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TÜRKİYE'DEKİ YOKSULLUK SINIRININ MEKANSAL DAĞILIMI

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ÖZET

Bu makalede, Türkiye'deki yoksulluk sınırı değerlerinin dağılımını mekansal istatistik araçları ile incelenmiştir. Analizler, Türkiye'deki yoksulluğun mekansal bir bağımlılığı olduğunu göstermektedir, Bu durum, kabaca, bir bölgedeki yoksulluğun komşularındaki yoksulluktan etkilendiği anlamına gelmektedir. TR21 (Tekirdağ, Edirne, Kırklareli), TR10 (İstanbul), TR42 (Kocaeli, Sakarya, Düzce, Bolu, Yalova), TR41 (Bursa, Eskişehir, Bilecik), TR51 (Ankara), TR31 (İzmir), TR61 (Antalya, Isparta, Burdur) bölgeleri için yoksulluk eşiğinin yüksek olduğu bulunmuştur. Öte yandan, TRC2 (Şanlıurfa, Diyarbakır), TRC3 (Mardin, Batman, Şırnak, Siirt), TRB2 (Van, Muş, Bitlis, Hakkari) için yoksulluk sınırlarının düşük olduğu tespit edilmiştir. Ek olarak, Moran I istatistiği, yoksulluk sınırı için 0.6959 (p-val≅0) olarak hesaplanmıştır, bu da Türkiye'de yüksek global mekansal otokorelasyonun görüldüğü ve komşuluk ilişkisinin olduğu anlamına gelmektedir. Ayrıca, yoksulluk eşiği için yerel mekansal ilişkinin local göstergeleri (LISA) haritası yardımıyla, TR10 (İstanbul), TR21 (Tekirdağ, Edirne, Kırklareli), TR42 (Kocaeli, Sakarya, Düzce, Bolu, Yalova) için yüksek-yüksek (HH) ve TRB1 (Malatya, Elazığ, Bingöl, Tunceli) için düşük-düşük (LL) olduğu görülmektedir. Yani bu bölgelerdeki yoksulluklar komşu bölgelerden etkilenmektedir. Bir diğer sonuçta, yoksulluk için ileri analiz yapılırken komşuluk ilişkisi dikkate alınmalıdır.

Anahtar Kelimeler: Yoksulluk sınırı-çizgisi, Haritalar, Mekansal İstatistik, Mekansal otokorelasyon, Türkiye

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SPATIAL DISTRIBUTION OF POVERTY THRESHOLD IN TURKEY

ABSTRACT

This paper analyses poverty threshold for Turkey by considering the spatial statistics tools. It is found that the poverty in Turkey has a spatial dependency, which means that the poverty in a region is influenced by the poverty of its neighbours. For TR21 (Tekirdag, Edirne, Kırklareli), TR10 (Istanbul), TR42 (Kocaeli, Sakarya, Duzce, Bolu, Yalova), TR41 (Bursa, Eskisehir, Bilecik), TR51 (Ankara), TR31 (İzmir), TR61 (Antalya, Isparta, Burdur) poverty thresholds are found to be high. On the other hand, for TRC2 (Sanliurfa, Diyarbakir), TRC3(Mardin, Batman, Sirnak, Siirt), TRB2 (Van, Mus, Bitlis, Hakkari) regions's poverty thresholds are found to be low. In addition, Moran's I is calculated as 0.6959 (p-val≅0) for poverty threshold, which means that high global spatial autocorrelation is seen in Turkey. Moreover, for the poverty threshold local indicators of spatial association (LISA) map indicates that high-high (HH) and low-low (LL) values are obtained for TR10 (Istanbul), TR21 (Tekirdag, Edirne, Kırklareli), TR42 (Kocaeli, Sakarya, Duzce, Bolu, Yalova) and TRB1 (Malatya, Elazig, Bingol, Tunceli), respectively. In other words, poverty in these regions is affected by neighbouring regions. As a consequence, the neighbour relationship should be taken into consideration when making further analysis for poverty.

Keywords: Poverty limit-line, Maps, Spatial Statistics, Spatial autocorrelation, Turkey

1. INTRODUCTION

Poverty is a situation in which a person or community lacks the financial resources and basics for a minimum standard of living. Absolute and relative poverty are often used as poverty measures. Relative poverty means that living standards cannot be met when compared to the time and place of the person. Sabates (2008) has stated that relative poverty can vary from group to group, from region to region, from country to country. The absolute poverty, which is a situation where household income is below a required level to maintain basic living standards (food, housing, housing), is a standard measure on the world and is set by the World Bank. It can used to compare economic factors of different countries over time. For instance, World Bank has updated the poverty threshold (also known as the poverty limit - poverty line) as $1.90 a day in 2015, according to World Bank reports (2016). Although such a poverty threshold is

mentioned, this is a controversial issue. Many countries set their own poverty threshold on a national scale. For instance, poverty limit is stated by Davidson (2012) as US$51 per day for Australia in 2010. For the same year, the poverty limit in America is reported by US Census Bureau (2011) as US$15.15 per day. This value is taken from US Census Bureau (CB) report. CB is the nation's leading provider of quality data. Turkish Statistical Institute (TurkStat) has installed a similar mission to Turkey. This study focused on the poverty line in Turkey. The determinants of the poverty have been investigated at an increasing rate recently (Dürr, 2012). However, compared to the intensity of research in the world, poverty research for Turkey is less. For example, the determinants of household poverty in Turkey based on ordered logit model was investigated by Caglayan et al. (2012). Poverty in Turkey was examined by Morçöl (1997) and it has been concluded that structural reasons are the causes of poverty. The determinants of entering and leaving the poverty group were examined by Acar and Baslevent (2014). As far as we know, spatial distribution of poverty research has not been conducted for Turkey. Motivation of this study is to conduct a spatial analysis of poverty for Turkey using spatial statistics.

In the literature, studies for various regions have tried to model poverty with spatial data analysis methods. Small area income and poverty estimates (SAIPE) program is conducted by CB (2016) in USA. Spatial poverty and inequality in South Africa is investigated by David *et al.* (2018) using spatial econometric model to identify the correlates of poverty across municipalities in South Africa. Spatial patterns and geographic determinants of poverty and inequality in Vietnam are studied by Minot et al. (2006). With the aid of poverty maps, predicted poverty rates for Ecuador is presented and spatial dimensions of poverty is investigated by Jesko et al. (2000). For Mexico, Slum tourism is mentioned and urban poverty, spatial representation and mobility is argued by Dürr (2012). The link between poverty incidence and geographical conditions within rural locations in Kenya and also spatial determinants of poverty are investigated by Okwi et al. (2007). Under cover of poverty map and poverty line spatial clustering of rural poverty and food insecurity in Sri Lanka is investigated by Amarasinghe et al. (2005). Spatial dependence in models of changes in poverty rates is presented by Crandall and Weber (2004).

In this study, spatial distribution of the poverty threshold in Turkey is researched by using the spatial statistics tools. We have conducted spatial autocorrelation and local indicators of spatial association (LISA) for the poverty threshold. This study is presented as spatial

descriptive of the poverty threshold. In this context, spatial statistics tools are briefly mentioned in the second section. In the third part, the data used in the application is shared. Research questions and hypothesis of study are presented in the fourth section. Analysis results are stated in the fifth part. Finally, all the findings are discussed in the conclusion section.

2. SPATIAL STATISTICS

In order to explore the spatial autocorrelation, the well-known measure is Moran's I, which identifies global spatial clustering. Moran's I statistic is defined as follows:

$$I = \frac{n}{\sum_{i=1}^{n}(x_i - \bar{x})^2} \times \frac{\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}(x_i - \bar{x})(x_j - \bar{x})}{\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}}, \quad (1)$$

$$I_i = n \times \frac{x_i \sum_{j=1}^{n} w_{ij}(x_j - \bar{x})}{\sum_{j=1}^{n}(x_j - \bar{x})^2} \quad (2)$$

where I and I_i are global and local spatial autocorrelation measures. x_i and x_j are the values of the variable of at regions i and j, n is the number of regions. w_{ij} is a measure of connectivity between region i and region j. In this study, we have used the queen matrix.

The interpretation of the Moran's I value can be summarized as follows:

$$\begin{cases} I < 0 & negative\, spatial\, autocorrelation \\ I = 0 & No\, spatial\, autocorrelation \\ I > 0 & positive\, spatial\, autocorrelation \end{cases}$$

In addition, Scrucca, (2005) has stated that while large positive I_i values indicate local clustering of data around the *i*-th location, large negative I_i values indicate that the sign of data value at the *i*-th location is the opposite to those of its neighbours. It has been stated by Aktas et al. (2019), Anselin (1995) and Cliff and Ord (1981) that the local Moran's I is used to the identification of local indicators of spatial association (LISA). On the other hand, Boots (2002) has stated that local measure of spatial autocorrelation is identified the presence of deviations from global patterns of spatial association and hots spots such as local clusters or local outliers. Different applications of LISA can be found in (Yildirim, 2018, Yildirim and Kantar, 2019).

3. DATA

Data is obtained from Turkish Statistical Institute (TurkStat) for the year of 2017. Data used in study is collected to research regional income and living conditions by TurkStat (2018). Within the framework of Programme for Alignment with the Acquis applied by the European Union at regional level; Nomenclature of Territorial Units for Statistics abbreviated as NUTS (from the French version Nomenclature des Unités Territoriales Statistiques) study has been conducted under the coordination of the Undersecretariat of State Planning Organization with the contribution of the TurkStat for Turkey. As a result of this study; NUTS level 1 as 12 geographical region units, NUTS level 2 as 26 regions and NUTS level 3 as 81 provinces have been defined and the Council of Ministers' Decision 2002/4720 has been published in the Official Journal dated 22 September 2002. Map of Turkey showing the 26 regions (Level 2) and 81 provinces (Level 3) is provided in Fig. 1 to see the place of provinces. Map displayed in Fig. 2 exhibits Level 2 codes, too. In addition, Fig. 3 shows spatial distribution of the poverty threshold in Turkey. As it is seen that while low values are seen in southeast of Turkey, high values are seen in northeast of Turkey mostly.

Figure 1. NUTS level 2 and level 3.

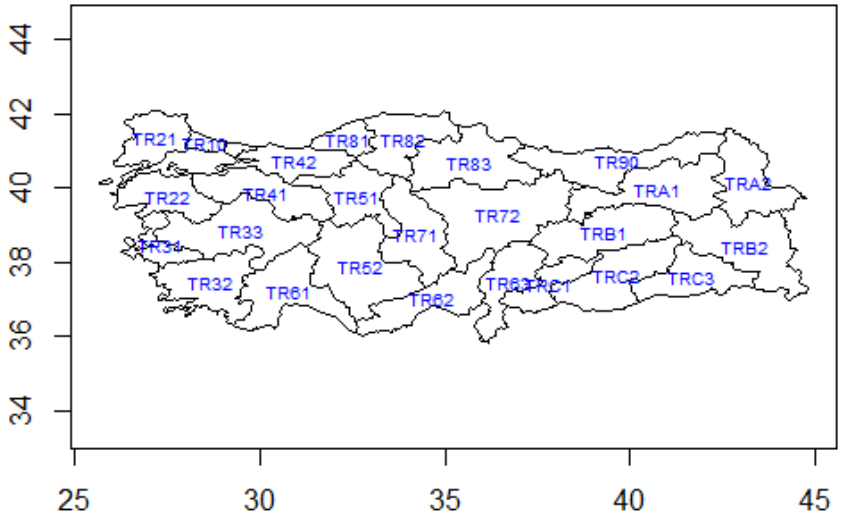

Figure 2. NUTS level 2 codes.

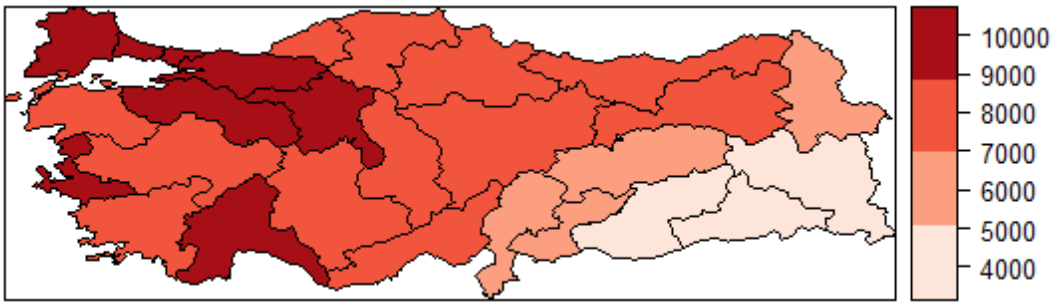

Figure 3. Natural breaks maps for the poverty threshold

4. RESEARCH QUESTIONS AND HYPOTESIS OF THE STUDY

Based on the argument above, the current study addresses the spatial distribution of the poverty threshold in Turkey for 2017. The study was driven by the following hypotesis in accordance with the main purpose:

1. H_0: There is no global spatial assosiation between poverty lines of regions.
2. H_0: There is no spatial local clustering of poverty lines of regions.

5. RESULTS

To test the hypothesis for global spatial association between poverty lines of regions, the global Moran's I statistics is conducted. It is found that Moran's I statistics for the poverty threshold is 0.6959 with *p*-value <0.001. This value indicates that hypothesis, stated that there is no global spatial assosiation between poverty lines of regions, is rejected. That is, high global spatial autocorrelation is seen in Turkey. For TR21 (Tekirdag, Edirne, Kırklareli), TR10 (Istanbul), TR42 (Kocaeli, Sakarya, Duzce, Bolu, Yalova), TR41 (Bursa, Eskisehir, Bilecik), TR51 (Ankara), TR31 (İzmir), TR61 (Antalya, Isparta, Burdur) poverty thresholds are found to be high. On the other hand, for TRC2 (Sanliurfa, Diyarbakir), TRC3 (Mardin, Batman, Sirnak, Siirt), TRB2 (Van, Mus, Bitlis, Hakkari) poverty thresholds are found to be low. Moreover, positive spatial autocorrelation can be seen in Fig.4. This result is supported with positive Moran's I value.

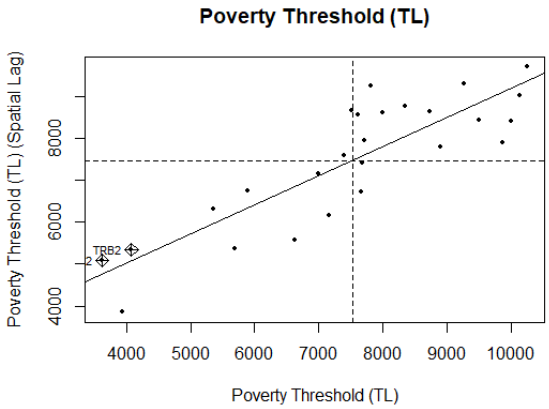

Figure 4. Scatter plot for poverty threshold

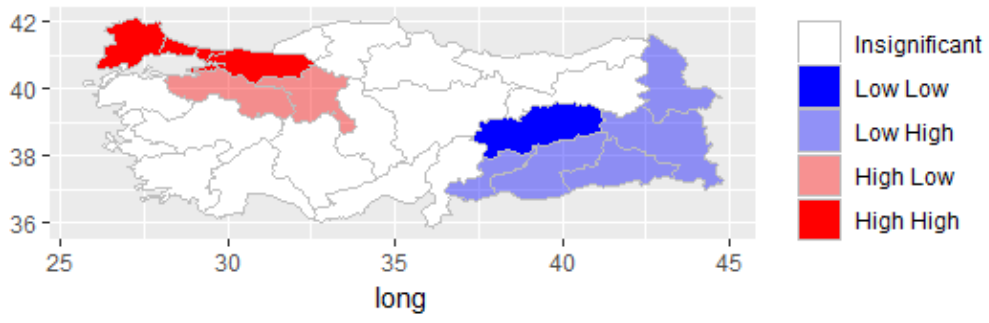

Figure 5. LISA for the poverty threshold

To see local clusters for the poverty threshold, LISA is performed. LISA provides a map detecting local clusters. The map usually contains four groups such as high-high (HH), low-low (LL), high-low (HL) and low-high (LH) for clusters. It also offers outlier values. As it can be seen in Fig. 5, for the poverty threshold LISA map indicates that high-high (HH) and low-low (LL) values are obtained for TR10 (Istanbul), TR21 (Tekirdag, Edirne, Kırklareli), TR42 (Kocaeli, Sakarya, Duzce, Bolu, Yalova) and TRB1 (Malatya, Elazig, Bingol, Tunceli), respectively. While TR10 (Istanbul), TR21 (Tekirdag, Edirne, Kırklareli), TR42 (Kocaeli, Sakarya, Duzce, Bolu, Yalova) show those with high values surrounded by high values, TRB1 (Malatya, Elazig, Bingol, Tunceli) show those with low values surrounded by low values. Dark red colored regions have much more poverty threshold compared to their neighbours. Meanwhile dark blue colored region have lower value compared to its neighbours. Furthermore, light colors' poverty thresholds are different than their neighbours.

East and southeast of Turkey are clustered as outlier low-high (LH), which mean these regions have low values but surrounded by high values. TR51 (Ankara) and TR41 (Bursa, Eskişehir, Bilecik) are outlier as high-low (HL) that these regions have high values but surrounded by low values. The hypothesis, stated that there is no any spatial local clustering of poverty lines of regions, is rejected with significant Local Moran's I values (L-L and H-H).

6. CONCLUSIONS

In this paper, the poverty threshold in Turkey is descriptively researched with the spatial statistics tools. We find that the poverty in Turkey has a spatial dependency. The first subregions of the NUTS level 1 regions in the West of Turkey (TR10, TR21, TR31, TR41, TR51, TR61) and in addition to these regions, TR42 (which may have entered into this group due to the high level of industrialization) has a high poverty threshold. The whole of Southeastern Anatolia (except TRC1) and the second subgroup of the Middle East Anatolia (TRB2) have a low poverty line. Moreover, according to the local spatial analysis (LISA), the Northern Marmara (TR10, TR21, TR42) and the first subgroup of and Middle East Anatolia (TRB1) provinces have locally clustered as High-High (HH) and Low-Low (LL). Meanwhile, east and south east of Turkey (TRA2, TRB2, TRC1, TRC2, TRC3) are clustered low-high (LH) and TR51 (Ankara) and TR41 (Bursa, Eskişehir, Bilecik) are clustered high-low (HL). Also, it

can be concluded from analysis that the neighbour relationship should be taken into consideration when making further analysis for poverty.

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