lowest within-region inequality compare to the other regional definitions. There is greater homogeneity in the NUTS-2 regions than the other regional systems. Therefore, the level of NUTS-2 regions might be more appropriate as the basis for the application of regional policy and programs with respect to EU policies.

The result of spatial data analysis indicates that there is a strong spatial autocorrelation on GDP per capita for initial and final years, while overall inequalities are decreasing. The rich provinces that are clustering as High-High are located in the west and mainly west and south coast. Moreover, the distribution of GDP per capita highlights the eastern-spatial peripherality of regional development pattern in Turkey. There are few provinces which are classified as HL in the eastern part, and there appears to be little evidence of development stimulation from neighbours in this part of the country. On the other hand, spill over effects of the rich provinces are becoming stronger with their closest neighbours, rather than expanding their spill over effects to other provinces. Therefore, the findings of the analysis of inequality and spatial dependence emphasize two significant points for regional policies. First, there is evidence of a strengthening of a two-regime spatial division in the country; secondly, there would appear to be little evidence of positive spill overs from the more-developed to the less-developed parts of the country. What is need is a deeper understanding of the nature of these processes and consideration of policies that might enhance the interdependence between the two regimes.

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**APPENDIX: LIST OF NUTS-2 LEVEL SUB-REGIONS AND COMPONENT PROVINCES**

	<b>NUTS 1 Sub-regions</b>	<b>NUTS 2 Sub-regions</b>	<b>NUTS 3 Sub-Regions (Provinces)</b>
1	Istanbul	Istanbul	Istanbul
2	W. Marmara	Tekirdag	Tekirdag, Edirne, Kirklareli
3	W. Marmara	Balikesir	Balikesir, Çanakkale
4	Aegean	Izmir	Izmir
5	Aegean	Aydin	Aydin, Denizli, Mugla
6	Aegean	Manisa	Manisa, Afyon, Kütahya, Usak
7	E.Marmara	Bursa	Bursa, Eskisehir, Bilecik
8	E.Marmara	Kocaeli	Kocaeli, Sakarya, Düzce, Bolu, Yalova
9	W.Anatolia	Ankara	Ankara
10	W.Anatolia	Konya	Konya, Karaman
11	Mediterranean	Antalya	Antalya, Isparta, Burdur
12	Mediterranean	Adana	Adana, Mersin
13	Mediterranean	Hatay	Hatay, K.maras, Osmaniye
14	M.Anatolia	Kirikkale	Kirikkale, Aksaray, Nigde, Nevsehir, Kirsehir
15	M.Anatolia	Kayseri	Kayseri, Sivas, Yozgat
16	W.Blacksea	Zonguldak	Zonguldak, Karabük, Bartin
17	W.Blacksea	Kastamonu	Kastamonu, Çankiri, Sinop
18	W.Blacksea	Samsun	Samsun, Tokat, Çorum, Amasya
19	E.Blacksea	Trabzon	Trabzon, Ordu, Giresun, Rize, Artvin, Gümüşhane
20	N.Anatolia	Erzurum	Erzurum, Erzincan, Bayburt
21	N.Anatolia	Agri	Agri, Kars, Iğdir
22	M.E.Anatolia	Malatya	Malatya, Elazığ, Bingöl, Tunceli
23	M.E.Anatolia	Van	Van, Mus, Bitlis, Hakkari
24	S.E.Anatolia	Gaziantep	Gaziantep, Adiyaman, Kilis
25	S.E.Anatolia	Sanliurfa	Urfa, Diyarbakir
26	S.E.Anatolia	Mardin	Mardin, Batman, Sirnak, Siirt