

Monocentric or Polycentric? Defining Morphological Structure of NUTS-2 Regions of Turkey from 2000 to 2016

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Abstract

The popularity of polycentricity has been increasing in recent years. European spatial planning literature and policy documents that emphasize the positive effects of polycentricity can be one of the reasons for the increase in the popularity of the concept. Although not as clear and planned as in European countries, it is argued that, Turkey's metropolitan cities are also evolving from monocentric spatial structure to polycentric ones. However, there is no empirical study on the measurement of this spatial evolution at national and micro-regional scale in Turkey. From this point of view, this study aims to clarify changes in the morphological structure of Turkey from 2000 to 2016 at national and micro-regional scales and to examine the proposition of 'the spatial configurations of the settlements, especially metropolitans, have been evolving from monocentric to polycentric as results of the dynamics of the 21st century' in Turkey case. The results of empirical analyses show that there is a possibility for Turkey to be a more monocentric in following years if the historical trends continuous.

Keywords: Morphological Polycentricity, Rank-Size Rule, Primacy Index, Micro-Regional Analysis, Turkey

Introduction

Polycentric spatial configuration is generally defined as more than an activity centre cluster in an urban territory and it is commonly accepted as an opposite spatial form of monocentricity. Polycentric distribution representing an optimal amalgamation of more locational factors whereby each centre possesses those kind of facilities, which correspond to the specific features, and resources of that centre (Romelic, 1997). The numbers of activity centres can be changed according to degree of decentralization of economic activities from the main city and complexity of cross-commuting flows among these fragmented spatial formations (Davoudi, 2003). Although the concept is very popular in academic and political arena, it is still a fuzzy con-

cept. According to the literature, polycentricity can be explained not only analytical and normative approaches but also different spatial scales (Waterhout et al., 2005, Kloosterman & Musterd, 2001; Nordregio et al., 2004). Davoudi (2003) explains these approaches under four different dimensions; analytical dimension, normative dimension, spatial scale dimension and morphological and functional dimension.

Analytical dimension emphasizes that every settlement can be spatially defined, measured, and characterized whether it is polycentric or not. Normative dimension, on the other hand, utilizes existing polycentric configurations and supports the formation of such spatial restructuring. According to spatial

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scale dimension, the spatial scale should be clarified carefully in all empirical studies. Urban, urban-region, regional, interregional, national and international scales are mostly preferred scales used in empirical studies. It is possible to define these scales as macro, meso and micro in general (Waterhout et al., 2005; Davoudi, 2003).

Morphological and functional dimension highlights that polycentricity is formed by special morphological structures of settlements and the roles of centres and functional associations among them. According to morphological dimension, centre is a place in which population and employment are agglomerated and these centres are physically located separately from each other. This spatial configuration means at the same time, low hierarchical structure, since there is no dominating centre in this system. In functional dimension, on the other hand, centre is seen as a “node” that attracts many flows and provides many economic facilities its surroundings. Flows, relations and cooperation among centres are the main concerns of this type of dimension (Meijers, 2005; Green, 2007; Limtanakool et al., 2007; Hall & Pain, 2006).

Studies carried out at different spatial scales mostly focus on three topics; the conceptualization and measurement of polycentricity, the clarification of social, economic and environmental advantages and disadvantages associated with polycentricity and the examination of the changes in planning and governance approaches associated with polycentricity. Morphological structures, functional relationships, and sometimes more dimensions (eg, regional identity or administrative collaborations) are used to conceptualize and measure the polycentricity. However, each empirical study can follow different methods considering the internal dynamics of the centres.

Today, there is still no systematic approach to the determination of social, economic and environmental advantages and disadvantages associated with polycentricity. The fact that the concept is not clearly defined has an effect on this fuzziness. However, in some of the studies is argued that this model supports sustainability, economic competitiveness and social cohesion (EC, 1999; Hall & Pain, 2006). For example, it is claimed that polycentricity has had a positive impact on climate change issues because it prevents from urban sprawl. It is stated that the agglomeration of activities at certain centres provides protection and improvement of particularly open spaces and green areas, and development of rational and effective transportation plans (Kirk & Hague, 2003).

Another argument is that polycentrism increases the competitiveness of centres, facilitating the efficient distribution of employment among centres and providing even development (Phelps & Ozawa, 2003;

Meijers, 2007). Since, polycentricity provides agglomeration of urban services in certain centres and this spatial configuration pressures land use decisions, which can be resulted in urban sprawl and high land prices. Non-hierarchical structure of polycentric spatial development creates complementary relations among centres and this not only supports even economic development but also increases social integration and quality of life.

The effect of polycentricity on governance capacity is also another argument that needs to be examined more deeply. Some of the researchers point out that polycentric development generates cooperation among local authorities (from municipalities to neighbourhoods), central governments, non-governmental organizations and leading entrepreneurs in different sectors at different levels (McGinnis, 1999; Rivolin & Faludi, 2005; Olsson & Cars, 2011). Strategies and tools that support polycentric development are jointly managed by these groups, and even distribution of results of this structure should be realized among the groups (Davoudi, 2003).

Actually, the concept of polycentricity was first conceived in 1945 by Harris and Ullman as ‘multiple nuclei cities’, and after that study some other important researches were realized on the concept. However, the turning point for acceleration of the concept is the publication of ‘European Spatial Development Perspective’ (ESDP) in 1999. After that, a large number of theoretical and empirical studies have been carried out on polycentric spatial development especially in European settlements. ESDP claims that the more polycentric the urban systems, more efficient, sustainable and equitable than both monocentric urban systems and dispersed small settlements. With this argument, polycentricity is accepted as a key tool to encourage economic competitiveness, social cohesion and environmental sustainability. These propositions often “lack a theoretical rationale and, even more importantly, they have not been sufficiently corroborated through appropriate empirical investigations” (Veneri & Burgalassi, 2012).

In contrast to studies on European settlements, there are limited numbers of studies on polycentric spatial development in developing countries. Turkey as a developing country has also confronted of spatial reconfiguration processes especially after the 1990s. These processes, with the effects of the inefficient planning activities in metropolitan areas often lead to uneven and fragmented urban structures. Although not as clear and planned as in European countries, it is argued that, Turkey’s metropolitan cities are also evolving from monocentric spatial structure to polycentric ones. However, there is no empirical study on the measurement of this spatial evolution

at national and micro-regional scale in Turkey. From this point of view, this study aims to clarify changes in morphological structure of Turkey from 2000 to 2016 at national and micro-regional scales and to examine the proposition of ‘the spatial configurations of the settlements, especially metropolitans, have been evolving from monocentric to polycentric as results of the dynamics of the 21st century’ in Turkey case.

For this aim, degree of polycentricity/monocentricity in Turkey both in NUTS-2 level and in overall national level has been measured morphologically in 2000 and in 2016. Primacy Index and Rank-Size Rule models, which are mostly preferred models in the measurement of degree of polycentricity, are selected for this measurement.

The paper is organised as follows; after introduction, second section gives introductory information about planning activities, policies and strategy documents that effect polycentric development of Turkey

from historical perspective. Third section focuses on the methodology of the empirical study. A historical analysis on the measurement of degree of morphological polycentricity in Turkey both in 2000 and in 2016 is realized to in the fourth section. The results of the empirical study and possible planning and policy implications for Turkey, are discussed in Section five, which concludes.

This study is crucial in terms of both national and international polycentricity debate, because of its ‘spatial scale’ and ‘case study area’. Actually, there is a very limited number of study directly focused on the measurement of the degree of polycentricity at micro-regional scale (Sýkora & Mulíček, 2009; Malý, 2016; Vasanen, 2013). On the other hand, studies on polycentricity are generally focused on European regions and cities. For this reason, studying this spatial development pattern in a developing world, should give different perspectives for both academics and professionals.

Turkish Policies and Strategy Documents Associated with Polycentric Spatial Development

ESDP and other European strategy documents suggest polycentric spatial development from macro scale to the micro scale to overcome regional inequalities. It is argued that polycentric spatial development can be a tool in eliminating regional disparities and providing sustainable development and social cohesion. Compare to the European studies, polycentricity has been dealt with at the macro level in general and polycentric development policies have been developed on national scale In Turkey. The definition of polycentricity as a policy to address uneven regional development has taken place either directly or indirectly in basic policy and strategy documents in Turkey (Sat et al., 2014). ‘The Ministry of Development of the Republic of Turkey’, which is one of the most important planning institutions in Turkey, prepares ‘Development Plans’ and “Special Expertise Commission (SEC) Reports”. The Ministry of Development was founded in 1960 and it is “... an expert based organization which plans and guides Turkey’s development process in a macro approach and focuses on the coordination of policies and strategy development” (Internet 1). The Development Plans “are prepared using a holistic and participatory planning approach that is consistent with long term targets and takes into consideration inter-sectoral balance. During the Plan preparatory period, SECs are formed that convene for meetings and workshops. Through these committees, the economic and social policy views, recommendations and targets of the diverse groups in society are reflected in the Plan. Turkey has so far prepared ten Development Plans” (Republic of Turkey Ministry

of Development, 2014) and the 1st Development Plan was for the years between 1963 and 1967.

Although the word of ‘polycentricity’ has been firstly used in the 9th Development Plan (2007-2013), there have been policies, giving reference to the concept, since the 1st Development Plan (1963-1967). These policies have focused on balanced distribution of population and functions, to eliminate regional inequalities in the whole country. There have also been various implementations, i.e. ‘growth poles’, to encourage the creation of new centres and to support polycentric development in line with the objectives set out in the key policy and strategy documents. The 9th Development Plan (2007-2013), and its SEC Reports’ spatial development policies were prepared parallel to the EU spatial development strategies. The Settlement-Urbanization Vision of the Report emphasizes elimination of the inequalities among regions and settlements, preservation and improvement of natural and cultural heritage, enhancement of living and urban quality, reduction of risks, assurance of gender equalities, competitive, balanced, complement and sustainable polycentric spatial development. It highlights the gradualization of settlements, polycentric and balanced development in priority primary goals and policies.

The second important institution that prepares basic policy and strategy documents in Turkey is ‘The Ministry of Environment and Urbanization’. Integrated Urban Development Strategy and Action Plan, 2010-2023 (KENTGES) was prepared by The Ministry of Environment and Urbanism as a national urban strategy document in 2010. “KENTGES estab-

lishes principles, strategies and actions for providing healthy, balanced and livable urban development, as well as structural solutions for urbanization. These are grouped under three main axes; restructuring the spatial planning system, improving the quality of space and life in settlements and strengthening the economic and social structures of settlements” (Republic of Turkey Ministry of Public Works and Settlement, 2010:1). KENTGES provides important clues about settlement, urbanization and spatial planning

within the framework of sustainability in order to increase space and quality of life in settlements. One of the principles for sustainable urbanization and settlement; the creation of urban systems, which are polycentric, dynamic, competitive, attractive and have balanced spatial structure.

To conclude, in all these policies and implementations, polycentricity has been dealt with at the macro level in general and polycentric development policies have been developed on national scale in Turkey.

Methodology

The methodology of the empirical study consists of three stages. The first stage is determination of territorial units used in empirical analysis. The second stage is the evaluation of the degree of polycentricity of individual regions and overall national level in two different years; 2000 and 2016, by using Primacy Index and Rank-Size Rule analyses and the third stage is the evaluation of the results of morphological analyses by a complementary perspective.

Determination of territorial units is very crucial in polycentricity studies. In each spatial scale, polycentricity has different meaning and different analyti-

cal framework (Nordregio, 2004). In this study, ‘city’, which refers to municipality in Turkish institutional definition, is used as a territorial unit. The municipality (NUTS-5 level) that has more than 20.000 inhabitants is taken as a basic unit of analysis for the measurement of regional polycentricity. As mentioned in the study of Veneri and Burgalassi, (2012) when considering polycentricity in terms of NUTS-2 regions, using municipalities as a territorial unit, makes the estimations very reliable than other spatial units and enables the regional polycentric development to be more thoroughly characterized. There are 26 NUTS-

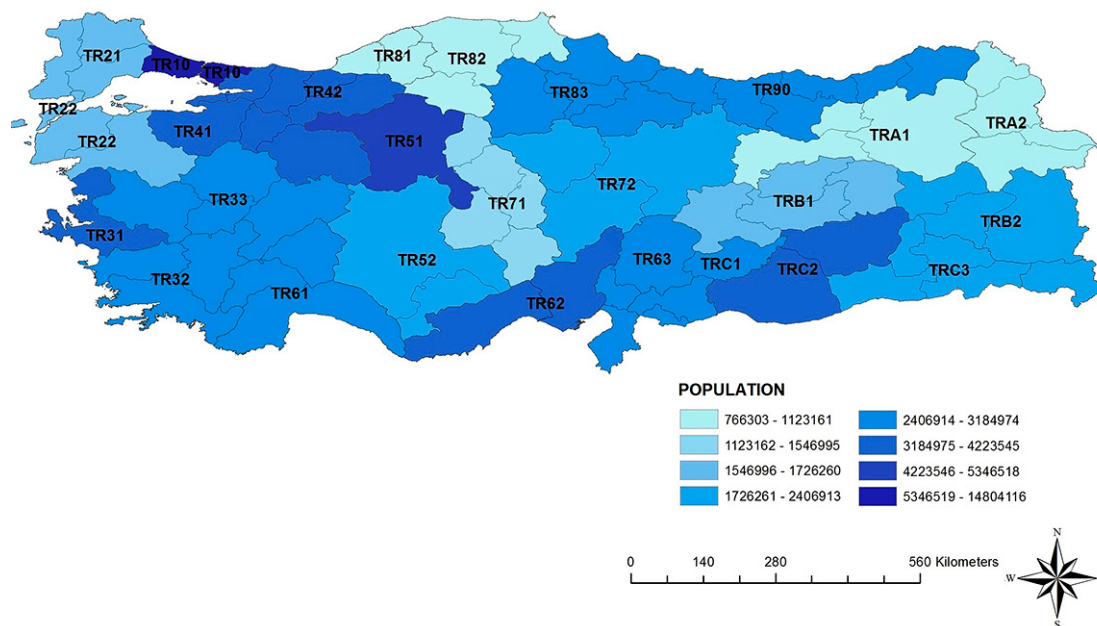


Figure 1. Populations of NUTS-2 regions in Turkey (2016)

Source: data collected from TURKSTAT (2000) and (2016)

TR10 (Istanbul), TR21 (Tekirdag, Edirne, Kırklareli), TR22 (Balıkesir, Canakkale), TR31 (Izmir), TR32 (Aydın, Denizli, Mugla), TR33 (Manisa, Afyon, Kutahya, Usak), TR41 (Bursa, Eskisehir, Bilecik), TR42 (Kocaeli, Sakarya, Duzce, Bolu, Yalova), TR51 (Ankara), TR52 (Konya, Karaman), TR61 (Antalya, Isparta, Burdur), TR62 (Adana, Mersin), TR63 (Hatay, Kahramanmaras, Osmaniye), TR71 (Kırıkkale, Aksaray, Nigde, Nevsehir), TR72 (Kayseri, Sivas, Yozgat), TR81 (Zonguldak, Karabuk, Bartın), TR82 (Kastamonu, Cankırı, Sinop), TR83 (Samsun, Tokat, Corum, Amasya), TR90 (Trabzon, Ordu, Giresun, Rize, Artvin, Gumushane), TRA1 (Erzurum, Erzincan, Bayburt), TRA2 (Agri, Kars, Iğdır, Ardahan), TRB1 (Malatya, Elazığ, Bingöl, Tunceli), TRB2 (Van, Mus, Bitlis, Hakkari), TRC1 (Gaziantep, Adiyaman, Kilis), TRC2 (Sanliurfa, Diyarbakır), TRC3 (Mardin, Batman, Sırnak, Siirt)

2 regions in Turkey and 604 municipalities (in level NUTS-5) more than 20.000 inhabitants (Figure 1).

Polycentricity can be analysed in two different methods (Parr, 2004; Green, 2007; Meijers, 2008; Burger & Meijers, 2012; Veneri & Burgalassi, 2012): morphological (Lambooy, 1998; Parr, 2004; Meijers, 2008) and functional (Van der Laan, 1998; Hall & Pain, 2006; Limtanakool et al., 2007; Lin et al., 2015). Morphological analyses are based on the specific characteristics of the region, i.e. size (population, employment, GDP and etc.) and territorial distribution and functional analyses of polycentricity, on the other hand, are focused on flows of goods, people, information, services, economic interactions and etc. to learn about the organizations, interactions and supply-demand relations among these centres (Brezzi & Veneri, 2015). It should be pointed out that, there are diverging methodologies in measurement of polycentricity. While some of the researchers select either one of the two dimensions, the others prefer using both dimensions and create a new multidimensional approach (Ken Sinclair-Smith, 2015). In this study, because there is no committing flow data in municipality level in Turkey, morphological polycentricity is selected as methodology for measurement of polycentricity.

Evaluation of the degree of morphological polycentricity of individual regions is the main concern of the second stage of the study. Primacy Index and the Rank-Size Rule analyses, which are the most popular techniques for measuring morphological polycentricism, are realized for two different years; 2000 and 2016. Primacy Index (Adolphson, 2009; Burger et al., 2011) is calculated as the ratio of people living in the main city –in the principal city- and the total popula-

tion the city-region and, hence, based on the balance in the distribution of nodality scores. In other words, primacy indicator can be applied to describe the dominance of the prime city in relation to the region: the higher the primacy, the more monocentric the region. Primacy Index is presented in equation (1) and $n=1$ indicates the main city:

$$primacy = \frac{pop(1)}{\sum_{n=1}^N pop(n)} \quad (1)$$

A more complicated measurement model is rank-size rule. This model has been used since the 1960s in urban geography. The focus of this model is to rank cities according to their size in the region. Population and economic production is usually used in the measurement of settlement (Sinclair-Smith, 2015). In this study population variables are preferred for the measurement. The equation (2) of the Rank-Size Rule is:

$$\ln pop = a + \beta \ln rank \quad (2)$$

The slope of equation (2), given by the estimated β , is derived by using ordinary-least-squares log-log rank-size regression method like in the studies of Meijers (2008) and Burger and Meijers (2012). Hierarchical level and polycentricity level within a region can be indicated: the higher the value of estimated β , the higher the level of polycentricity. In other words, a flatter downward slope of the regression line indicates a more polycentric region. In contrast, a steeper downward slope of the regression line indicates a more monocentric region (Burger et al., 2014).

Results: Morphological Structure of Turkey

The measurement of the degree of polycentricity Turkish regions and changes in these values by time is realized at three different stages this section of the study. At the first stage, Primacy Index analysis, at the second stage Rank-Size Rule analyses are derived in both in 2000 and in 2016. The evaluation of the results of morphological analyses by a complementary approach is realized at the third stage.

Primacy Index

Primacy Index, as mentioned above, describes the dominance of the prime city in relation to the region: the higher the primacy, the more monocentric the region. Primacy Index shows the ratio of people living in the main city (i.e., the principal city) and the total population the city-region and, hence, based on the balance in the distribution of nodality scores.

Table 1 shows the Primacy Index results in 2000 and in 2016. The ranking of the most polycentric and the most monocentric regions are similar for four regions both in 2000 and in 2016. TR10 (İstanbul) is the most polycentric city in Turkey both in 2000 and in 2016. Additionally, TR10 (Istanbul) is the most populated city in Turkey and it has 38 NUTS-5 regions (municipalities more than 20.000 inhabitants). The results show that, population distribution is more balanced in TR10 relative to other regions. The number of more polycentric regions that include metropolitans in their boundaries is similar both in 2000 and 2016, so it is not possible to say that metropolitans in Turkey are evolving more polycentric by time (Figure 2). Thus, the proposition of ‘the spatial configurations of the settlements, especially metropolitans, have been evolving from monocentric to polycentric as results of

Table 1. The Results of Primacy Index (2000 – 2016)

| | Primacy 2000 | | Primacy 2016 | |
|--------|--------------|--------|--------------|--|
| TR10* | 0,0751 | TR10* | 0,0537 | Most polycentric ↑ ↓ Most monocentric |
| TR90 | 0,0904 | TR33 | 0,0955 | |
| TR33 | 0,0913 | TR42* | 0,0962 | |
| TRA2 | 0,1169 | TR22 | 0,1028 | |
| TR82 | 0,1171 | TRC2* | 0,1046 | |
| TR72* | 0,1285 | TR32 | 0,1126 | |
| TR21 | 0,1322 | TR31* | 0,1142 | |
| TR71 | 0,1399 | TR83* | 0,1183 | |
| TR52* | 0,1430 | TR90 | 0,1239 | |
| TR83* | 0,1458 | TR63 | 0,1244 | |
| TRC3 | 0,1534 | TRA2 | 0,1335 | |
| TR42* | 0,1554 | TRB2 | 0,1376 | |
| TR32 | 0,1593 | TR21 | 0,1469 | |
| TR63 | 0,1714 | TR61* | 0,1684 | |
| TRB2 | 0,1822 | TR81 | 0,1692 | |
| TR22 | 0,1867 | TR51* | 0,1719 | |
| TR51* | 0,1920 | TRA1* | 0,1779 | |
| TR41* | 0,2123 | TR71 | 0,1898 | |
| TR81 | 0,2131 | TR82 | 0,1907 | |
| TR31* | 0,2321 | TRC3 | 0,1971 | |
| TR62* | 0,2426 | TR62* | 0,2006 | |
| TRC2* | 0,2571 | TR41* | 0,2123 | |
| TRB1 | 0,2584 | TR72 | 0,2309 | |
| TRC1* | 0,2660 | TRB1 | 0,2519 | |
| TR61* | 0,2829 | TR52* | 0,2588 | |
| TRA1* | 0,2883 | TRC1* | 0,3264 | |
| Mean | 0,1782 | Mean | 0,1619 | |
| TURKEY | 0,0131 | TURKEY | 0,0121 | |

*Region, which includes metropolitan(s) in its boundaries; regions above the average value are in grey colour. Source: data collected from TURKSTAT (2000) and (2016), author's processing

the dynamics of the 21st century' is not referred to in Turkey case, according to the results of Primacy Index.

TRA1 (Erzurum, Erzincan, Bayburt) was the most monocentric region in 2000 and TRC1 (Gaziantep, Adiyaman, Kilis) is the most monocentric one in 2016. Each of these two regions have 13 NUTS-5 regions and are taken place on the east part of the country. The results of Primacy Index show that the nodality scores are very high in these regions and the ratio of people living in the main city –in the principal city- and the total population the city-region is very high compare to the other regions in the country (Figure 3, 4).

TR52, TR72, TRC2 and TR31 regions' ranks have changed radically from 2000 to 2016. While TR52, TR72 regions have become more monocentric, TRC2 and TR31 have become more polycentric during these years. Since the Primacy Index shows the ratio of people living in the main city (i.e., the principal city) and the total population the region and, these changes can be explained by these regions' population distribution has becoming more balanced (for TRC2 and TR31) or unbalanced (for TR52, TR72) during these 16 years.

The mean value of Primacy Index is become smaller from 2000 to 2016. Although the difference between these two values is very small (-9,15%), it can be said that Turkey's spatial configuration is becoming more polycentric compare to the 2000s according to the results of micro-regional Primacy Index analysis. Similar result is calculated for Turkey as an overall score. The value of Primacy Index has decreased from 0,0131 to 0,0121 and the ratio of this change is -7,63% (Table 1). Undoubtedly, these ratios are not enough to make general conclusions and predictions for the spatial configuration on Turkey.

The Rank-Size Rule:

According to the rank-size distributions, the slope of regression line, (estimated beta), indicates the level of

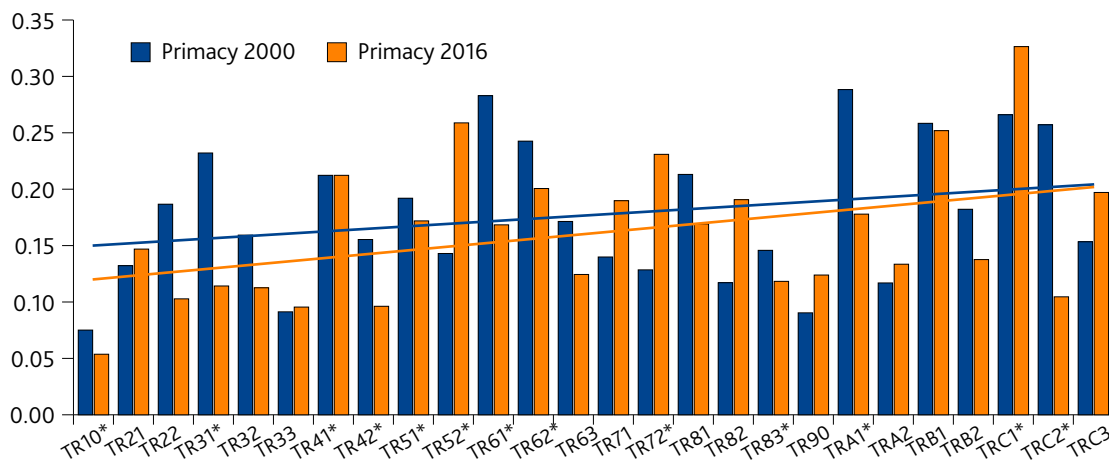


Figure 2. The Results of Primacy Index (2000 – 2016)

Source: data collected from TURKSTAT (2000) and (2016), author's processing

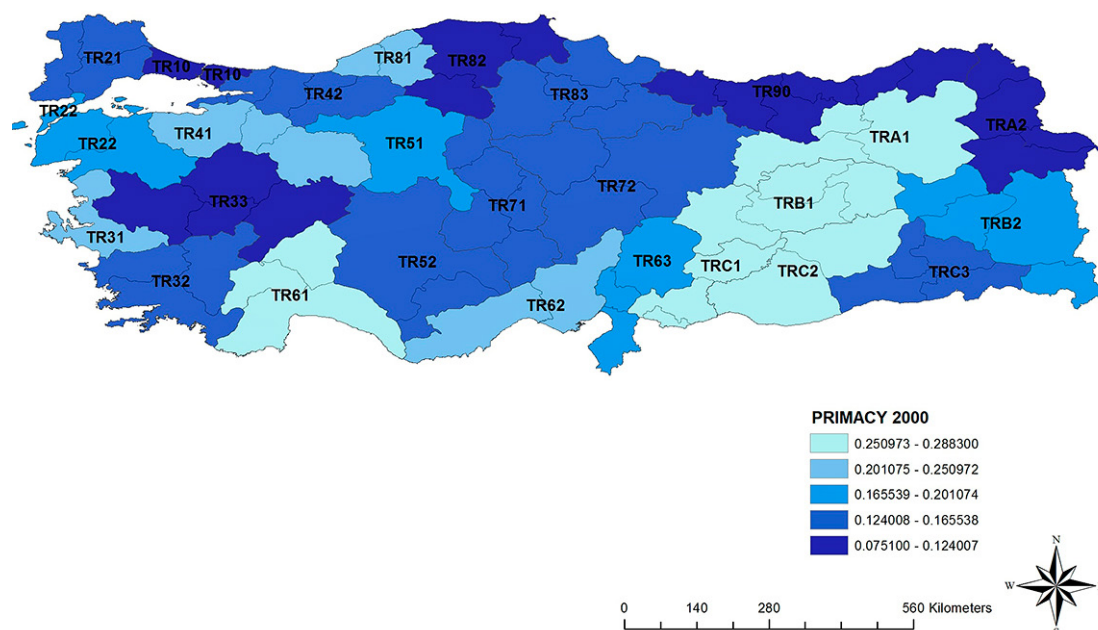


Figure 3. The Levels of Morphological Polycentricity in the Turkish NUTS-2 Regions (with reference to Primacy Index - 2000)

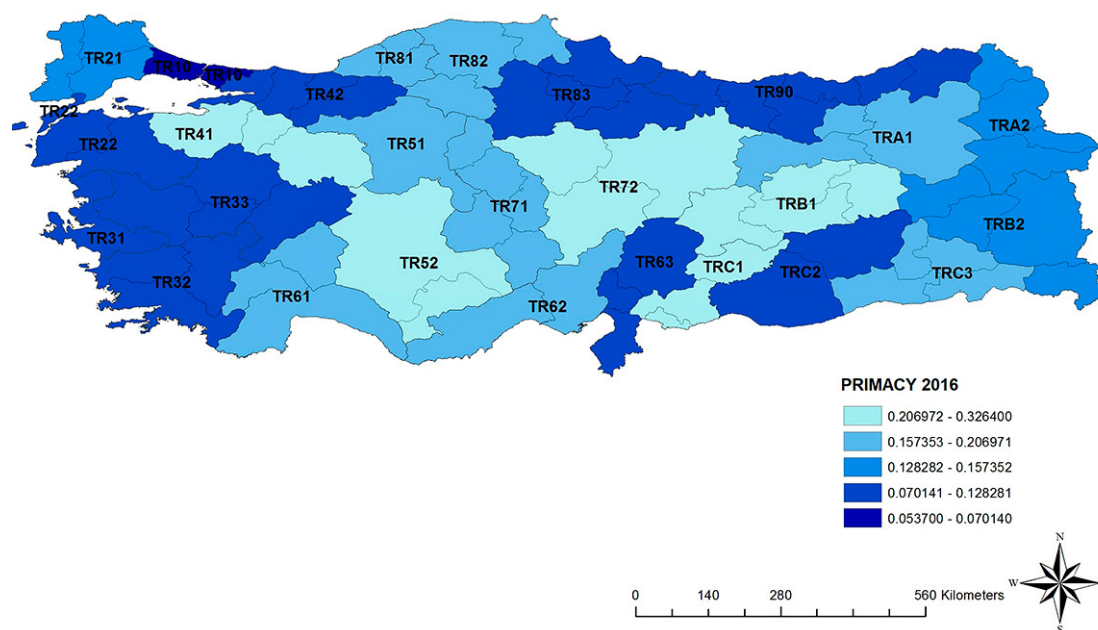


Figure 4. The Levels of Morphological Polycentricity in the Turkish NUTS-2 Regions (with reference to Primacy Index - 2016).

Source: data collected from TURKSTAT (2000) and (2016), author's processing

hierarchy and thus the level of polycentricity within a region. The higher the value of estimated beta means a flatter slope of line interpolating data that indicates a higher the level of polycentricity.

Table 2 shows the rank-size rules results, in other words estimated beta results in 2000 and in 2016. The ranking in the most polycentric and the most monocentric regions are generally same both in 2000 and in 2016 (Figure 5). The results of rank-size distribution analysis show that, TR82 (Kastamonu, Cankırı,

Sinop) was the most polycentric region in 2000. TR10 (Istanbul) in 2016 is the most polycentric region as similar the results of Primacy Index in 2016. An interesting point here is that, while TR82 is one of the least populated region in the country and has 10 NUTS-5 regions (municipalities more than 20.000 inhabitants), TR10 (Istanbul), on the other hand, is the most populated city in Turkey and has 38 NUTS-5 regions. The results mean that the gap among municipalities in terms of population distribution in these two regions

Table 2. The Results Rank-Size (estimated beta) Rules in National and Micro-Regional Level (2000 – 2016)

| | Beta 2000 | | Beta 2016 | |
|--------|-----------|--------|-----------|--------------------|
| TR82 | -0,55416 | TR10* | -0,55271 | Most polycentric ↑ |
| TR90 | -0,64525 | TR22 | -0,77326 | |
| TR10* | -0,68584 | TR90 | -0,79548 | |
| TR22 | -0,69533 | TRB2 | -0,81001 | |
| TRB2 | -0,72376 | TRA2 | -0,85525 | |
| TRA2 | -0,75208 | TR82 | -0,87866 | |
| TR21 | -0,75858 | TR21 | -0,88812 | |
| TRC3 | -0,7682 | TR83* | -0,89833 | |
| TR33 | -0,78586 | TR33 | -0,9003 | |
| TRA1* | -0,79579 | TR63 | -0,91111 | |
| TR72* | -0,84423 | TR32 | -0,91676 | |
| TR32 | -0,84936 | TR81 | -0,92769 | |
| TR52* | -0,85447 | TRC2* | -0,93603 | |
| TR83* | -0,85841 | TR42* | -0,95079 | |
| TR71 | -0,90092 | TRC3 | -0,97054 | |
| TR63 | -0,93475 | TRA1* | -0,99176 | |
| TR81 | -0,96465 | TR31* | -1,03509 | |
| TRB1 | -0,97368 | TR61* | -1,08673 | |
| TR31* | -1,04497 | TR71 | -1,15093 | |
| TR42* | -1,04979 | TR72* | -1,1816 | |
| TR61* | -1,05111 | TR52* | -1,19054 | |
| TRC2* | -1,07544 | TR62* | -1,21453 | |
| TR41* | -1,2483 | TR41* | -1,25892 | |
| TRC1* | -1,28825 | TRB1 | -1,30694 | |
| TR51* | -1,41823 | TRC1* | -1,52228 | |
| TR62* | -1,47221 | TR51* | -1,54852 | |
| Mean | -0,92283 | Mean | -1,01742 | |
| TURKEY | -0,8869 | TURKEY | -0,9478 | Most monocentric ↓ |

*Region, which includes metropolitan(s) in its boundaries; regions above the average are in grey colour. Source: data collected from TURKSTAT (2000) and (2016), author's processing

is smaller than other regions in the country. The slope of regression line of these polycentric regions has a flatter slope of line interpolating data (Figure 6).

The number of more polycentric regions that include metropolitans in their boundaries has declined from five to three during 16 years. The proposition of 'the spatial configurations of the settlements, especially metropolitans, have been evolving from monocentric to polycentric as results of the dynamics of the 21st century' is not referred to in Turkey case, according to the results of Rank-Size analysis.

The most monocentric region was TR62 (Adana, Mersin) in 2000. TR51 (Ankara), capital city, is the most monocentric in 2016 (Figure 7, 8). While TR62 become more polycentric in 2016 compare to the 2000, the rank of TR51 did not change very much, from 25th to 26th. As can be seen from the Figure 6, the slope of regression line in the rank-size distribution is steeper than other regions, the population gap is higher, and hierarchical population structure exists in these regions.

TRC2 and TR52 regions' are the regions whose ranks have changed dramatically from 2000 to 2016. TRC2 (Sanliurfa, Diyarbakır), which is located in the eastern part of the country, was one of the most monocentric regions with β : -1,07544 in 2000, but in 2016 its β value is -0,93603 which is above the average and closed to the polycentric spatial configuration. TR52 (Konya, Karaman), on the other hand, had beta value β : -0,85447 which is above the average in 2000, and the region have become the most monocentric regions with β : -1,19054 in 2016. These results are also supported by Primacy Index analyses. The reasons behind these changes can be related to economic fluctuations in these regions and inefficient planning activities both in macro and in micro-regional levels.

The value of estimated beta has decreased from -0,8869 to -0,9478 in Turkey as an overall score. The percentage the change is -6,9%. Similar trend is seen

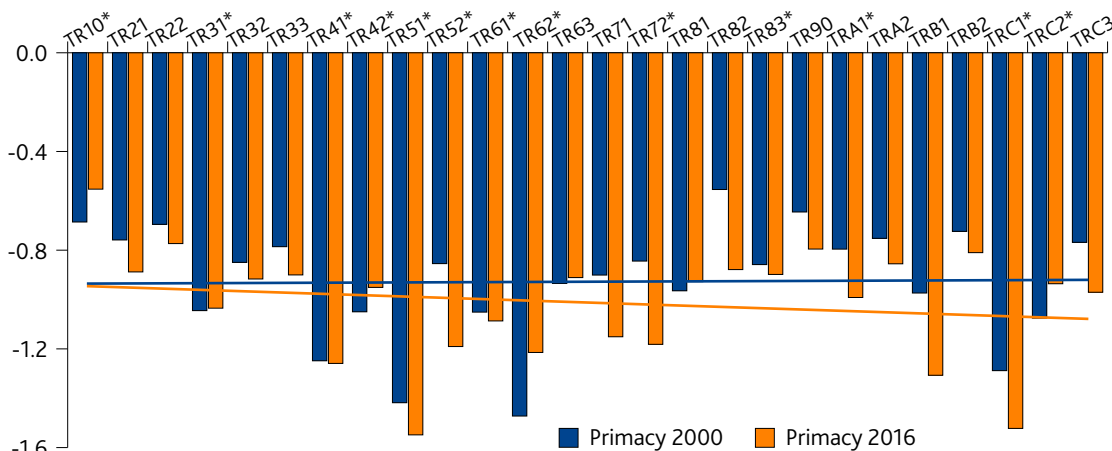


Figure 5. The Results of Rank-Size Rule(2000 - 2016)

Source: data collected from TURKSTAT (2000) and (2016), author's processing

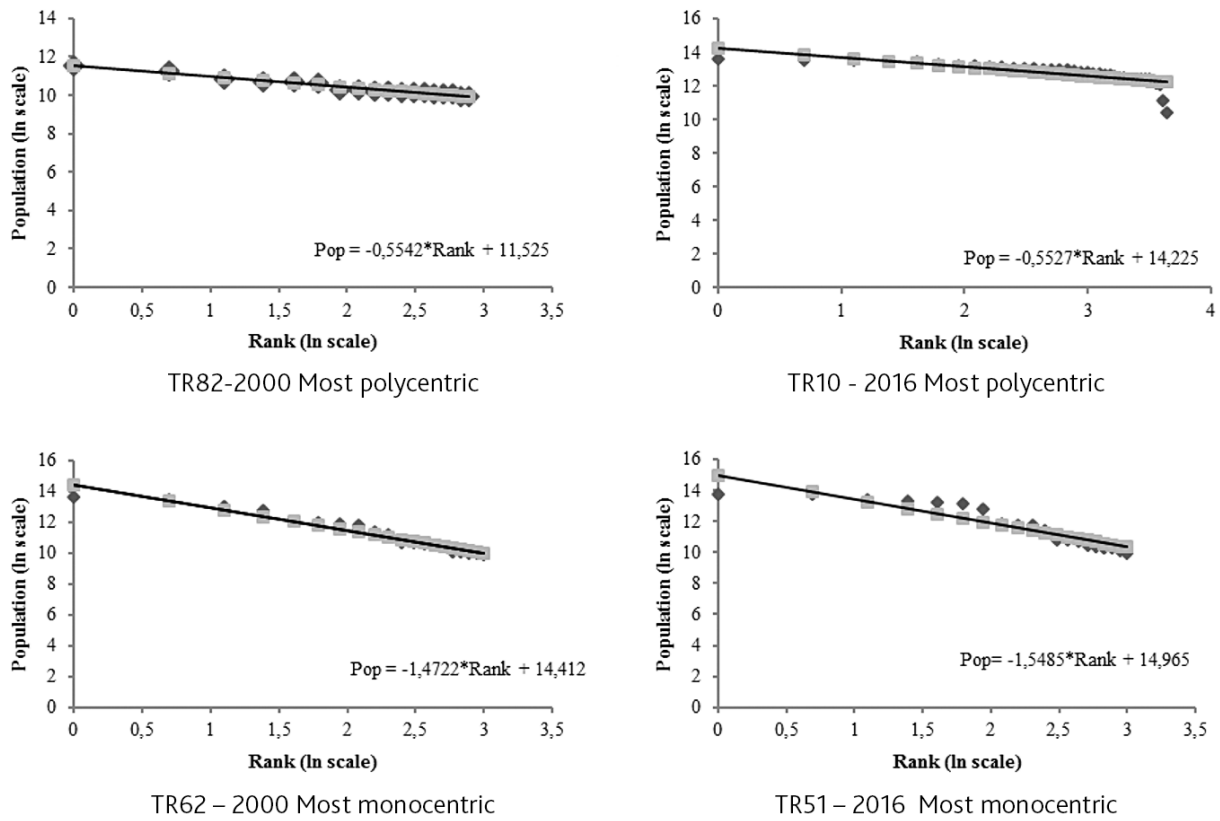


Figure 6. Examples for Slope Regression Line-Population Threshold of 20.000 (the most polycentric - TR82 and TR10; the most monocentric - TR62 and TR51)
 Source: data collected from TURKSTAT (2000) and (2016), author's processing

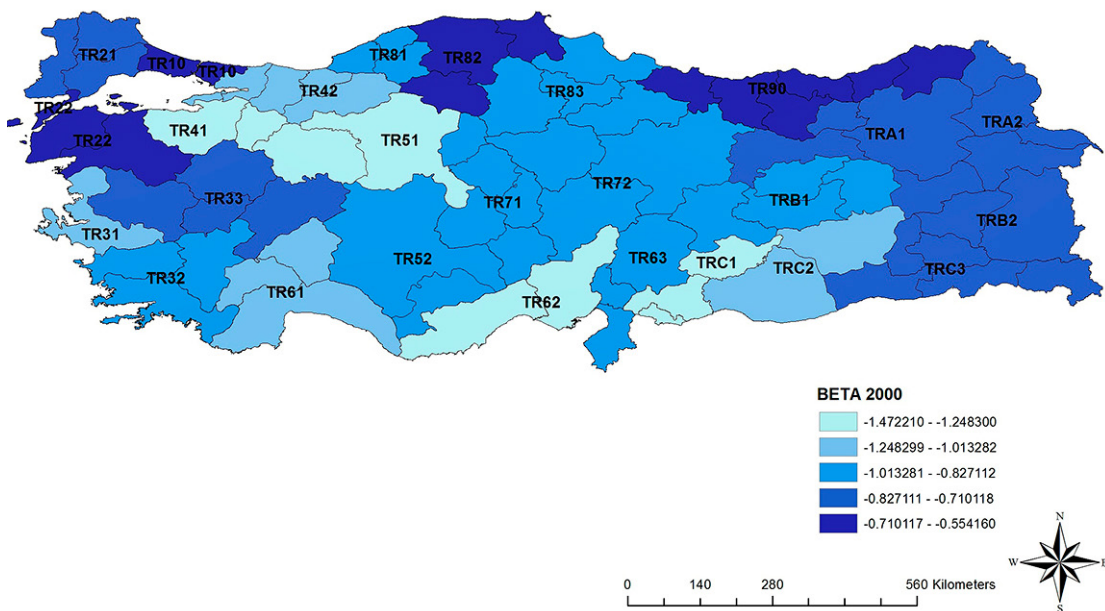


Figure 7. The Levels of Morphological Polycentricity in the Turkish NUTS-2 Regions (with reference to Rank-Size Rule- 2000).
 Source: data collected from TURKSTAT (2000), author's processing

for micro regional level (NUTS-2) analyses. The mean value of estimated beta has been becoming smaller (from -0,92283 to -1,01742) during 16 years. The ratio of this change is -10,3%. These ratios are too small to

make some general conclusions on spatial configuration of Turkey.

Because of the conflicting results of morphological analyses on spatial configuration of Turkey both

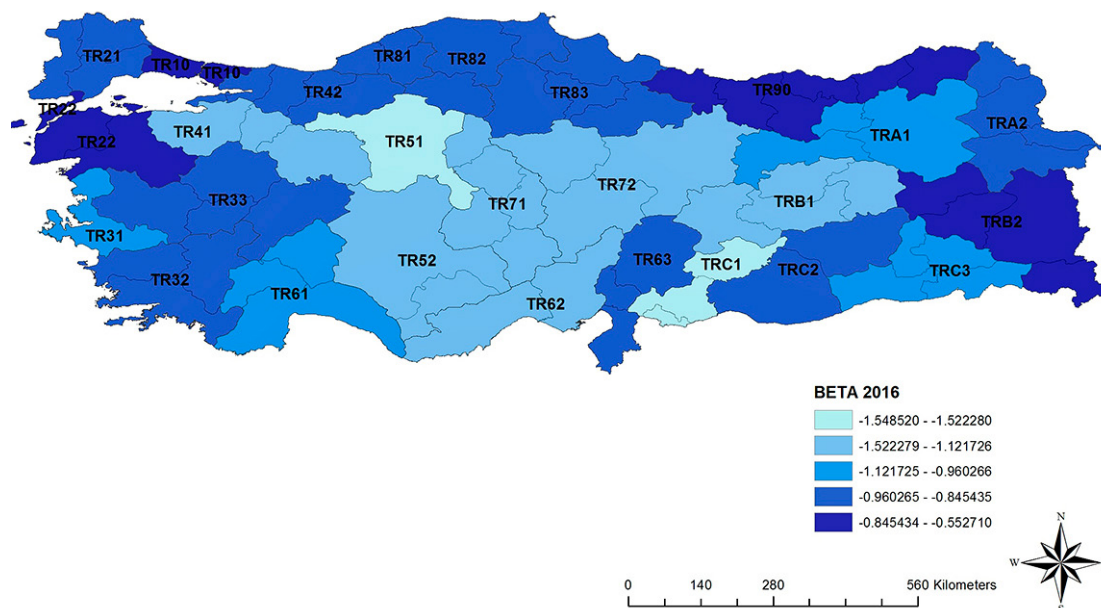


Figure 8. The Levels of Morphological Polycentricity in the Turkish NUTS-2 Regions (with reference to Rank-Size Rule- 2016).

Source: data collected from TURKSTAT (2016), author's processing

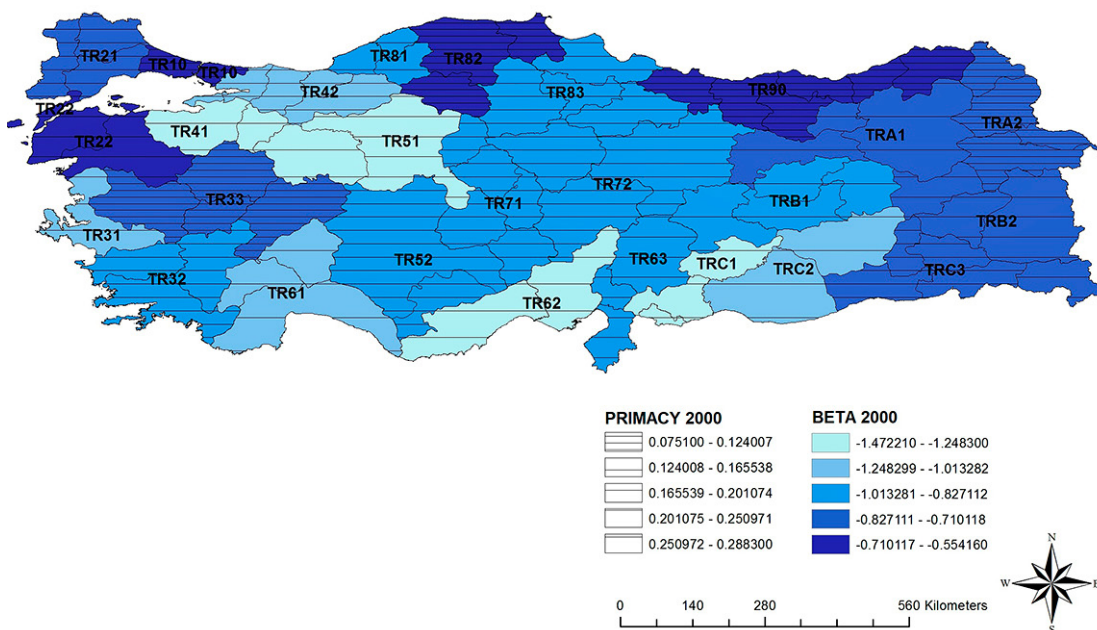


Figure 9. The levels of morphological polycentricity (both Primacy Index and estimated beta) in the Turkish NUTS-2 regions (2000).

Source: data collected from TURKSTAT (2000), author's processing

in NUTS-2 level and overall national level, changes in the number of more polycentric NUTS-2 regions, which have above/below the average estimated Beta/Primacy Index values, are analysed at the last stage of the study (Figure 9, 10). According to the Primacy Index results (Table 1, in grey) the number of regions below the average, in other words, the number of more polycentric regions decreased from 14 to 13. Similar

trend can be seen in Rank-Size Rule Analyses' results (Table 2, in grey) too, the number of more polycentric regions declined from 15 to 13. These results show that number of polycentric regions have been decreasing in years. By taking into account all these analyses, it can be said that there is a possibility for Turkey to be a more monocentric in following years.

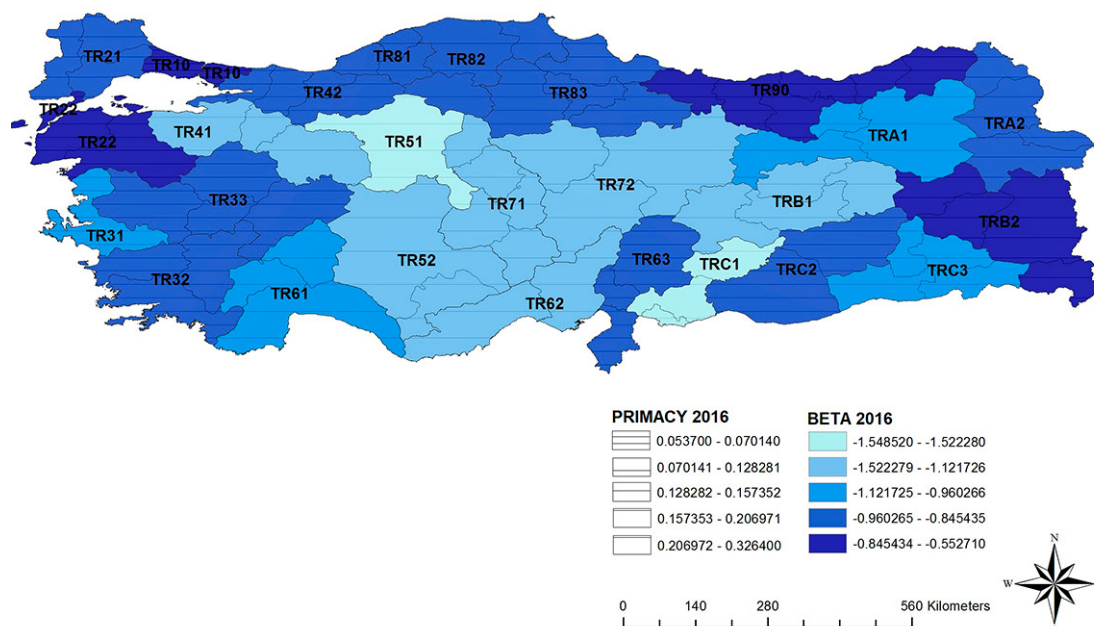


Figure 10. The Levels of Morphological Polycentricity (both Primacy Index and estimated beta) in the Turkish NUTS-2 Regions (2016).

Source: data collected from TURKSTAT (2016), author's processing

Conclusion

Following the publication of 'European Spatial Development Perspective' in 1999, a large number of theoretical and empirical studies have been carried out on polycentric spatial development especially in European settlements. In contrast to studies on European settlements, there are limited numbers of studies on polycentric spatial development in developing countries. Turkey as a developing country has also confronted of spatial reconfiguration processes especially after the 1990s. These processes, with the effects of the inefficient planning activities in metropolitan areas often lead to uneven and fragmented urban structures. Although not as clear and planned as in European countries, it is argued that, Turkey's metropolitan cities are also evolving from monocentric spatial structure to polycentric ones. Nevertheless, there is no empirical study on the measurement of this spatial evolution at national and micro-regional scale in Turkey. From this point of view, this study aims to clarify the degree of morphological polycentricity in Turkey in 2000 and in 2016 at national and micro-regional scales and to examine the proposition of 'the spatial configurations of the settlements, especially metropolitans, have been evolving from monocentric to polycentric as results of the dynamics of the 21st century' in Turkey case.

The results of morphological analyses on spatial configuration of Turkey both in NUTS-2 level and in overall country at national level are very confus-

ing. While the results of Primacy Index emphasize polycentricity trend in the country, Rank-Size Rule analyses, on the other hand, resulted in opposite arguments. For this reason, as the last step changes in the number of NUTS-2 regions, which are above/below the average estimated β /Primacy Index values, are analysed. By taking into account all these results, it can be said that there is a possibility for Turkey to be a more monocentric in following years.

In Turkey, polycentricity has been dealt with at the macro level in general and polycentric development policies have been developed on national scale. The definition of polycentricity as a policy to address uneven regional development has taken place either directly or indirectly in basic policy and strategy documents in Turkey. But, all the results of empirical analyses show that these policies and practices have not been effective enough to achieve the targeted outcome.

Undoubtedly, there is a need to make policies and practices more sensitive to regional and local conditions for more balanced and efficient distribution and organization of not only economic activities but also residential facilities. From this perspective, Turkey should prepare policies and strategies to support polycentric spatial development in both the macro and micro-regional scale and these strategies should also be supported by institutions and implementation tools.

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