ANALYSIS OF INTRA-METROPOLITAN MOBILITY IN MARMARA REGION

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Abstract

Urban spaces are dynamic entities and to understand the socio-spatial processes of these entities is hard to analyze and evaluate. Residential mobility is one of the most important socio-spatial dynamics proceeding in an urban space through which socio-economic changes are produced consistently. This study aims to figure out the intra-metropolitan mobility in Marmara Region and to find out the interaction between the districts of Istanbul and the other districts in Marmara Region. Having a very crucial position in its region and the whole country, Istanbul, has gone through a continuous and a very rapid change in the 'metropolitanization' process while being in a ceaseless interaction with its hinterland and having its own urbanization dynamics. In this study, residential mobility of the individuals within Marmara Region has been analyzed and evaluated in order to map out the interaction between the districts of Istanbul and the other districts of Marmara Region. All quantitative data of the study is derived from the census of 1990 and 2000. Turkish Statistical Institute's (TURKSTAT) both censuses of 1990 and 2000 contain 5% sample of all population in Turkey. Two different methods have been consecutively used for the analysis of the data. First, Lebart's Procedure based on Combined Use of Cluster Analysis has been used to summarize and depict the qualitative contrast invisible to the naked eye. Second, Correspondence Analysis -a variant of factor analysis devised for reducing large data sets- has been deployed. By clustering the origin and destination units according to their distinctive and similar arrival and departure profiles, a chaotic picture of a huge original interaction matrix of 1985-1990 and 1995-2000 mobility flows can be perceptible. The results of the empirical study show that the mobility patterns in both periods are very similar to each other. From the south-west, people significantly moved to the south-west, and from the districts of Bursa, people significantly moved to the districts of Bursa. The mobility patterns in the north-east of Marmara and Thracian districts are different in two periods. In the 1985-1990 period, these districts are placed with the districts of Istanbul as origin units. However, in the 1995-2000 period, the interaction between these districts decreased and they generate different groups according to their arrival profiles.

Key words: Intra-metropolitan mobility, residential mobility, Marmara Region, Istanbul, interaction, correspondence analysis, Lebart's procedure, data reduction

1. Introduction

The concept of 'intra-metropolitan mobility' has been recently cited by the leading researchers on mobility. More about residential mobility and intra-urban mobility, or intra-urban residential mobility concepts are cited by the authors who study about the mobility flows between one neighborhood/part of a town/city to another. However, cities are becoming city-regions and metropolitan cities are not only considered within their province boundaries.

"A world-wide mosaic of large city-regions seems to be over-riding (though is not effacing entirely) an earlier core-periphery system of spatial organization… As globalization proceeds, an extended archipelago or mosaic of large city-regions is evidently coming into being, and these peculiar agglomerations now increasingly function as the spatial foundations of the new world system that has been taking shape since the end of the 1970s" (Scott, 2001:813). In this context of a globalizing economy, the existing social and economic disposals are decomposed by the entry of markets into peripheral regions. *"The interaction between an urban core and its semi-urban and rural hinterland is the essence of the city-region"* (Rodríguez-Pose, 2008:1026). As a result, people become more mobile due to the alteration in their customary livelihoods and the need for searching for new ways of earning income, managing risk and acquiring capital. *"Migration does not stem from a lack of economic development, but from development itself"* (Hirschman et al., 1999: 48).

Residential mobility can be defined as the movement of residents from one house to another, or from one neighborhood/part of a town/city to another (Gbakeji and Rilwani, 2009). In Simmel's terms mobility is part of a *"world in flux, whose substantive contents are themselves dissolved in motion"* (Frisby, 2002:24). *"Mobility is the product of the intense commodification of social relations fuelled by industrial development and entwined with the sharply increasing division of labor and the spatial concentration of diversified activities in the modern metropolis."* (Frisby, 2002: 101).

This study aims to figure out the intra-metropolitan residential mobility in Marmara Region and to find out the interaction between the districts of Istanbul and the other districts in Marmara Region. Istanbul, the demographic and economic heart of Turkey, has gone through enormous changes over the past century. The mega-city of about 13 to 16 million inhabitants (depending on the unit of analysis), has considered 20% of Turkey's total population since 1950. A dramatic population increase (more than tenfold) has been also observed during this period (OECD, 2008). Istanbul stands as the centre of both the country and the Marmara region and during the last quarter of the twentieth century, it, experienced tremendous transformation in its urban structure (Dokmeci & Berkoz, 2000). Having a very crucial position in its region and the whole country, Istanbul, has gone through a continuous and a very rapid change in the 'metropolitanization' process while being in a ceaseless interaction with its hinterland and having its own urbanization dynamics. In this study, residential mobility of the individuals within Marmara Region has been analyzed and evaluated in order to map out the interaction between the districts of Istanbul and the other districts of Marmara Region. For the analysis, the Census Data of the Turkish Statistical Institute (TURKSTAT) has been used and two different methods Lebart's Procedure based on Combined Use of Cluster Analysis and

Correspondence Analysis have been consecutively deployed. Therefore, stratification, categorization and cartographic representation of the data has been provided and intra-metropolitan mobility in Marmara Region has been mapped out. The residential mobility of the individuals has been analyzed at the district level in order to see the interaction between the districts of Istanbul and the other districts of Marmara Region. The reason for the choice of district level as the analysis unit is that this level enables to better examine the complex relationships within the regions than the providence level analysis. Understanding the dynamics of the demographics and socio-spatial transformations of the metropolitan area is merely possible by examining the multi-dimensional relations. The structure of the paper is as follows: the next section reviews the literature on residential mobility and evaluates the different theoretical frameworks and perspectives to understand and analyze residential mobility. Section 3 addresses the intra-metropolitan residential mobility in Marmara Region. In this section, first the case study area, data and methodology are introduced and following the results of the analyses are presented. The last section evaluates the empirical results and the mobility patterns in Marmara Region.

2. Intra-metropolitan Residential Mobility

Population mobility is the main variable to understand the processes of dynamic cities, and is the main demographic variable related with metropolization dynamics. Módenes (1998) classifies the types of population mobility in three categories usual mobility, daily mobility, occasional mobility and residential mobility. All of these are inter-related and have different functions in the general mobility process (Elordui-Zapaterietxe and Cladera, 2006).

"Residential mobility can be defined as the movement of residents from one house to another, or from one neighborhood/part of a town/city to another" (Gbakeji and Rilwani, 2009: 45). Residential mobility is an outcome of a choice process which enables individuals and households to choose their residence and/or neighborhood that suits them better (Mandic, 2001). This choice process is exercised under complex institutional and personal constraints.

Although residential mobility and migration are very closed concepts, the pivotal difference between them are referring to the distance and the change in everyday habits. Módenes (1998) and Lewis (1982) designate **migration** as the residential change with a long distance and alteration in everyday habits, while residential mobility is not designated by a complete change in everyday life and is practiced within short distances. Therefore, the terms of inter-regional and intra-urban migration are used to distinguish migration and residential mobility. According to Painter (1997), long distance moves are practiced under the circumstances about the changes in employment, while there are more varied reasons for practicing short distance moves. There are many individual-level factors affecting the mobility patterns like proximity to employment, duration of residence, employment status, income level, gender and family status (Conway, 1985; Gilbert and Varley, 1990; Klak and Holtzclaw, 1993; Miraftab, 1997; Selier and Klare, 1991; Sdra, 1982; Turner, 1968; UNCHS, 1982). In Simmel's terms mobility is part of a *"world in flux, whose substantive contents are themselves dissolved in motion"* (Frisby, 2002: 24). *"Mobility is the product of the intense commodification of social relations fuelled by industrial development and entwined with the sharply increasing division of labor*

and the spatial concentration of diversified activities in the modern metropolis. In more abstract terms, motion is at the heart of capitalist social relations through the objectification of contentless form in money, which "embodies social reality in constant motion" (Frisby, 2002: 101)**.**

Urban spaces are dynamic entities, so that to understand the socio-spatial processes of these entities is hard to analyze and evaluate. Residential mobility is probably one of the most important socio-spatial dynamics proceeding in an urban space through which socio-economic changes are produced consistently. Geographers, demographers, and sociologists have explained the transformation of urban demographic landscape dominantly by residential mobility while social mobility, which consists of aging in place, or in situ changes in population structure takes a secondary role (Gober, et. al., 1991). Moreover, intra-urban residential structure is mainly formed by the the aggregate outcome of residential mobility and residential location choice (Wu, 2004; Knox and Pinch, 2000; Kim, 1994; Kim et. al., 2005). Therefore, social scientists have seen intra-urban residential mobility as a crucial subject to study in order to comprehensively understand the changing structure of cities (Clark and Moore, 1978; Cadwallader, 1982).

The importance of the study of local residential mobility is emphasized by many scholars from several perspectives. Moving behavior is discussed under individual and inter-personal choices and mobility has a direct impact upon the socio-spatial structure of urban areas. A great number of scholars analyze the impacts of the factors like accessibility, neighborhood amenities, housing demand and land market on residential location choice decisions (Clark et. al., 2006; Kim et. al., 2005; Margulis, 2001; Li and Siu, 2001; Mandic, 2001; Ommeren and Nijkamp, 1999; South and Crowder, 1998). These factors are generally related to the socio-economic status of the movers in order to explain the postwar decentralization of metropolitan areas and the process of neighborhood change and decline in central cities (suburbanization) resulting segregation between different social groups. Hence, land use patterns and the spatial distribution of socio-demographic groups are studied by urban planners, demographers, geographers and sociologists as an outcome of the mobility processes (Bolt and van Kempen, 2010; Kahrik and Tammaru, 2008; Freeman, 2005; Maloutas, 2004; Crowder, 2001; Gober et. al., 1991; Hanushek and Quigley, 1978).

A vast body of literature on residential migration analysis has been categorized by Baccaïni and Dutreuilh (2007) with respect to the behavior of individuals or households on their residential choices and strategies, or on the spatial aspects of migratory flows that reveal interactions between different localities. Another classification has been done by Cadwallader (1982:458) who categorized the analyses of residential mobility into two types as micro-analytical and macro-analytical approaches. He states the main differences between two approaches as follows:

"The micro approach is characterized by an interest in the characteristics of movers versus stayers, and is concerned with the construction of models that realistically represent the individual decision-making process involved in residential mobility. (Cadwallader, 1979). Alternatively, the macro approach has been used in two main contexts (Moore, 1971). First, to identify the spatial pattern of mobility rates, and second, to establish the interrelationships between mobility rates and other features

of the urban environment, such as socio-economic, demographic, and housing characteristics."

Although there are several studies of micro-analytical approach in literature, the macro-analytical studies couldn't contribute enough to residential mobility phenomena. The spatial patterns of mobility rates and the interrelationships between mobility rates and urban environment have not been studied enough by the scholars concerning residential mobility. This can be because of the methodological difficulties to summarize migrational data which needs to be analyzed by relational approach. The macro-analytical, or aggregate, approach has started in the beginning of the 20th century by two classical models (Albig, 1933). These models of Burgess and Hoyt explain urban growth partially by residential mobility (Johnston, 1971; Cadwallader, 1982).

Burgess explains the urban growth and transformation of urban areas by the residential change of the migrants. He states that recent migrants firstly locate at the centre of the city they migrate, and then, move out towards the edge. This movement is a result of a process for them to change their status and housing choices at the time they stay in the city. (Cadwallader, 1982; Maloutas, 2004). As a result, progressively, poorer households are located at any particular distance from the centre of the city. However, according to Maloutas (2004), the Burgess model privileges residential mobility over the other types of mobilities. He emphasizes the effects of social mobility on the transformation of urban landscape and criticizes the assumption that the socially mobile will inevitably relocate. Alternatively, Hoyt's model, which describes a sectoral rather than a zonal pattern of socio-spatial differentiation, makes assumptions about the moving behavior of the affluent social strata. He argues that the high rent districts develop by the dispersal of new transportation routes outward from the central business district as a result the more affluent social strata prefer to move to the most desirable locations in the easily accessible suburbs (Cadwallader, 1982; Knox, 1995; Maloutas, 2004).

The attention of macro-analysts on the spatial distribution of residential mobility rates associated with urban sub-areas dates back to 1970s. These studies also focus on the relationship between the mobility rates and the socio-economic and demographic characteristics of the movers (Short, 1978). Moore's studies (1969 and 1971) about residential mobility in Brisbane, Australia are attempts to examine the distribution of mobility rates. He has developed a causal model to analyze the relationship between mobility rates and selected socio-economic and demographic variables (Cadwallader, 1982). Moore states that, as residential mobility is a direct function of population density, mobility rates should decline with increasing distance from the city centre (McDonald and Bowman, 1976; Cadwallader, 1982). Knox and Pinch (2000: 331), point out the obstacles to residential mobility studies as follows:

"Although it is widely accepted that the shaping and reshaping of urban social areas is a product of the movement of households from one residence to another, the relationships between residential structure and patterns of residential mobility are only imperfectly understood".

Relatively recent methodologies devised for exploratory relational data analysis and pattern recognition enable us to represent each place as an eventual origin and destination of migration or mobility flows. Migration/mobility is a spatial interaction between places of Origin and Destination associated with a permanent change of residence (Guvenc, 2010). In this paper, these permanent changes have been

analyzed and evaluated according to the over-represented mobility flows from one destination unit to another by using the interaction matrices. Of course it is impossible to recognize these flows from the huge interaction matrices. In order to reduce these interaction matrices, Lebart's Procedure based on Combined Use of Cluster Analysis and correspondence analysis have been used in the study. These two methods of analysis are very promising data reduction techniques which process, decipher, summarize, represent and communicate large contingency tables in cognitively relevant formats. A detailed information about these models are given in the next section.

3. Analysis of Intra-metropolitan Residential Mobility in Marmara Region

3.1. Prefatory Remarks

This study aims to figure out the intra-metropolitan residential mobility in Marmara Region and to find out the interaction between the districts of Istanbul and the other districts in Marmara Region. The residential mobility between the districts has been considered within a field consisting the NUTS 1 regions of Istanbul, Eastern Marmara and Western Marmara which is called Marmara Region in this study. The residential mobility in Marmara Region has been examined in two periods: 1985-1990 and 1995-2000, and these two periods are compared in order to understand whether mobility patterns change over the years.

All quantitative data of the study is derived from the census of 1990 and 2000. Turkish Statistical Institute's (TURKSTAT) both censuses of 1990 and 2000 contain 5% sample of all population in Turkey. Two questions from the census are significant for the analyses of intra-regional and intra-metropolitan mobility: (i) In which district did you use to live 5 years ago? and (ii) In which district do you live now?). On the basis of these two questions, the residential mobility in Marmara Region has been analyzed and evaluated.

Mobility and migration are relational concepts. They are difficult to be analyzed through substantive methods and require the analyses of interaction patterns. The interaction patterns can be depicted through interaction matrices. An interaction matrix differs from case variable matrices by the fact that its diagonal elements are empty. This is a huge problem for the reduction of interaction matrices.

Therefore, in this study two different methods have been used for analyzing the data. First of all, Lebart's Procedure based on Combined Use of Cluster Analysis has been used for summarizing and depicting qualitative contrast invisible to the naked eye. By clustering the origin and destination units according to their distinctive and similar arrival and departure profiles, a chaotic picture of a huge original interaction matrix of 1985-1990 and 1995-2000 mobility flows can be perceptible. Clustering the districts of origins and destinations is not a random grouping. Every origin and destination profiles of the districts in the same group must be similar.

Secondly, Correspondence Analysis, a variant of factor analysis devised for reducing large data sets has been used in this study. The Correspondence Analysis is an efficient data reduction tool summarizing large data sets with manual and measurable information losses (Guvencc and Kirmanoglu, 2009). The rows and the columns of the data set are considered as data **profiles** and are represented via **points** with known coordinates. The profile of each row is represented through a **row-point** and

that of each column is represented through a **column-point**. The representation of a data set with N rows and M columns with **n row-points** and **m column points** produces a substantive economy. This property has, as we are going to see, interesting implications for the stratification, categorization and cartographic representation of qualitative sets (Guvenc and Kirmanoglu, 2009).

The similarity of the profiles generate locational similarity or proximity. That is to say, being placed in the same group means for those districts that they send low amount of migrants to the similar places and high amount of migrants to the similar districts. In interaction matrices, that means the places which have similar relational patterns with the other places appear in the same group. Therefore, the districts even if they are geographically distant from each other will be in the same group and in the migration pattern map they will be the same color.

The following two sub-sections (3.2 and 3.3) analyze the mobility behaviors between the districts which belong to the provinces in TR 1 Istanbul, TR 2 Western Marmara and TR4 Eastern Marmara NUTS Level 1 Regions by clustering the districts which show similar origin and destination profiles. Intra-urban mobility in Istanbul itself and interaction between the districts of Istanbul and other districts in Marmara Region are evaluated according to the origin and destination profiles of all districts. Sub-section 3.2 evaluates the mobility patterns in the period of 1985-1990. Next, Sub-section 3.3 evaluates these patterns for the following period 1995-2000. The last Sub-section (3.4) compares these two periods and evaluates the similarities and differences in mobility patterns between the two periods.

3.2. Analysis of Residential Mobility in Marmara Region between 1985-1990

In the 1985-1990 period, Marmara Region has 12 provinces including 155 districts. Table 1 shows NUTS Level 1, Level 2 and Level 3 Regions.

Table 1: Marmara NUTS Regions 1990, EUROSTAT

NUTS Level 1	NUTS Level 2	NUTS Level 3
TR 1 – ISTANBUL	TR 10 - ISTANBUL	TR 100 - Istanbul
TR 2 – WESTERN MARMARA	TR21 – TEKIRDAG	TR 211 – Tekirdag
		TR 212 – Edirne
		TR 213 – Kirklareli
	TR22 – BALIKESİR	TR 221 – Balikesir
		TR 222 – Canakkale
TR 4 – EASTERN MARMARA	TR 41 - BURSA	TR 411 – Bursa
		TR 412 – Eskisehir
		TR 413 – Bilecik
	TR 42 – KOCAELI	TR 421 – Kocaeli
		TR 422 – Sakarya
		TR 424 – Bolu

Total number of the individuals representing a 5% sample of all the population which moved from one district to another in defined area is 64,943 (TURKSTAT). The over-represented mobility can be clearly seen in Table 2.

Table 2: Reduced and reordered residential mobility matrix for Marmara Region 1985-1990 (signed chi square indices)

Districts of Origin (1985)	Districts of Destination (1990)											
	1	**2**	**3**	**4**	5	6	7	8	9	10	11	12
1	15754,5	-45,2	-1022,6	-324,1	-43,1	-1,2	-42,3	-227,3	-29,0	-322,0	-115,3	-33,2
2	-129,0	2852	487,8	-446	-68,9	-26,4	-49,1	-414,5	-68,8	-618,8	-261,9	-48,8
3	-1882,7	-479	2213,5	759,4	-70,1	-463,3	-116	-559,0	-116	-898,2	-314,7	-78,5
4	-120,6	-26,7	-186,2	2078	13471	-33,4	-7,8	-30,1	-6,3	-40,3	-14,8	-4,8
5	-91,6	-0,1	-269,2	-71,0	-18,2	10141	-6,5	-13,6	-11,3	-69,3	-43,8	-12,8
6	-357,1	-83,4	-744,3	-25,2	-19,1	-18,6	3061	6712	2342	0,4	284,7	-0,7
7	-63,4	-19,5	-269,3	-12,4	-3,4	-9,8	1,9	6435	-0,4	-2,9	-12,9	-2,4
8	-430,5	-107	-1198	-91,8	-25,9	-82,2	-12,4	43,9	-11,8	23868,2	-9,1	-16,3
9	-118,8	-35,8	-519,6	-47,6	-6,5	-47,2	-12,6	-0,4	215,8	-15,2	26700,7	-4,6
10	-42,3	-7,3	-104,3	-5,3	-2,2	-14,0	0,1	52,0	-2,0	-7,8	-9,6	32740
Source: Derived from the 5% Public Use Sample of the 1990 Population Census, TSI												
See Table 3 and Table 4 for the content of groups.												

Table 3 and Table 4 reveal the districts which are comprised in the groups.

The districts belonging to Istanbul only appear in the 1st, 2nd and 3rd groups as origins, and the 1st, 2nd, 3rd and the 4th groups as destinations. These groups contain all the districts of Istanbul and also the districts which have over-represented mobility flows from and/or to Istanbul. In other words, the other groups comprise the districts which have under-represented mobility flows to/from Istanbul.

In the 1985-1990 period, there is a few number of groups as both origin and destination units. From the north-east the individuals substantially moved to the east side of Marmara. From the south-east people significantly moved to the south-east and from the districts of Bursa people significantly moved to the districts of Bursa. From the districts of Canakkale and Balikesir people significantly moved to the districts of Balikesir, Canakkale and Thrace. From the Tracian districts the individuals significantly moved to the districts of Thrace and Canakkale. In this period, the Thracian districts are grouped together with the Istanbul's Anatolian districts as origin units.

Figure 1 shows the over-represented mobility flows in the 1985-1990 period. The flows have been shown by the arrows. The thicknesses and the darknesses of the arrows have been drawn according to the levels of representation. As it can be seen in Figure 1, the most over-represented mobility flows were from/to the districts of Istanbul.
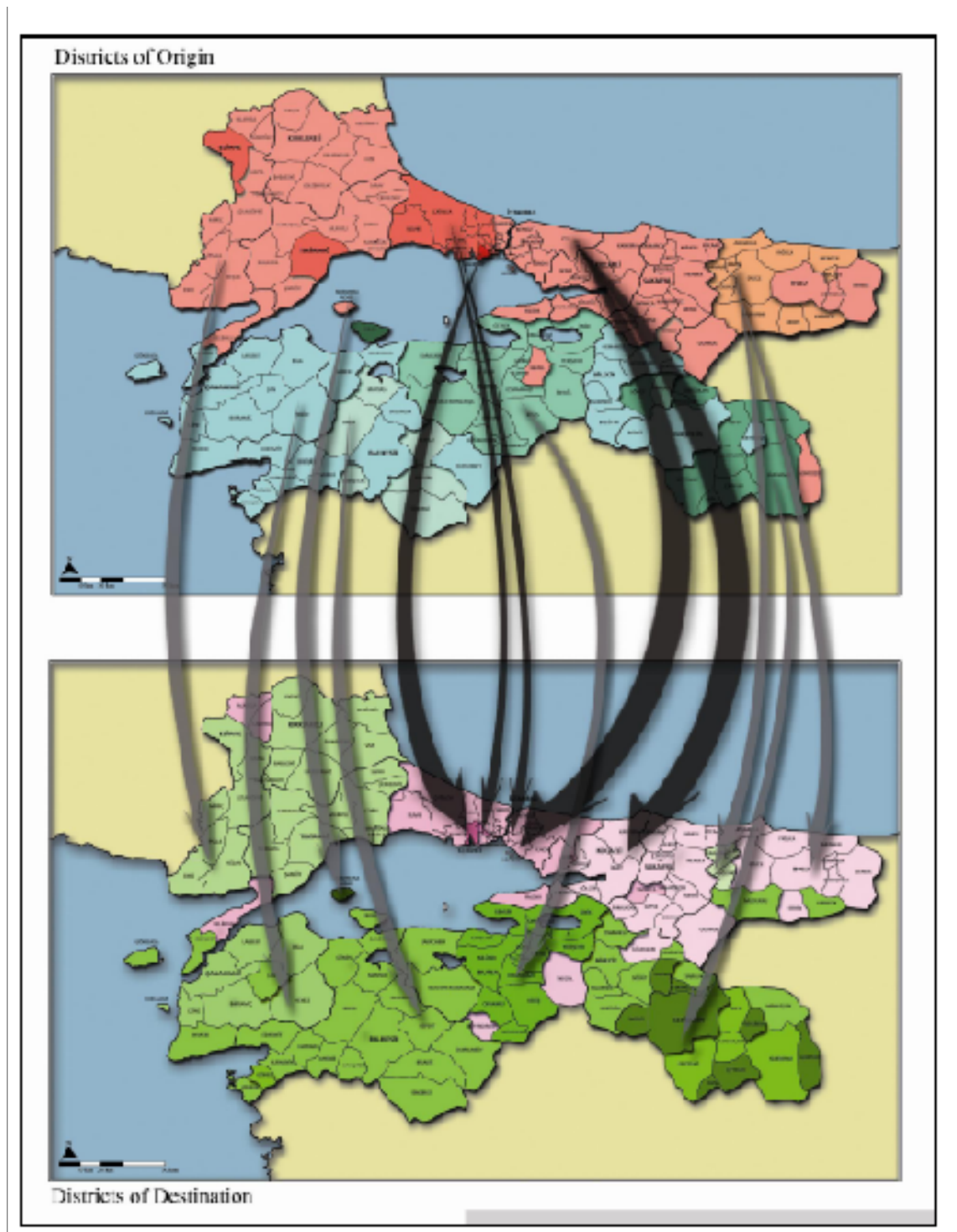
Table 3: Residential mobility in Marmara Region 1985-1990 (districts of origin)

1	**ISTANBUL** (Bakirkoy)
2	**ISTANBUL** (Bayrampaşa, Eminonu, Eyup, Fatih, Gaziosmanpaşa, Kucukcekmece, Zeytinburnu, Buyukcekmece, Catalca, Silivri), EDIRNE (Merkez), TEKIRDAG (Merkez)
3	**ISTANBUL** (Adalar, Beşiktaş, Beykoz, Beyoglu, Kadikoy, Kagithane, Kartal, Pendik, Sariyer, Sişli, UUmraniye, Uskudar, Sile, Yalova) BALIKESIR (Marmara), BOLU (Merkez, Dortdivan, Gerede, Goynuk), BURSA (Kestel), ESKISEHIR (Gunyuzu) KOCAELI (Merkez, Gebze, Golcuk, Kandira, Karamursel, Korfez), SAKARYA (Merkez, Akyazi, Ferizli, Geyve, Hendek, Karapurcek, Karasu, Kaynarca, Kocaali, Pamukova, Sapanca, Sogutlu)
4	BOLU (Akcakoca, Cumaova, Cilimli, Duzce, Golkaya, Kibriscik, Mengen, Mudurnu, Seben, Yenicaga, Yigilca)
5	CANAKKALE (Gelibolu), EDIRNE (Enez, Havsa, Ipsala, Keşan, Lalapaşa, Meric, Suleoglu, Uzunkopru), KIRKLARELI (Merkez, Babaeski, Demirkoy, Kofcaz, Luleburgaz, Pehlivankoy, Pinarhisar, Vize), SAKARYA (Tarakli), TEKIRDAG (Cerkezkoy, Corlu, Hayrabolu, Malkara, Marmara Ereglisi, Muratli, Saray, Sarkoy)
6	BALIKESIR (Merkez, Ayvalik, Bandirma, Burhaniye, Dursunbey, Edremit, Gomec, Gonen, Havran, Ivrindi, Susurluk), BILECIK (Merkez, Bozuyuk, Golpazari, Osmaneli, Pazaryeri, Yenipazar), BURSA (Merkez), CANAKKALE (Merkez, Ayvacik, Bayramic, Biga, Bozcaada, Can, Eceabat, Ezine, Gokceada, Lapseki, Yenice), ESKISEHIR (Merkez, Beylikova, Inonu)
7	BALIKESIR (Balya, Bigadic, Kepsut, Manyas, Savaştepe, Sindirgi)
8	BILECIK (Inhisar), BURSA (Nilufer, Osmangazi, Yildirim, Buyukorhan, Gemlik, Gursu, Harmancik, Inegol, Iznik, Karacabey, Keles, Mudanya, M.Kemalpaşa, Orhanli, Orhangazi, Yenişehir)
9	BILECIK (Sogut), ESKISEHIR (Alpu, Cifteler, Han, Mahmudiye, Mihalgazi, Mihaliccik, Saricakaya, Seyitgazi, Sivrihisar)
10	BALIKESIR (Erdek)

Table 4: Residential mobility in Marmara Region 1985-1990 (districts of destination)

1	**ISTANBUL** (Kucukcekmece)
2	**ISTANBUL** (Bayrampaşa)
3	**ISTANBUL** (Adalar, Bakirkoy, Beşiktaş, Beykoz, Beyoglu, Eminonu, Eyup, Fatih, Gaziosmanpaşa, Kadikoy, Kagithane, Kartal, Pendik, Sariyer, Sişli, UUmraniye, UUskudar, Zeytinburnu, Buyukcekmece, Catalca, Silivri, Sile, Yalova), BURSA (Buyukorhan, Inegol), CANAKKALE (Gelibolu), EDIRNE (Lalapaşa, Suleoglu), KOCAELI (Gebze), SAKARYA (Sapanca)
4	BILECIK (Golpazari), BOLU (Merkez, Akcakoca, Dortdivan, Duzce, Gerede, Goynuk, Mengen, Seben, Yenicaga, Yigilca), KOCAELI (Merkez, Golcuk, Kandira, Karamursel, Korfez), SAKARYA (Merkez, Akyazi, Ferizli, Geyve, Hendek, Karapurcek, Karasu, Kaynarca, Kocaali, Pamukova, Sogutlu, Tarakli)
5	BOLU (Cumaova, Cilimli, Golyaka)
6	EDIRNE (Merkez, Enez, Havsa, Ipsala, Keşan, Meric, Uzunkopru), KIRKLARELI (Merkez, Babaeski, Demirkoy, Kofcaz, Luleburgaz, Pehlivankoy, Pinarhisar, Vize), TEKIRDAG (Merkez, Cerkezkoy, Corlu, Hayrabolu, Malkara, Marmara Ereglisi, Muratli, Saray, Sarkoy)
7	CANAKKALE (Merkez, Bayramic, Biga, Bozcaada, Ezine, Lapseki, Yenice)
8	BALIKESIR (Merkez, Ayvalik, Balya, Bandirma, Bigadic, Burhaniye, Dursunbey, Edremit, Erdek, Gonen, Havran, Ivrindi, Kepsut, Manyas, Savaştepe, Sindirgi, Susurluk), BILECIK (Merkez, Bozuyuk, Osmaneli, Pazaryeri, Sogut, Yenipazar), BOLU (Kibriscik, Mudurnu), BURSA (Karacabey, M. Kemalpaşa), CANAKKALE (Ayvacik, Can, Eceabat, Gokceada), ESKISEHIR (Mihaliccik, Saricakaya)
9	BALIKESIR (Gomec), ESKISEHIR (Alpu, Mahmudiye, Seyitgazi, Sivrihisar)
10	BURSA (Nilufer, Osmangazi, Yildirim, Gemlik, Gursu, Harmancik, Iznik, Keleş, Kestel, Mudanya, Orhaneli, Orhangazi, Yenişehir)
11	BILECIK (Inhisar), ESKISEHIR (Merkez, Beylikova, Cifteler, Gunyuzu, Han, Inonu, Mihalgazi)
12	BALIKESIR (Marmara)

Figure 1: Residential Mobility in Marmara Region between 1985-1990.

3.3. Analysis of Residential mobility in Marmara Region between 1995-2000

In the 1995-2000 period, Marmara Region has 14 provinces including 172 districts. Table 5 shows NUTS Level 1, Level 2 and Level 3 Regions.

Table 5: Marmara NUTS Regions 2000, EUROSTAT

NUTS Level 1	NUTS Level 2	NUTS Level 3
TR 1 – ISTANBUL	TR 10 - ISTANBUL	TR 100 - Istanbul
TR 2 – WESTERN MARMARA	TR21 – TEKİRDAG	TR 211 – Tekirdag
		TR 212 – Edirne
		TR 213 – Kirklareli
	TR22 – BALIKESİR	TR 221 – Balikesir
		TR 222 – Canakkale
TR 4 – EASTERN MARMARA	TR 41 - BURSA	TR 411 – Bursa
		TR 412 – Eskisehir
		TR 413 – Bilecik
	TR 42 – KOCAELİ	TR 421 – Kocaeli
		TR 422 – Sakarya
		TR 423 – Duzce
		TR 424 – Bolu
		TR 425 - Yalova

Total number of individuals representing a 5% sample of all the population which moved from one district to another in the defined area is 81,848 (TURKSTAT).

Table 6: Reduced and reordered residential mobility matrix for Marmara Region 1995-2000 (flows in absolute numbers)

Districts of Origin (1995)	Districts of Destination (2000)									Arrivals Total
	1	2	3	4	5	6	7	8	9	
1	27273	631	202	283	608	0	619	295	569	30480
2	19968	1238	112	180	333	0	634	147	373	22985
3	1714	2230	15	81	107	0	249	59	126	4581
4	623	68	631	128	118	0	64	82	108	1822
5	3602	307	470	1535	1614	13	497	515	695	9248
6	713	172	7	50	82	0	1560	85	227	2896
7	138	41	8	13	21	0	832	18	132	1203
8	144	26	11	50	45	0	35	915	92	1318
9	1044	171	32	72	251	0	487	219	5039	7315
Departures Total	55219	4884	1488	2392	3179	13	4977	2335	7361	81848

Source: Derived from the 5% Public Use Sample of the 2000 Population Census, TSI

See Table 7 and Table 8 for the content of groups.

The over-represented mobility can be clearly seen in Table 6. The districts belonging to Istanbul only appear in the 1st and the 2nd groups as origins, and the 1st group as destinations. These groups contain all the districts of Istanbul and also the districts which have over-represented migration movements from and/or to Istanbul. In other words, the other groups comprise the districts which have under-represented mobility flows to/from Istanbul. Table 7 and Table 8 reveal the districts which are comprised in the groups.

Table 7: Residential mobility in Marmara Region 1995-2000 (districts of origin)

1	**ISTANBUL** (Adalar, Beşiktaş, Beykoz, Beyoglu, Kadikoy, Kagithane, Kartal, Maltepe, Pendik, Sariyer, Sişli, Tuzla, UUmraniye, UUskudar, Catalca, Sultanbeyli, Sile), BALIKESIR (Marmara), TEKIRDAG (Marmara Ereglisi)
2	**ISTANBUL** (Avcilar, Bagcilar, Bahcelievler, Bakirkoy, Bayrampaşa, Eminonu, Esenler, Eyup, Fatih, Gaziosmanpaşa, Gungoren, Kucukcekmece, Zeytinburnu, Buyukcekmece)
3	EDIRNE (Merkez, Enez, Havsa, Ipsala, Keşan, Lalapaşa, Meric, Suleoglu, Uzunkopru), KIRKLARELI (Merkez, Babaeski, Demirkoy, Kofcaz, Luleburgaz, Pehlivankoy, Pinarhisar, Vize), TEKIRDAG (Merkez, Cerkezkoy, Corlu, Hayrabolu, Malkara, Muratli, Saray, Sarkoy)
4	SAKARYA (Merkez, Tarakli)
5	BILECIK (Merkez), BOLU (Merkez, Dortdivan, Gerede, Goynuk), BURSA (Iznik), CANAKKALE (Bozcaada), ESKISEHIR (Merkez), KOCAELI (Merkez, Gebze, Golcuk, Kandira, Karamursel, Korfez, Derince), SAKARYA (Akyazi, Ferizli, Geyve, Hendek, Karapurcek, Karasu, Kaynarca, Kocaali, Pamukova, Sapanca, Sogutlu), YALOVA (Merkez, Altinova, Cinarcik, Ciftlikkoy), DUUZCE (Merkez, Akcakoca, Cumayeri, Cilimli, Golkaya, Gumuşova, Kaynaşli, Yigilca)
6	BALIKESIR (Merkez, Ayvalik, Balya, Bandirma, Burhaniye, Edremit, Gomec, Ivrindi), CANAKKALE (Merkez, Ayvacik, Bayramic, Biga, Can, Eceabat, Ezine, Gelibolu, Gokceada, Lapseki, Yenice), YALOVA (Termal)
7	BALIKESIR (Bigadic, Dursunbey, Erdek, Gonen, Havran, Kepsut, Manyas, Savaştepe, Sindirgi, Susurluk)
8	BILECIK (Bozuyuk, Golpazari, Inhisar, Osmaneli, Pazaryeri, Sogut, Yenipazar), ESKISEHIR (Alpu, Beylikova, Cifteler, Gunyuzu, Han, Inonu, Mahmudiye, Mihalgazi, Mihaliccik, Saricakaya, Seyitgazi, Sivrihisar)
9	BURSA (Merkez, Nilufer, Osmangazi, Yildirim, Buyukorhan, Gemlik, Gursu, Harmancik, Inegol, Karacabey, Keleş, Kestel, Mudanya, M. Kemalpaşa, Orhaneli, Orhangazi, Yenişehir), YALOVA (Armutlu)

Table 8: Residential mobility in Marmara Region 1995-2000 (districts of destination)

1	**ISTANBUL** (Adalar, Avcilar, Bagcilar, Bahcelievler, Bakirkoy, Bayrampaşa, Beşiktaş, Beykoz, Beyoglu, Eminonu, Esenler, Eyup, Fatih, Gaziosmanpaşa, Gungoren, Kadikoy, Kagithane, Kartal, Kucukcekmece, Maltepe, Pendik, Sariyer, Sişli, Tuzla, UUmraniye, UUskudar, Zeytinburnu, Buyukcekmece, Catalca, Silivri, Sultanbeyli, Sile), BURSA (Harmancik), KIRKLARELI (Pehlivankoy), KOCAELI (Gebze, Kandira), TEKIRDAG (Marmara Ereglisi, Sarkoy)
2	EDIRNE (Merkez, Enez, Havsa, Ipsala, Keşan, Lalapaşa, Meric, Uzunkopru), KIRKLARELI (Merkez, Babaeski, Demirkoy, Kofcaz, Luleburgaz, Pinarhisar, Vize), TEKIRDAG (Cerkezkoy, Corlu, Hayrabolu, Malkara, Muratli, Saray)
3	SAKARYA (Akyazi, Ferizli, Geyve, Hendek, Karapurcek, Karasu, Kaynarca, Kocaali, Pamukova, Sapanca, Sogutlu)
4	ESKISEHIR (Mihalgazi, Mihaliccik, Saricakaya, Seyitgazi), KOCAELI (Merkez, Karamursel, Korfez), YALOVA (Altinova, Ciftlikkoy, Termal), DUUZCE (Cumayeri, Cilimli, Kaynaşli, Yigilca)
5	BILECIK (Golpazari), BOLU (Merkez, Dortdivan, Gerede, Goynuk), BURSA (Iznik, Orhangazi), EDIRNE (Suleoglu), KOCAELI (Golcuk, Derince), SAKARYA (Merkez, Tarakli), YALOVA (Merkez, Cinarcik), DUUZCE (Merkez, Akcakoca, Gumuşova)
6	Duzce (Golkaya)
7	BALIKESIR (Merkez, Ayvalik, Balya, Bandirma, Bigadic, Burhaniye, Dursunbey, Edremit, Erdek, Gomec, Gonen, Havran, Ivrindi, Kepsut, Manyas, Marmara, Savaştepe, Sindirgi, Susurluk), BURSA(Karacabey, M. Kemalpaşa), CANAKKALE (Merkez, Ayvacik, Bayramic, Biga, Bozcaada, Can, Eceabat, Ezine, Gelibolu, Gokceada, Lapseki, Yenice)
8	BILECIK (Merkez, Bozuyuk, Inhisar, Osmaneli, Pazaryeri, Sogut, Yenipazar), ESKISEHIR (Merkez, Alpu, Beylikova, Cifteler, Gunyuzu, Han, Inonu, Mahmudiye, Sivrihisar)
9	BURSA (Merkez, Nilufer, Osmangazi, Yildirim, Buyukorhan, Gemlik, Gursu, Inegol, Keleş, Kestel, Mudanya, Orhaneli, Yenişehir), YALOVA (Armutlu)
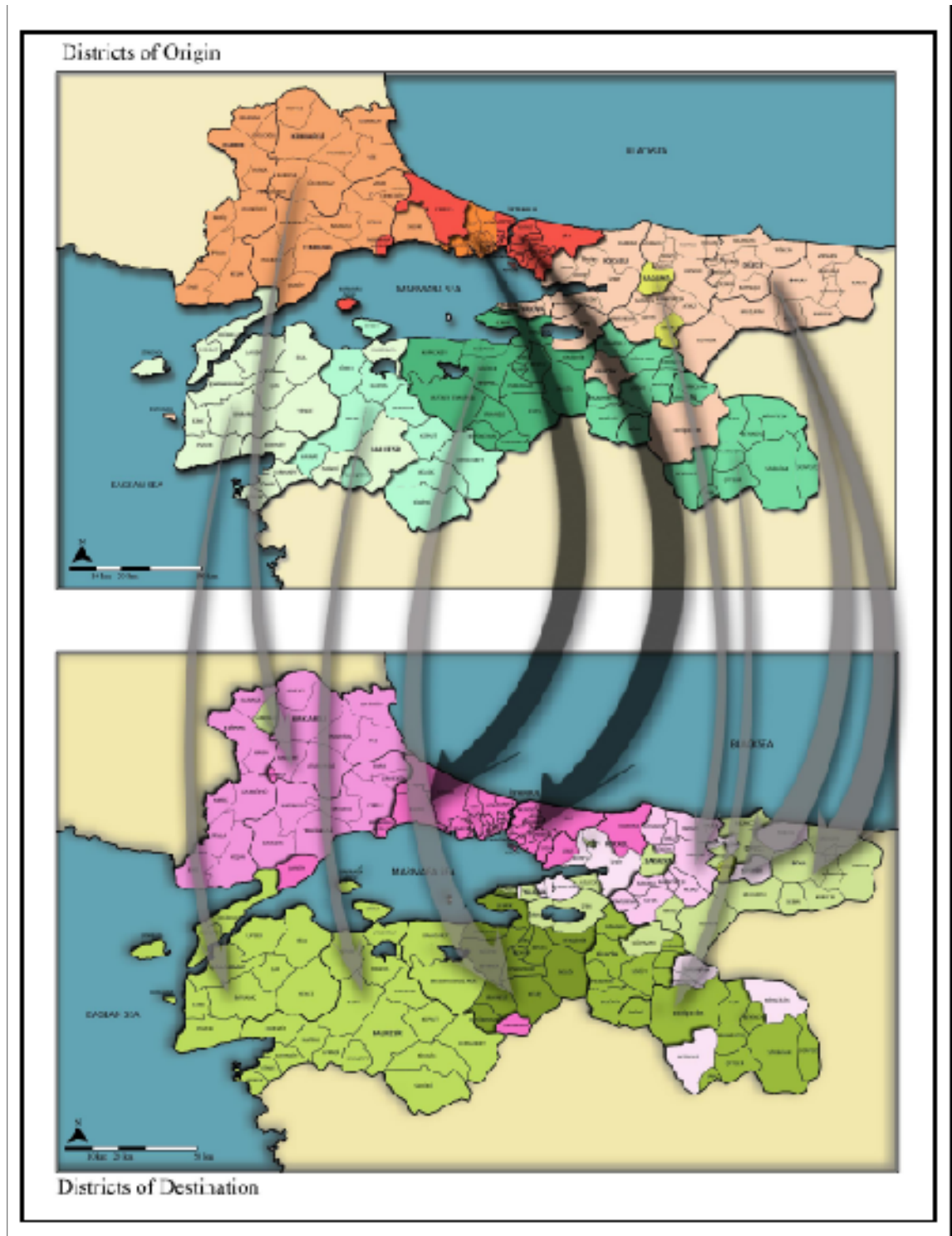
Figure 2: Residential Mobility in Marmara Region between 1995-2000.

In the 1995-2000 period, there is a more compact structure than the previous period. However, also in this period there is a few number of groups as both origin and destination units. From the south-west people significantly moved to the south-west and from the districts of Bursa people significantly moved to the districts of Bursa.

Unlike the previous period, the Thracian districts are not grouped together with the districts of Istanbul as origin units. The residential mobility from Thrace, north-east

and south-east of Marmara Region have over-represented patterns in between themselves. In other words, in this period the distinction between the mobility patterns is more evident than the previous period.

Figure 2 shows the over-represented mobility flows in the 1985-1990 period. The flows have been shown by the arrows. Likewise the previous period, the most over-represented mobility flows were from/to the districts of Istanbul.

3.4. A Comparative Evaluation of Residential Mobility Patterns

The results of our empirical study show that the mobility patterns in both periods are very similar to each other. From the south-west people significantly moved to the south-west and from the districts of Bursa people significantly moved to the districts of Bursa.

However, the mobility patterns in the north-east of Marmara and Thracian districts are different in two periods. In the 1985-1990 period, these districts are grouped together with the districts of Istanbul as origin units, whereas in the 1995-2000 period, the interaction between these districts decreased and they generated different groups according to their arrival profiles.

When the analyses of mobility in Marmara Region between the 1985-1990 and the 1995-2000 periods are compared with respect to their mobility flows, it is clear that in both periods the mobility from/to the districts of Istanbul have significant portion (Table 9).

Table 9: Mobility from / to the districts of Istanbul in all Marmara Region in the 1985-1990 and the 1995-2000 periods

	1985-1990		1995-2000	
	Number of Individuals	**% in Marmara Region**	**Number of Individuals**	**% in Marmara Region**
TOTAL MOBILITY in Marmara Region	64,943	100	81,848	100
from the districts of ISTANBUL	43,310	66.7%	53,681	65.6%
to the districts of ISTANBUL	44,509	68.-,6%	53,500	65,4%

In both periods, there are few numbers of districts in Marmara Region which have over-represented mobility between the districts of Istanbul. Nevertheless, in the 1995-2000 period, the districts which have interaction with the districts of Istanbul as both origins and destinations are less than the previous period. In both periods, the mobility in between the districts of Istanbul is more significant than the mobility between the districts of Istanbul and the districts of other provinces. The interaction between the districts of Istanbul and the districts of the other provinces in Marmara Region with respect to the individuals' mobility is more significant in the 1985-1990 period than the 1995-2000 period.

4. Concluding Remarks

The research on intra-urban residential mobility has become a popular topic among the social scientists for a long time, as it is thought that the changing economic and demographic structure of cities can only be fully understood by analyzing the underlying processes associated with residential movements patterns.

Our study aimed to analyze the intra-metropolitan residential mobility patterns in Marmara Region. With a macro-analitical approach our study has identified the residential mobility patterns in Marmara Region between 1985-1990 and 1995-2000. Two methods used in our study, the Lebart's Procedure and Correspondence Analysis, have revealed the over-represented and the under-represented mobility flows between all the districts of Marmara Region.

The results of our study showed that in both periods, the mobility from/to the districts of Istanbul had significant portion. The results of our study show also that the mobility in between the districts of Istanbul was more significant in both periods than the mobility between the districts of Istanbul and the districts of other provinces. An interesting result of our study is that the interaction between the districts of Istanbul and the districts of the other provinces in Marmara Region was more significant in the 1985-1990 period than the 1995-2000 period. Altogether these results show that while intra-urban interaction has increased, inter-urban interaction has decreased over the years. Or, in other words, while Istanbul was in a more dominant position in the whole region in the earlier period, over the years the other cities have developed and the dominancy of Istanbul has decreased. Although Istanbul has still played a dominant role in the region, this change over the years can be also evaluated as a regional convergence. The results of our study show that, especially Bursa, as another metropolitan city, has played an important role in Marmara Region. While attracting the mobility flows, Bursa balance the mobility flows in Marmara Region and moderate the population pressure on Istanbul.

Although our study, has been able to map out the residential mobility in Marmara Region according to the over-represented mobility patterns, unfortunately could not review the reasons behind these movements due to the lack of data. The existing studies about these reasons in the literature generally focus on the individuals' decisions. In these studies, many factors like marriage, divorce, entering and leaving school, job change, proximity to job, retirement, income level and gender are shown as the reasons of residential mobility. Besides the individual level reasons, the inter-personal relationships are also mentioned as the reasons of residential mobility and come up as another research topic. These types of studies are very important for analyzing and interpreting the reasons of the over-represented mobility patterns in Marmara Region. However, to better understand the reasons behind these mobility patterns requires the production of a different database. Survey studies can be very effective for producing this database. Therefore, our study contributes as a reference study to future studies for selecting the area or districts in which the survey studies can be made. Various studies, which relate the mobility patterns with the individual-level, inter-personal and/or socio-spatial issues of residential mobility, can be conducted with the findings of our study.

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