

79-22

DESCRIPTIVE ANALYSES OF
VILLAGE-TO-PROVINCE-CENTER MIGRATION

IN TURKEY: 1965-70
(aggregated for each province:
permanent resident population,
number of migrants, and migration rates of
origin and destination areas)*

Ayşe Gedik**

November 1979

* This study is based on, and is extension of a previous study by the author which was about village-to-province-center migration in Turkey, during the 1965-70 quinquennial period ("A Causal Analysis of the Destination Choice of Village-to-Province-Center Migrants in Turkey, 1965-70," Doctoral Dissertation, Department of Urban Planning, University of Washington, Seattle, November 1977). The original study was supported by the Ford Foundation.

** JSPS (Japan Society for Promotion of Science) visiting scholar, University of Tsukuba, Japan, and instructor (on-leave) in Department of City and Regional Planning, Middle East Technical University, Ankara, Turkey.



TABLE OF CONTENTS

	<u>Page</u>
I. INTRODUCTION - - - - -	1
II. SIGNIFICANCE OF THE STUDY - - - - -	2
III. DESCRIPTIVE ANALYSES - - - - -	4
III.1 Destination-Oriented Variables - - - - -	4
III.1.a Univariate Aspatial Statistics - - - - -	4
III.1.b Spatial Analyses—Mapping of the Variables - - - - -	8
III.1.c Bivariate Spatial Statistics - - - - -	11
III.1.d Bivariate Aspatial Statistics—Correlation - - - - -	14
III.2 Origin-oriented Variables - - - - -	14
III.2.a Univariate Aspatial Statistics - - - - -	14
III.2.b Spatial Analyses—Mapping of the Variables - - - - -	14
III.2.c Bivariate Spatial Statistics - - - - -	21
III.2.d Bivariate Aspatial Statistics—Correlation - - - - -	23
III.3 Synthesis: Destination-Oriented Versus Origin-Oriented Variables - - - - -	23
III.3.a Univariate Aspatial Statistics - - - - -	24
III.3.b Spatial Analyses—Mapping of the Variables - - - - -	25
III.3.c Bivariate Spatial Statistics - - - - -	26
III.3.d Bivariate Aspatial Statistics—Correlation - - - - -	29

TABLE OF CONTENTS (Continued)

	<u>Page</u>
IV. SUMMARY AND CONCLUSIONS - - - - -	32
REFERENCES - - - - -	35
Appendix A: AVAILABLE DATA - - - - -	36
A.1 Characteristics of the Available Data - - - - -	36
A.2 Possible Deficiencies in the Data - - - - -	37
Appendix B: ADJUSTMENT OF THE DATA FOR "RURAL"- VILLAGE-TO-PROVINCE-CENTER MIGRATION - - - - -	42
Appendix C: BIVARIATE SPATIAL STATISTICS - - - - -	45
Appendix D: RAW DATA - - - - -	48

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1 Univariate descriptive statistics for destination- and origin-oriented variables - - - - -	7
2 Destination-oriented variables for three metropolises - - - - -	8
3 Bivariate spatial statistics for destination- and origin-oriented variables - - - - -	12
4 Origin-oriented variables for three metropolises - - - - -	17
5 Location of bivariate spatial statistics for destination- and origin-oriented variables - - - - -	28
6 Correlation coefficients between variables - - - - -	30
A.1 Adjustments of enumerated population of the three metropolises in 1965 - - - - -	39
A.2 Enumerated versus permanent resident population of province centers - - - - -	40
A.3 Enumerated versus permanent resident population of villages - - - - -	41
B.1 Province centers with enumerated population of less than 10,000 in 1965 or in 1970 - - - - -	42
B.2 Provinces with villages with enumerated population of more than 10,000 - - - - -	43
D.1 Permanent resident population of province centers, number of in-migrants, and the in-migration rates - - - - -	49
D.2 Out-migrants from villages to province centers - - - - -	50

LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
1	Histogram for the permanent resident population of province centers in 1965 - - - - -	5
2	Histogram for the total number of in-migrants to province centers (from villages) between 1965-70 - - -	6
3	Histogram for the in-migration rates of province centers - - - - -	6
4	Map for permanent resident population of province centers in 1965 - - - - -	9
5	Map for in-migration rates of province centers - - - - -	9
6	Bivariate spatial statistics for permanent resident population of province centers in 1965 - - - -	13
7	Bivariate spatial statistics for total number of in-migrants to province centers (from villages) between 1965-70 - - - - -	13
8	Histogram for permanent resident population of villages in 1965, aggregated for each province - - -	15
9	Histogram for the total number of out-migrants from villages (to province centers) between 1965-70, aggregated for each province - - - - -	16
10	Histogram for out-migration rates of villages, aggregated for each province - - - - -	16
11	Map for permanent resident population of villages in 1965, aggregated for each province - - - - -	18
12	Map for total number of out-migrants from villages (to province centers) between 1965-70, aggregated for each province - - - - -	19
13	Map for out-migration rates of villages, aggregated for each province - - - - -	19
14	Bivariate spatial statistics for permanent resident population of villages in 1965, aggregated for each province - - - - -	22
15	Bivariate spatial statistics for total number of out-migrants from villages (to province center) between 1965-70, aggregated for each province - - - - -	22

LIST OF FIGURES (Continued)

<u>Figure</u>		<u>Page</u>
16	Permanent resident population of province centers in 1965 versus total number of in-migrants to province centers - - - - -	31
17	Permanent resident population of villages in 1965 versus total number of out-migrants from villages - - -	31

LIST OF LISTS

<u>List</u>		<u>Page</u>
1	Sizes of migration flows between 1965-70 - - - - -	3
2	Province centers which fall above 75th percentile in terms of destination-oriented variables, i.e., permanent resident population of province centers in 1965, number of in-migrants, and the in-migration rates - - - - -	10
3	Province centers which fall below 25th percentile in terms of the destination-oriented variables, i.e., permanent resident population of the province centers in 1965, number of in-migrants, and the in-migration rates - - - - -	10
4	Provinces which fall above 75th percentile in terms of origin-oriented variables: i.e., permanent resident population of villages in 1965, number of out-migrants, and the out-migration rates - - - - -	20
5	Provinces which fall below 25th percentile in terms of origin-oriented variables: i.e., permanent resident population of villages in 1965, number of out-migrants, and the out-migration rates - - - - -	20

I. INTRODUCTION*

The purpose of this paper is to carry out descriptive spatial and aspatial analyses of the village-to-province-center migration in Turkey between 1965-70. Village-to-province-center migration is studied in its aggregate measure, where migration flows are aggregated for each province, that is in terms of: total number of immigrants to each province center; total number of out-migrants from villages (aggregated for each province); and respective migration rates.

Descriptive analyses are carried out in three subsections: (1) destination-oriented variables; (2) origin-oriented variables; and (3) synthesis-- destination oriented versus origin-oriented variables. In the first two subsections, destination- and origin-oriented variables are analyzed in detail. In the third subsection, findings about destination-oriented and origin-oriented variables are summarized, compared, and synthesized; and correlation analysis is carried out between destination- versus origin-oriented variables.

The source of the data, for this study, is the one hundred percent population census of Turkey of 1970. Migration is defined as change of permanent residence between 1965 and 1970 Census Days. Migration data are based on the answers to the questions in the census to the effect such as "where is your permanent residence now, and where was your permanent residence in the 1965 Census Day?" Thus migration data are in terms of change of permanent residence between 1965 and 1970 Census Days among the three different settlement types, aggregated for each sixty-seven provinces. The different settlement types are: city area of the province centers; city area of the district centers; and the village area. Since in each province there is more than one village, and because the data are aggregated for each province, the available data about village-to-province-center migration is not in terms of individual villages but as villages aggregated for each province.

If the migration data were in terms of individual villages, the findings could be directly related to urban versus rural dichotomy, where urban is defined in Turkey as those settlements with 10,000 or more population. However, except only for seven percent of the total village population, all the villages could be considered as rural; and furthermore, all the province centers could be classified as urban. In Appendix B, the data are adjusted

so that it represents the "rural villages." The analyses are carried out for both data sets, i.e., where all villages are considered regardless of whether they are rural or urban, and where the data are adjusted for rural villages. The differences in the results of the analyses between these two data sets are indicated.

II. SIGNIFICANCE OF THE STUDY

The total permanent resident population in 1965-70 is a little over thirty million. Approximately sixty percent of this permanent resident population lived in villages, and forty percent in city areas (i.e., province centers and district centers). Between 1965 and 1970 Census Days, 13.13 percent of the population, that is about four million people migrated¹ (see Table A.2). Between 1965-70, only the province centers had a net in-migration, with a mean net in-migration rate of 7.19 percent. Approximately sixty percent of this transfer of population is from villages. The study of the migration flows indicates clearly that the largest transfer of population between "settlement types" was from villages to province centers, either directly or via district centers [Gedik, 1978].

Among the possible nine migration flows between three settlement types—village-to-village, village-to-province-center, and province-center-to-province-center—are the three largest (see List 1). Village-to-province-center migration is the second largest flow (680,025) and it comprises 17 percent of the total migration. Quantitatively, the above stated three largest flows are not very different from each other. How-

¹ The four million migrants exclude step migration, return migration, and the intra-provincial village-to-village and district-center-to-district-center migration. For more detailed analyses of the sizes of the migration flows in Turkey between 1965-70, see Gedik, 1978.

ever, qualitatively, they represent different socio-economic processes. Village-to-village migration does not indicate significant changes in the socio-economic characteristics of the population: it is an exchange of population between villages. Province-center-to-province-center migration represents partly the migration of an already urbanized population, and it is partly an extension of village-to-province-center migration. However, village-to-province-center migration represents the beginning, however slow, of the urbanization of the rural population through residence in the province center, and has very significant consequences [Gedik, 1977, pp. 1-13].

LIST 1. Sizes of Migration Flows Between 1965-70

Migration Flow		Number Of Migrants	Percentage of Total Number Of Migrants (%)
From	To	(In Thousands)	
Village	Village ¹	720	18
Village	Province Center	680	17
Province Center	Province Center	605	15
District Center	Province Center	450	11
Village	District Center	416	10
Province Center	Village	374	9
Province Center	District Center	282	7
District Center	Village	247	6
District Center	District Center ²	232	6
City	City ³	1,569	39
Village	City	1,069	27
Village	Village	720	18
City	Village	621	15
TOTAL		4,006	100

- Note: 1 Excludes intra-provincial village-to-village migration due to limitations of the data
 2 Excludes intra-provincial district center-to-district center migration due to the limitations of the data
 3 Province center and district center together are considered as city area

III. DESCRIPTIVE ANALYSES

In this section, descriptive analyses are carried out in three sub-sections: (1) destination-oriented variables, (2) origin-oriented variables, and (3) synthesis-- destination- versus origin-oriented variables. In the first two subsections, variables are analyzed in detail. In the third subsection, findings about destination- and origin-oriented variables are summarized, compared, and synthesized; and correlation analysis is carried out between destination-versus origin-oriented variables.

Under the above stated three subsections, descriptive aspatial and spatial analyses are carried out for each of these variables in four steps: a) univariate aspatial statistics, b) spatial analyses--mapping of the variables--, c) bivariate spatial statistics, and d) bivariate aspatial statistics--correlation. In the first three subsections, the variables are studied individually; whereas, in the fourth subsection, possible associations between the pairs of variables are explored by computing the zero-order correlation coefficients.

Henceforward, when the words like in-migration, out-migration and migration rates are used, it should always be understood that it refers to village-to-province-center migration.

III.1. Destination-Oriented Variables

For the destination-oriented descriptive study, three variables are considered: permanent resident population of province center in 1965, p_j ; the total number of in-migrants to each province center from villages, between 1965-70, $m_{.j}$; and the in-migration rates, $m_{.j}/p_j$.

III.1.a. Univariate Aspatial Statistics

The population of the province centers (p_j) ranges from approximately 10,000 to 1.5 million with a mean of 100,000, and a median of 45,000. The number of in-migrants ($m_{.j}$) ranges from approximately 700 to 160,000 with a mean of about 10,000, and a median of 4,000. Both variables are highly skewed towards lower values; both have very high values of coefficient of variation and kurtosis (see Table 1, and Figures 1 and 2). When

only "rural" villages are considered, the major changes are (1) maximum number of in-migrants decreases from about 160,000 to about 120,000; and (2) consequently, for the number of in-migrants, the degree of skewness, coefficient of variation, and kurtosis decrease (see Table 1).

The in-migration rates, m_j/p_j , range from 3 percent to 19 percent with a mean of about 10 percent. The shape of its distribution closely approximates normality (see Figure 3).

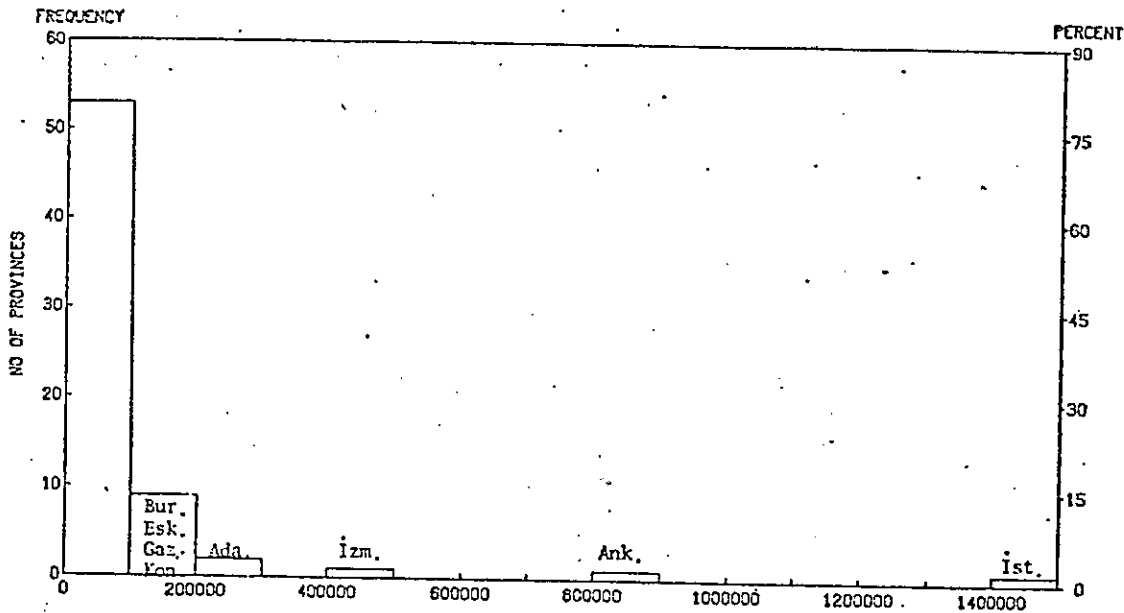


FIGURE 1. Histogram for the permanent resident population of province centers in 1965.

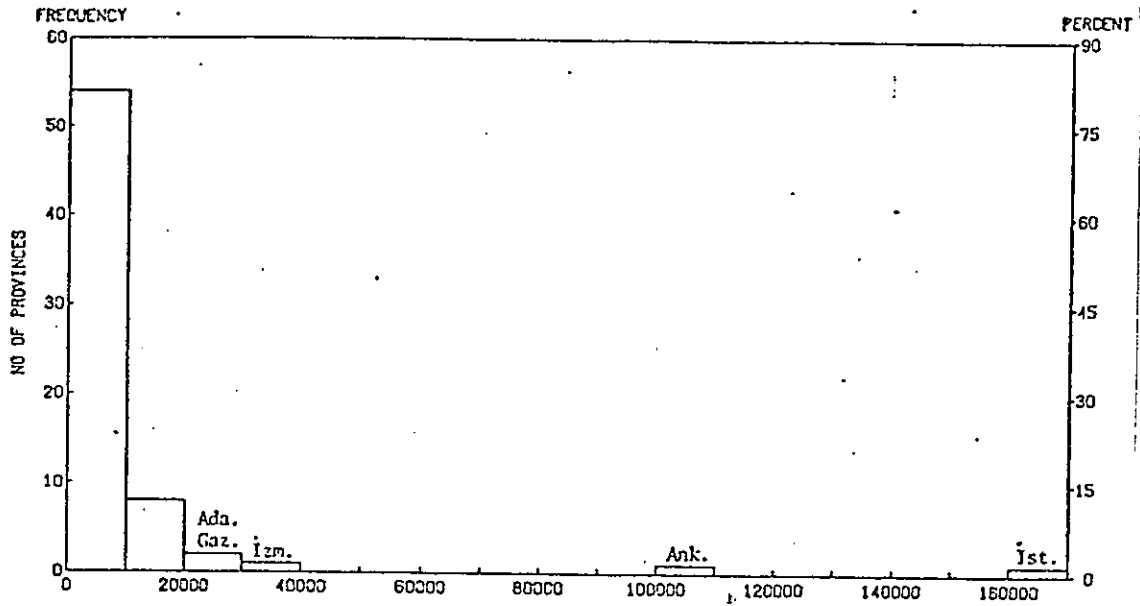


FIGURE 2. Histogram for the total number of in-migrants to province centers (from villages) between 1965-70

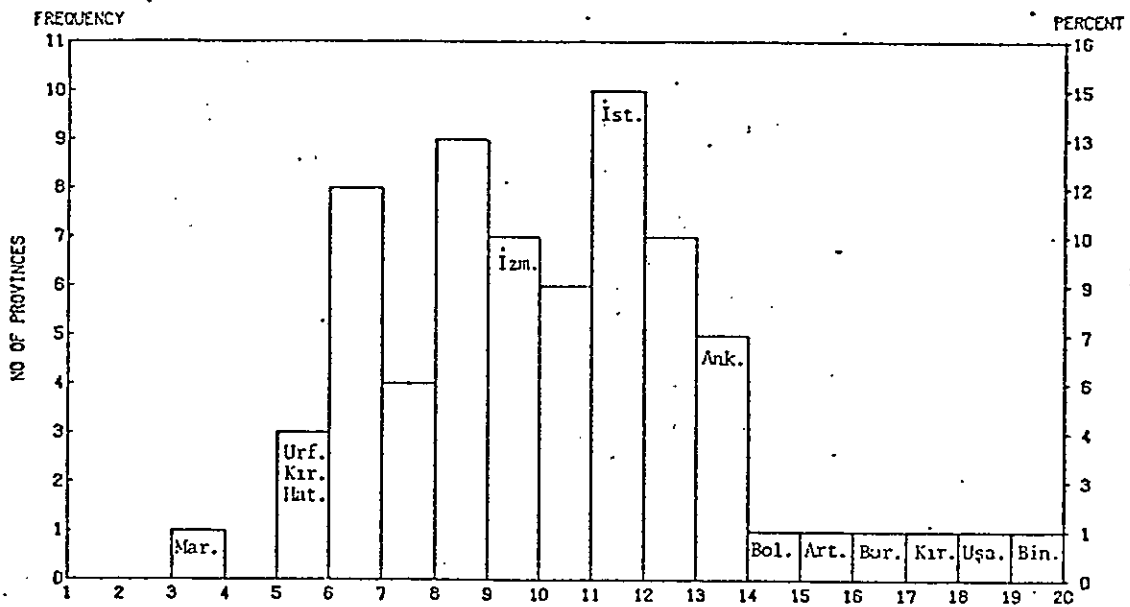


FIGURE 3. Histogram for the in-migration rates of province centers

TABLE 1. Univariate descriptive statistics for destination- and origin-oriented variables

	Minimum	Maximum	Range	Mode	Median	Mean	Standard Deviation	Coefficient of Variation	Skewness	Kurtosis
Destination-oriented variables										
Permanent res. population of Province centers	11,579	1,493,916	1,482,337	11,579	45,206	99,820	206,226	207	5.4	31.4
Number of in-migrants	738 (698)	163,625 (122,473)	163,625 (121,775)	738 (698)	4,177 (4,157)	10,150 (9,373)	23,686 (19,589)	233 (209)	5.32 (4.8)	29.3 (23.7)
In-migration rate	2.84 (2.82)	18.77 (18.72)	15.93 (15.90)	2.84 (6.26)	10.23 (9.96)	9.85 (9.70)	3.3 (3.3)	33 (34)	0.436 (0.479)	0.10 (0.19)
In-migration rate (weighted)				11 (8)	10.99 (8.26)	10.17 (9.50)	2.66 (2.58)	26.19 (27.10)	-0.5 (0.5)	1.15 (0.11)
Origin-oriented variables										
Permanent res. population of villages	72,054	685,138	613,084	72,054	282,396 (272,165)	283,899 (275,525)	132,626 (123,190)	46.7 (44.7)	0.746 (0.769)	0.065 (0.462)
Number of out-migration	829	70,159 (53,337)	69,330 (52,508)	829	7,054	10,150 (9,372)	10,765 (7,881)	106 (84)	3.79 (3.14)	16.52 (13.30)
Out-migration rate	1.07	12.29	11.22	2.9	2.89	3.4	2	58.97	2.16	5.92
Out-migration rate (weighted)				2.9	2.89	3.57	2.37	66.26	2.15	4.65

NOTE: The values which are in parentheses correspond to data which is adjusted for "rural"-village-to-province-center migration.

III.1.b. Spatial Analyses—Mapping of the Variables¹

The three metropolises which are in the western half of the country have much larger populations and number of in-migrants relative to other province centers (see Figure 4). Approximately 45 percent of all the village-to-province-center migration is directed to the three metropolises: when the data are adjusted for "rural"-village-to-province-center migration, Istanbul has the largest decrease in the number of in-migrants. However, the three metropolises have only medium in-migration rates (see Figure 5 and Table 2).

TABLE 2. Destination-oriented variables for three metropolises

Metropolises	Permanent resident population in 1965 (in thousands)		Number of in-migrants between 1965-70 (in thousands)		In-migration rates
Istanbul	1,494	(5%)	164 [122]	(24%) (18%)	11% [8%]
Ankara	815	(3%)	109 [107]	(16%) (16%)	13% [13%]
Izmir	408	(1%)	35 [30]	(5%) (4%)	9% [7%]
Total	2,717	(9%)	308 [259]	(45%) (38%)	
Total for Turkey	30,111	(100%)	680	(100%)	
Mean for Turkey	100		10		10%
Median for Turkey	45		4		10%

NOTES: *Values in brackets refer to data which is adjusted for "rural"-village-to-province-center migration

¹ Since the maps for permanent resident population of the province centers and the number of in-migrants to the province centers are very similar to each other, the map for the number of in-migrants is omitted.

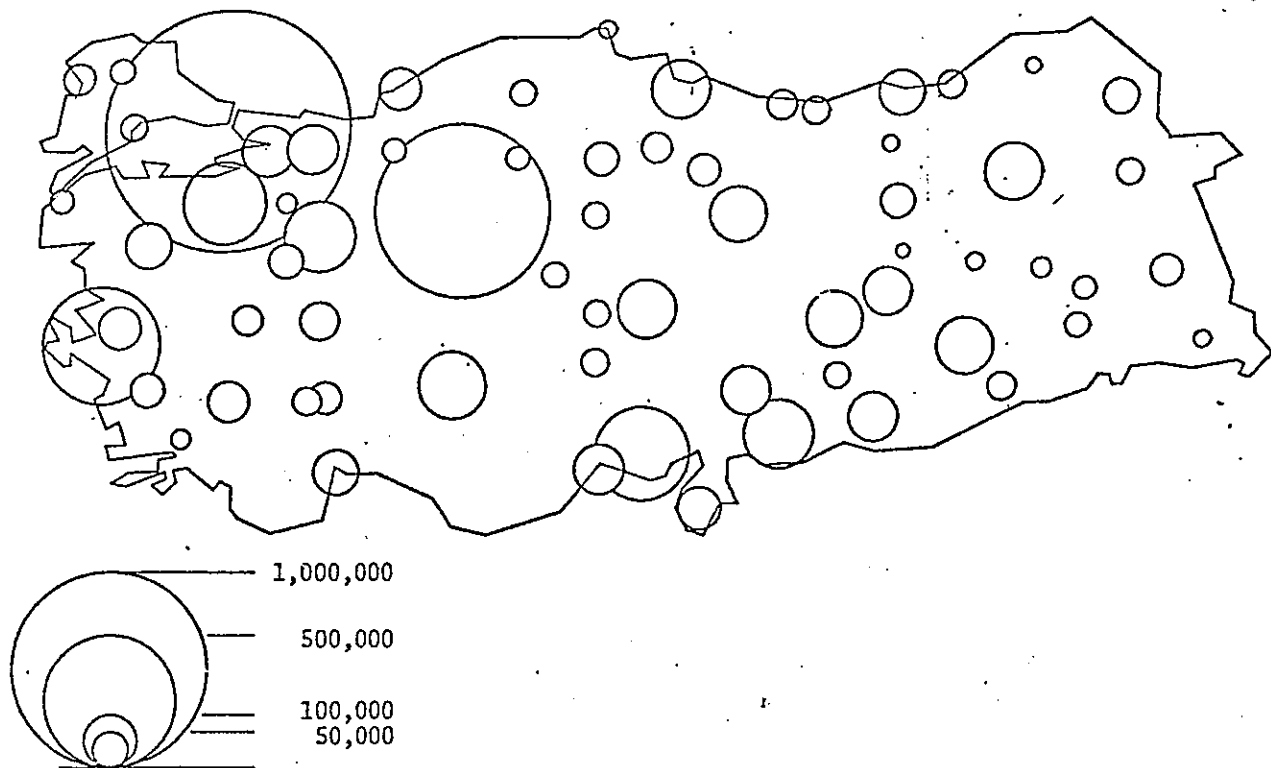


FIGURE 4. Map for permanent resident population of province centers in 1965

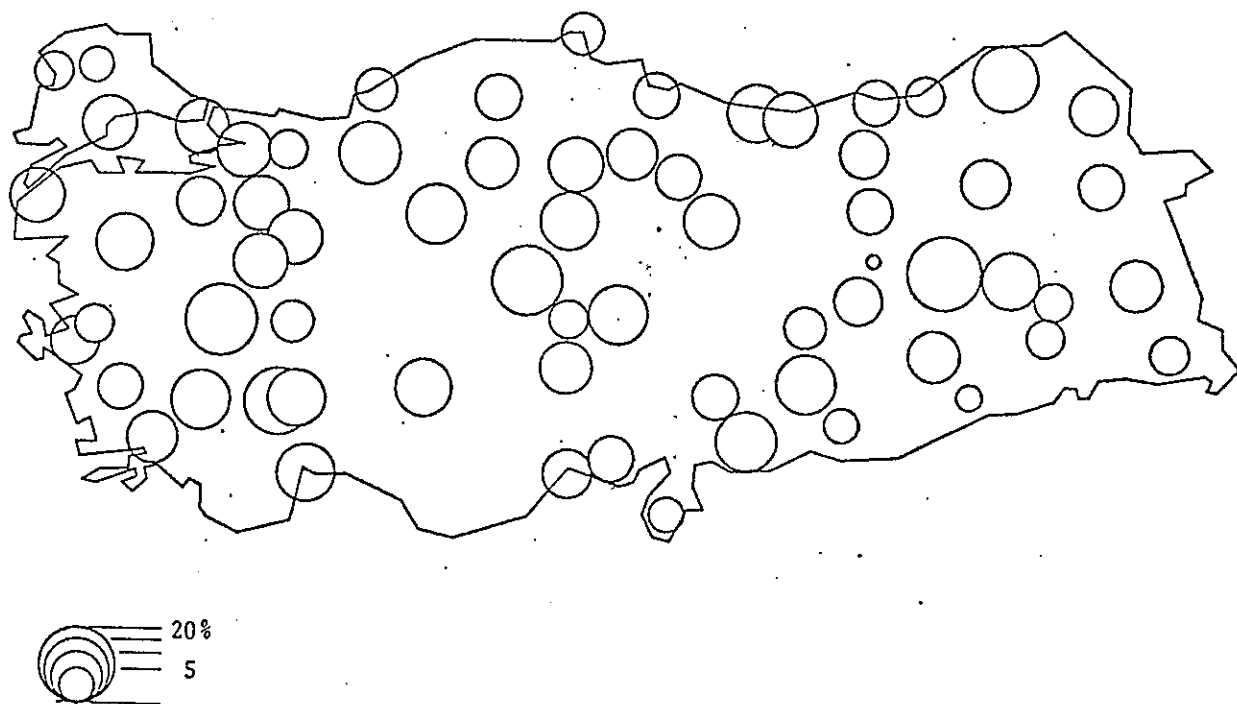


FIGURE 5. Map for in-migration rates of province centers

LIST 2. Province centers which fall above 75th percentile in terms of destination-oriented variables, i.e., permanent resident population of the province centers in 1965, number of in-migrants, and the in-migration rates

	Name of the prov. center	Region*	Population	Name of the prov. center	Region	Number of in-migrants	Name of the prov. center	Region	In-migration rates (%)
1.	Istanbul	W	1,493,916	Istanbul	W	164,363 (122,473)**	Bingöl	E	18.77
2.	Ankara	C	815,042	Ankara	C	108,881 (107,412)	Usak	W	17.81
3.	Izmir	W	407,642	Izmir	W	35,041 (30,485)	Kirsehir	C	17.43
4.	Adana	S	276,364	Adana	S	23,387 (22,820)	Burdur	W	16.00
5.	Bursa	W	219,818	Gaziantep	SE	20,588	Artvin	NE	15.10
6.	Eskisehir	W	165,306	Bursa	W	18,717	Bolu	W	13.57
7.	Gaziantep	SE	161,514	Eskisehir	W	17,943	Ankara	C	13.36
8.	Konya	C	152,518	Konya	C	17,768	Denizli	W	13.23
9.	Kayseri	C	120,106	Kayseri	C	15,745	Kayseri	C	13.11
10.	Samsun	BS	118,843	Sivas	e-C	11,752	Adiyaman	SE	12.90
11.	Erzurum	E	114,694	Diyarbakir	SE	11,571	Gaziantep	SE	12.75
12.	Diyarbakir	SE	113,116	Kocaeli	W	10,864	Mus	E	12.26
13.	Malatya	SE	110,261	Erzurum	E	10,277	Balikesir	W	12.08
14.	Sivas	e-C	107,814	Samsun	BS	9,810	Ordu	BS	11.88
15.	Kocaeli	W	97,540	Balikesir	W	9,637	Isparta	W	11.70
16.	Sakarya	W	90,896	Antalya	W	8,633	Konya	C	11.65
17.	Icel	S	90,766	Denizli	W	8,409	Antalya	W	11.51

NOTES: * W: west; E: east; C: central; S: south; SE: southeast; BS: Black Sea; NE: northeast; T: Thrace which is north-western corner of the country

** The value in the parentheses refer to the data which is adjusted for "rural"-village-to-province-center migration. Only those values which are different than the values for village-to-province-center migration for more than 1,000 for absolute numbers, and 1 percent for rates are listed.

LIST 3. Province centers which fall below 25th percentile in terms of the destination-oriented variables, i.e., permanent resident population of the province centers in 1965, number of in-migrants, and the in-migration rates

	Name of prov. center	Region*	Population	Name of prov. center	Region	Number of in-migrants	Name of prov. center	Region	In-migration rates (%)
1.	Artvin	NE	11,579	Hakkari	SE	738	Mardin	SE	2.84
2.	Gumushane	NE	12,661	Mardin	SE	927	Kirklareli	T	4.62
3.	Hakkari	SE	12,995	Sinop	BS	1,066	Hatay	SE	4.67
4.	Bingöl	E	14,285	Gumushane	NE	1,115	Urfa	SE	4.99
5.	Sinop	BS	14,940	Tunceli	E	1,135	Edirne	T	5.66
6.	Bilecik	W	16,996	Kirklareli	T	1,231	Hakkari	SE	5.68
7.	Mugla	W	17,824	Bitlis	SE	1,449	Rize	BS	5.89
8.	Mus	E	18,249	Siirt	SE	1,594	Manisa	W	5.90
9.	Bitlis	SE	22,896	Artvin	NE	1,749	Nevsehir	C	6.18
10.	Cankiri	C	23,422	Nevsehir	C	1,790	Sakarya	W	6.26
11.	Canakkale	W	24,201	Bilecik	W	1,837	Siirt	SE	6.29
12.	Bolu	W	25,001	Mugla	W	1,869	Bitlis	SE	6.33
13.	Siirt	SE	25,338	Rize	BS	1,871	Afyon	W	6.63
14.	Kirklareli	T	26,638	Mus	E	2,238	Zonguldak	BS	6.71
15.	Kirsehir	C	26,970	Agri	E	2,242	Sinop	BS	7.14
16.	Adiyaman	SE	27,620	Edirne	T	2,311	Malatya	E	7.18
17.	Nevsehir	C	28,983	Kastamonu	C	2,344	Adana	S	8.46

NOTE: * W: west; E: east; C: central; S: south; SE: southeast; BS: Black Sea; NE: northeast; T: Thrace which is north-western corner of the country

After the three metropolists, the province centers which have the largest permanent resident population, and the largest number of in-migrants are firstly located rather in the western half of the country, i.e., in South, West, and Southeast Turkey (Adana, Bursa, Eskisehir, and Gaziantap); and in Central Turkey (Konya and Kayseri) (see List 2 and Figure 4). Largest in-migration rates are mostly found for small province centers in various regions (i.e., in West Turkey: Usak, Burdur, and Bolu; and in East, Central, and Northeast Turkey: Bingol, Kirsehir, and Artvin) (see List 2, and Figure 5).

The province centers with smallest permanent resident population and the number of in-migrants are mostly in East Turkey (i.e., in Northeast and Southeast Turkey, such as Gumushane and Hakkari) (see List 3, and Figure 4). Lowest in-migration rates are mostly found in the two opposite ends of the country (i.e., in Southeast and Northwest Turkey, such as, Mardin, Hatay, Urfa, Hakkari, Kirklareli, and Edirne) (see List 3, and Figure 5).

III.1.c. Bivariate Spatial Statistics¹

For the destination-oriented variables (1) relative dispersion ranges between 0.82 and 0.86, which indicates that there is neither strong centrality nor strong peripherality, but slight centrality; (2) skewness is about 0.60, which indicates that the degree of directional bias is medium, but slightly linear; and (3) the correlation coefficients between x and y coordinate values are very low—about -0.23—(see Table 3 and Figures 6 and 7).

For the province center population and the number of in-migrants, the bivariate unweighted mean is in Central Turkey, near Yozgat (east of Ankara); likewise, the bivariate weighted mean and the bivariate median are also in Central Turkey, near Ankara. Thus, the bivariate

¹ In order to compute the bivariate spatial statistics, the Bivariate Median program (BVMN) is used which is explained in Appendix C.

weighted and unweighted means, and the bivariate median are all located in Central Turkey, and are not far from each other, which indicates that the distribution is not lopsided in its density and spacing. Consequently, the measure of eccentricity is low: it is 0.41 for the population of province centers, and 0.41 for the number of in-migrants.

However, even though bivariate mean and median are located in Central Turkey, the point of maximum potential is in Northwest Turkey, at Istanbul.

Both for the permanent resident population of the province centers and the number of in-migrants, the principal axis is in southeast-northwest direction, tilted towards Istanbul.

TABLE 3. Bivariate spatial statistics for destination- and origin-oriented variables

		Standard deviational ellipse		Standard distance (from weighted bivariate mean)			Relative dispersion (centrality/peripherality)	Skewness (circularity/linearity)	Correlation between x and y	Harmonic mean distance	Measure of eccentricity
		Min. stand dev. (minor radius)	Max. stand dev. (major radius)	S _d	S _x	S _y					
Destination	Province center population	92.8	229.3	247	228	96	0.86	0.595	-0.23	91	0.41
	No. of in-migrants	88.9 * 89.7)	217.4 (218.3)	235 (236)	216 (217)	92 (92)	0.82 (0.82)	0.591 (0.589)	-0.23 (-0.19)	86 (98)	0.44 (0.39)
Origin	Village population	101.7 (101.5)	250.6 (249.1)	270 (269)	250 (249)	103 (103)	0.94 (0.93)	0.594 (0.593)	0.13 (0.15)	202 (201)	0.09 (0.08)
	No. of out-migrants	94.0 (94.1)	231.5 (227.7)	250 (246)	232 (228)	94 (94)	0.87 (0.86)	0.594 (0.587)	-0.03 0.04	142 142	0.17 (0.09)

NOTE: The numbers in parentheses refer to data which is adjusted for "rural"-village-to-province center migration

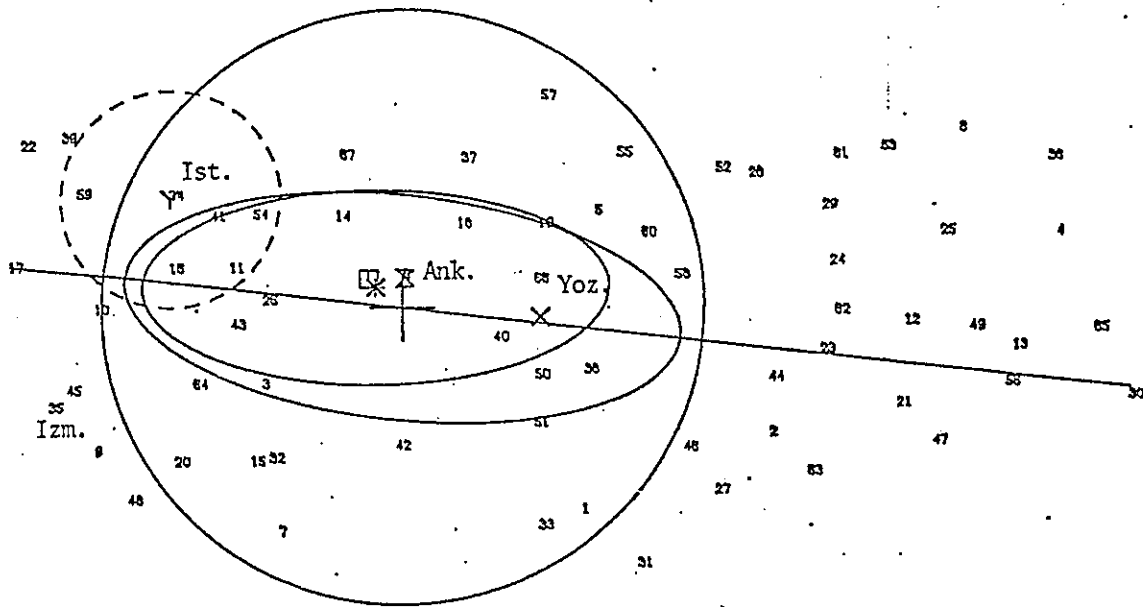


FIGURE 6. Bivariate spatial statistics for permanent resident population of province centers in 1965 (for legend see Appendix C)

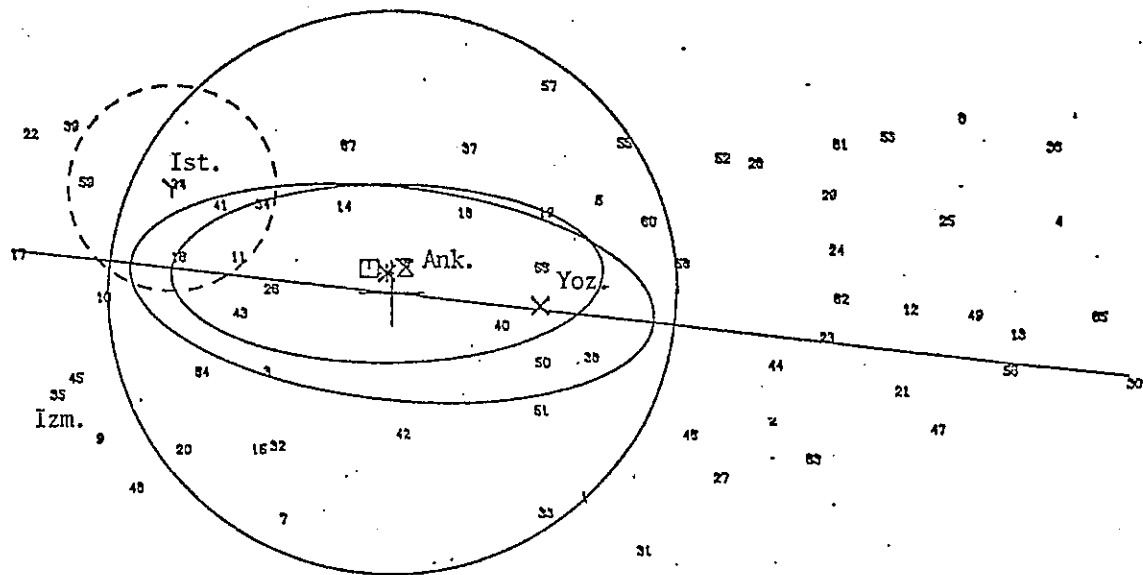


FIGURE 7. Bivariate spatial statistics for total number of in-migrants to province centers (from villages) between 1965-1970 (for legend, see Appendix C)

III.1.d. Bivariate Aspatial Statistics—Correlation

Among the three destination-oriented variables, the permanent resident population of the province centers, p_j , and the number of in-migrants to province centers, $m_{.j}$, are very highly associated with each other; the correlation coefficients range between 0.89 and 0.99. In-migration rates, $m_{.j}/p_j$, are not associated with any of the two variables. These findings indicate that the province centers are attracting village migrants in proportion to their population.

Correlation Coefficients

	<u>All provinces</u>	<u>Excludes three metropolises</u>
p_j and $m_{.j}$	0.99	0.94
$\log(p_j)$ and $\log(m_{.j})$	0.94	0.89
p_j and $m_{.j}/p_j$	-0.06	-0.08
$\log(p_j)$ and $m_{.j}/p_j$	-0.06	-0.15

III.2. Origin-oriented Variables

For the origin-oriented descriptive study, three variables are considered: the permanent resident population of the villages (aggregated for each province) in 1965, p_i ; the total number of out-migrants from villages (aggregated for each province) to province centers between 1965-70, $m_{i.}$; and the out-migration rates, $m_{i.}/p_i$.

III.2.a. Univariate Aspatial Statistics

Village population (aggregated for each province), p_i , ranges from approximately 70,000 to 700,000 with a mean of approximately 300,000. The number of out-migrants, $m_{i.}$, ranges from 800 to 70,000 with a mean of 7,000. Out-migration rates, $m_{i.}/p_i$, range from 1 percent to 12 percent

with a mean of 3.5 percent. All three variables are skewed towards lower values. Coefficient of variation, skewness, and kurtosis has the highest values for the number of out-migrants, medium values for out-migration rates, and has the lowest values for the permanent resident population of villages (see Table 1, and Figure 8, 9 and 10).

When only the "rural" villages are considered the major changes are (1) the maximum number of out-migrants decrease from about 70,000 to about 50,000; and (2) consequently the degree of skewness, coefficient of variation, and kurtosis, for the number of out-migrants, decrease (see Table 1).

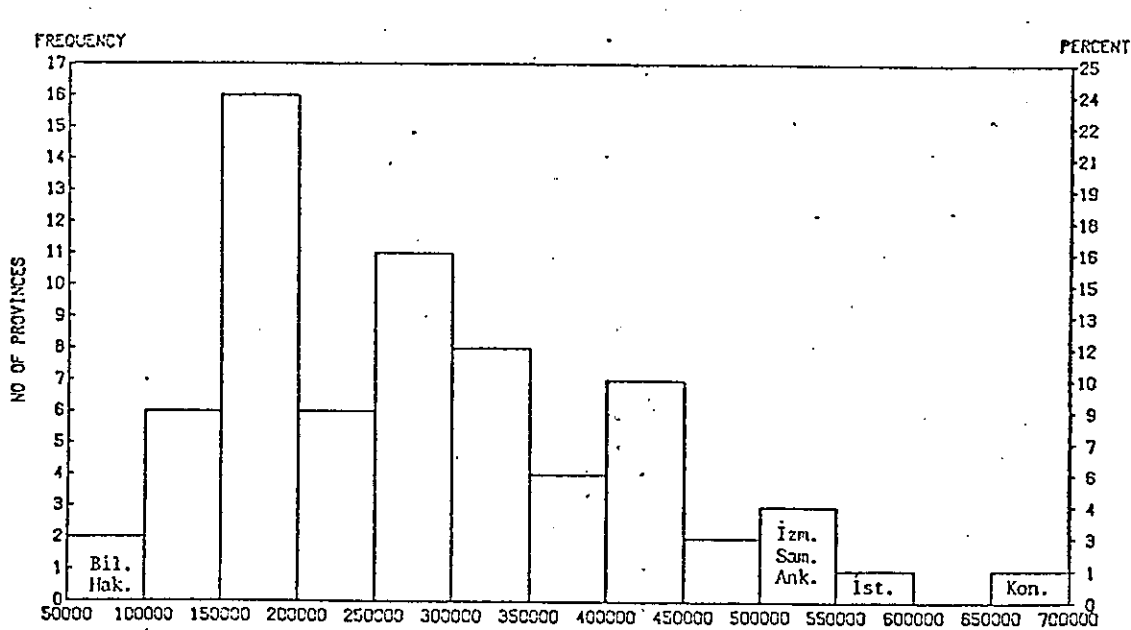


FIGURE 8. Histogram for permanent resident population of villages in 1965, aggregated for each province

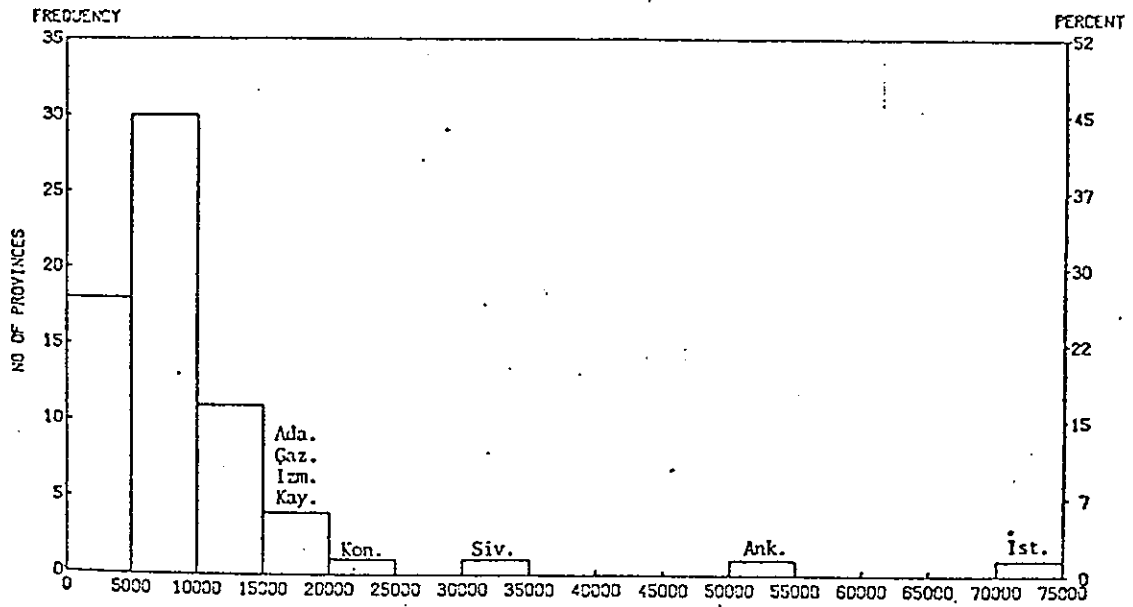


FIGURE 9. Histogram for the total number of out-migrants from villages (to province centers) between 1965-70, aggregated for each province

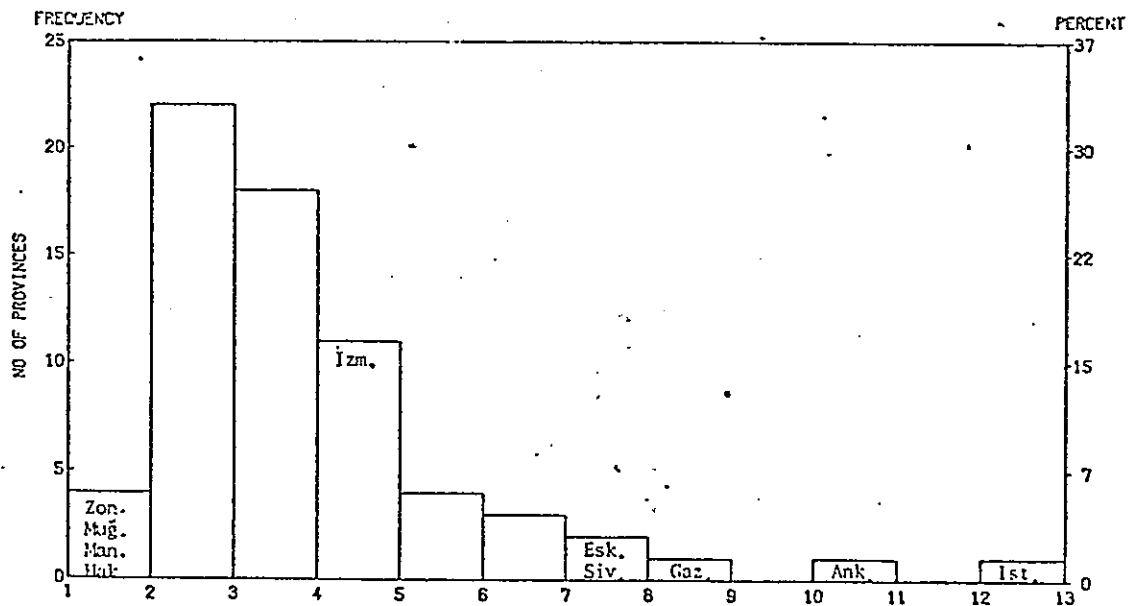


FIGURE 10. Histogram for out-migration rates of villages, aggregated for each province

III.2.b. Spatial Analyses—Mapping of the Variables

The provinces of the three metropolises which are in the western half of the country, after the province of Konya, have the largest permanent resident population of villages. However, when the data are adjusted for "rural"-village-to-province-center migration, the village population of Izmir and Istanbul decrease drastically: (see Table B.2). The two metropolises of Istanbul and Ankara have the largest number of out-migrants and the largest out-migration rates (see Figures 11, 12, and 13 and Table 4, and List 4).

TABLE 4. Origin-oriented variables for three metropolises

Metropolises	Permanent resident population in 1965 (in thousands)		Number of out-migrants between 1965-70 (in thousands)		Out-migration rates
Istanbul	571	(3%)	70	(10%)	12 %
	[224]*		[26]		
Ankara	532	(3%)	54	(8%)	10 %
	[524]		[53]		
Izmir	548	(3%)	20	(3%)	4 %
	[409]		[15]		
Total	1,651	(9%)	144	(21%)	
Total for Turkey	18,984	(100%)	680	(100%)	
Mean for Turkey	284		10		3.5%
	[275]		[9]		
Median for Turkey	282		7		3.0%
	[272]				

NOTES: * Values in brackets refer to data which is adjusted for "rural"-village-to-province-center migration.

Among the nonmetropolitan province centers, the largest number of out-migrants are from provinces with large province centers in the western half of the country (i.e., in Central Turkey: such as, Konya, Sivas, and Kayseri; and in South-Southeast Turkey: such as, Adana and Gaziantep) (see List 4, and Figure 12). The lowest number of out-migrants are from provinces with small province center in the eastern half of the country (i.e., in Southeast and East Turkey: such as, Bitlis, Mus, Agri, Tunceli, Artvin, Bingol, Siirt, Van)(see List 5, and Figure 12).

Highest out-migration rates are mostly in the provinces with large province centers in the western half of the country (i.e., in Southeast, West, and Central Turkey: such as, Gaziantep, Eskisehir, Sivas, and Kayseri) (see List 4, and Figure 13). Lowest out-migration rates are mostly in provinces with small province centers in West Turkey (in provinces with fertile good agricultural land, such as, Manisa, Mugla, and Aydin), and in Southeast Turkey (in provinces with ethnic minority groups, such as, Hakkari, Mardin, and Bitlis) (see List 5, and Figure 13).

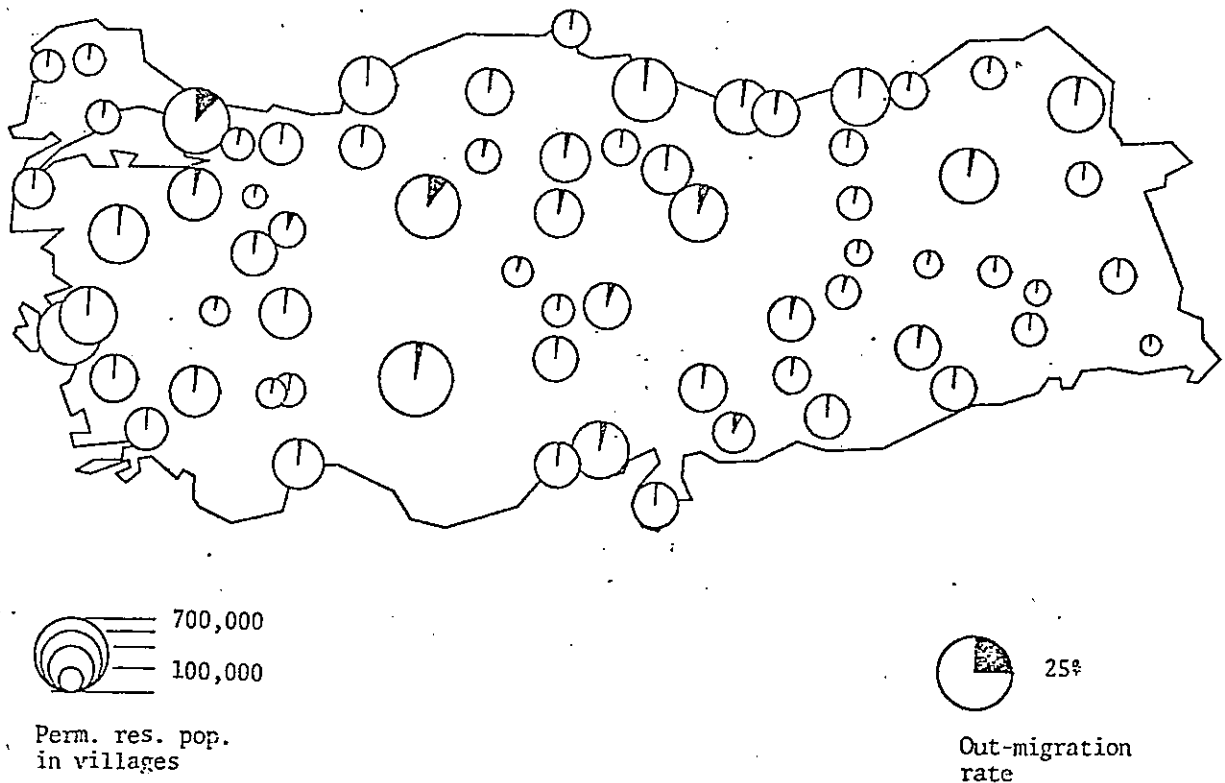
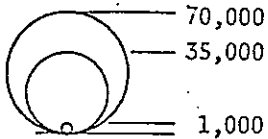
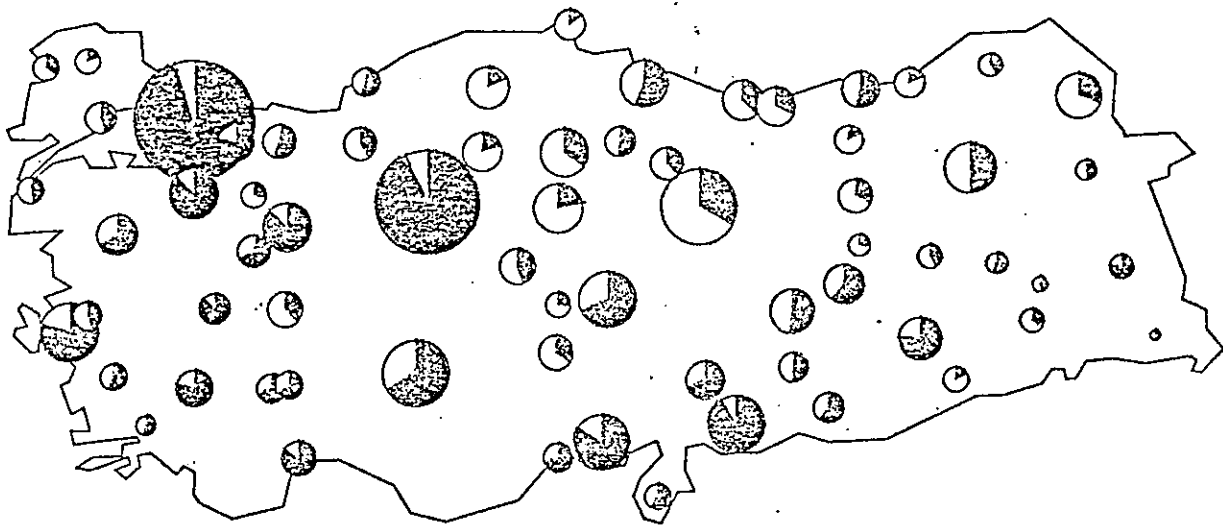


FIGURE 11. Map for permanent resident population of villages in 1965, aggregated for each province



No. of out-migrants



Percent. of migration within the province

FIGURE 12. Map for total number of out-migrants from villages (to province centers) between 1965-70, aggregated for each province

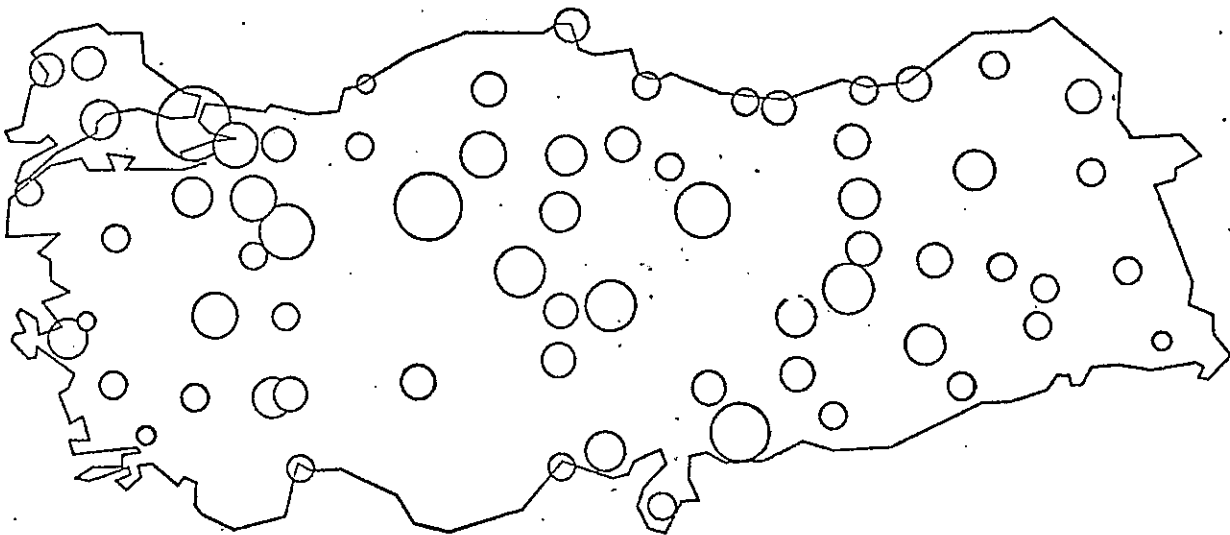


FIGURE 13. Map for out-migration rates of villages, aggregated for each province

LIST 4. Provinces which fall above 75th percentile in terms of origin-oriented variables:
i.e., permanent resident population of villages in 1965,
number of out-migrants, and the out-migration rates

...	Name of province	Reg.*	Population	Name of province	Reg.	Number of out-migrants	Name of province	Reg.	Out-migration rates (%)
1.	Konya	C	685,138	Istanbul	W	70,159 (26,422)**	Istanbul	W	12.29
2.	Istanbul	W	570,776 (224,315)	Ankara	C	54,326 (53,337)	Ankara	C	10.21
3.	Izmir	W	548,433 (409,131)	Sivas	e-C	30,494	Gaziantep	SE	7.69
4.	Ankara	C	532,022 (524,467)	Konya	C	23,968	Eskisehir	W	7.44
5.	Balikesir	W	465,441	Izmir	W	19,991 (14,683)	Sivas	e-C	6.78
6.	Trabzon	BS	455,993	Gaziantep	SE	18,637	Kayseri	C	6.08
7.	Sivas	e-C	449,783	Kayseri	C	18,430 (17,850)	Kirsehir	C	5.71
8.	Manisa	W	447,579 (439,881)	Adana	S	17,955	Elazig	E	5.52
9.	Zonguldak	BS	445,852 (403,541)	Erzurum	E	14,990	Cankiri	C	5.14
10.	Adana	S	441,488 (431,157)	Eskisehir	W	14,525	Kocaeli	W	4.91
11.	Kars	E	427,442	Bursa	W	14,372	Usak	W	4.83
12.	Erzurum	E	422,120	Yozgat	C	14,271	Bilecik	W	4.51
13.	Ordu	BS	417,668	Corum	C	13,794	Burdur	W	4.15
14.	Bursa	W	387,795	Samsun	BS	13,281	Adana	S	4.07
15.	Afyon	W	359,188	Kars	E	12,417	Diyarbakir	SE	3.95
16.	Antalya	W	354,809	Malatya	E	12,058	Corum	C	3.93
17.	Corum	C	351,153	Diyarbakir	SE	11,271	Bursa	W	3.71

NOTES: * W: west; E: east; C: central; S: south; SE: southeast; BS: Black Sea; NE: northeast; T: Thrace which is northwestern corner of the country.

** The value in the parenthesis refer to the data which is adjusted for 'rural'-village-to-province-center migration. Only those values which are different than the values for village-to-province-center migration for more than 1,000 for absolute numbers, and 1 percent for rates are listed.

LIST 5. Provinces which fall below 25th percentile in terms of origin-oriented variables
i.e., permanent resident population of villages in 1965,
number of out-migrants, and the out-migration rates

	Name of province	Reg.*	Population	Name of province	Reg.	Number of out-migrants	Name of province	Reg.	Out-migration rates (%)
1.	Hakkari	SE	72,054	Hakkari	SE	829	Mugla	W	1.07
2.	Bilecik	W	95,178	Bitlis	SE	1,794	Hakkari	SE	1.15
3.	Bitlis	SE	107,055	Mugla	W	2,764	Zonguldak	BS	1.20
4.	Tunceli	E	111,647	Mus	E	3,198	Manisa	W	1.21
5.	Bingol	E	120,461	Agri	E	3,201	Hatay	S	1.50
6.	Usak	W	133,808	Tunceli	E	3,346	Mardin	SE	1.52
7.	Burdur	W	140,221	Artvin	NE	3,662	Aydin	W	1.57
8.	Kirsehir	C	144,759	Siirt	SE	3,923	Bitlis	SE	1.68
9.	Kirklareli	T	153,556	Bingol	E	3,930	Trabzon	BS	1.89
10.	Mus	E	153,635	Van	SE	4,146	Icel	S	1.98
11.	Nevsehir	C	161,581	Mardin	SE	4,230	Tokat	C	1.98
12.	Edirne	T	166,664	Bilecik	W	4,294	Canakkale	W	2.01
13.	Artvin	NE	167,377	Nevsehir	C	4,395	Mus	E	2.08
14.	Isparta	W	167,891	Kirklareli	T	4,402	Urfa	SE	2.17
15.	Kocaeli	W	170,311	Hatay	SE	4,467	Van	SE	2.17
16.	Siirt	SE	170,583	Edirne	T	4,628	Antalya	W	2.19
17.	Tekirdag	T	175,925	Aydin	W	4,933	Artvin	NE	2.19

NOTES: * W: west; E: east; C: central; S: south; SE: southeast; BS: Black Sea; NE: northeast; T: Thrace which is northwestern corner of the country.

III.2.c. Bivariate Spatial Statistics

For the origin-oriented variables: (1) relative dispersion ranges between 0.87 and 0.94 which indicates that there is neither strong centrality nor peripherality, but slight centrality, (2) skewness is about 0.60 which indicates that the degree of directional bias is medium, but slightly linear, and (3) the correlation coefficients between x and y coordinate values are low, and range between -0.03 and 0.13 (see Table 3, and Figures 14 and 15).

For both the village population¹ and the number of out-migrants, the bivariate unweighted mean is in Central Turkey, near Yozgat, east of Ankara; likewise, the bivariate weighted mean and bivariate median are also in Central Turkey, located between Ankara and Yozgat. Thus, the bivariate median, bivariate weighted and unweighted means are all located in Central Turkey, and are not very far from each other which indicates that the distribution is not lopsided in its density and spacing. Consequently, the measure of eccentricity is low: it is 0.09 for the village population, and 0.17 for the number of out-migrants. For "rural"-village-to-province-center migration bivariate weighted mean moves eastward, near the location of unweighted bivariate mean; this is especially true for number of out-migrants; consequently, measure of eccentricity decreases from 0.17 to 0.09.

Above, we observed that for both the permanent resident population of the villages and the number of out-migrants from villages, bivariate mean and median were located in Central Turkey. However, while the point of maximum potential for village population is still in Central Turkey, near Ankara; point of maximum potential for the number of out-migrants is in northwest Turkey, at Istanbul.

When only "rural" villages are considered, then point of maximum potential moves eastward for both the variables. For permanent resident

¹In this study, the center of gravity for village population in a province is assumed to be at the province center, which may not be the case for some provinces, e.g., where the province center is located at the corner of a province.

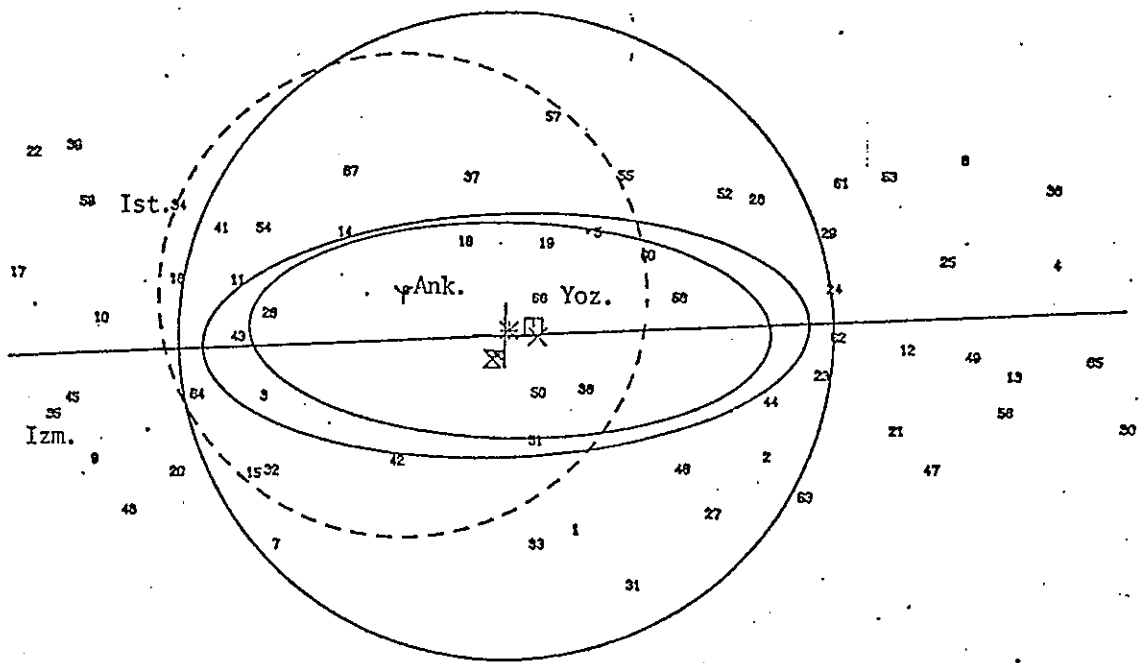


FIGURE 14. Bivariate spatial statistics for permanent resident population of villages in 1965, aggregated for each province (for legend, see Appendix C)

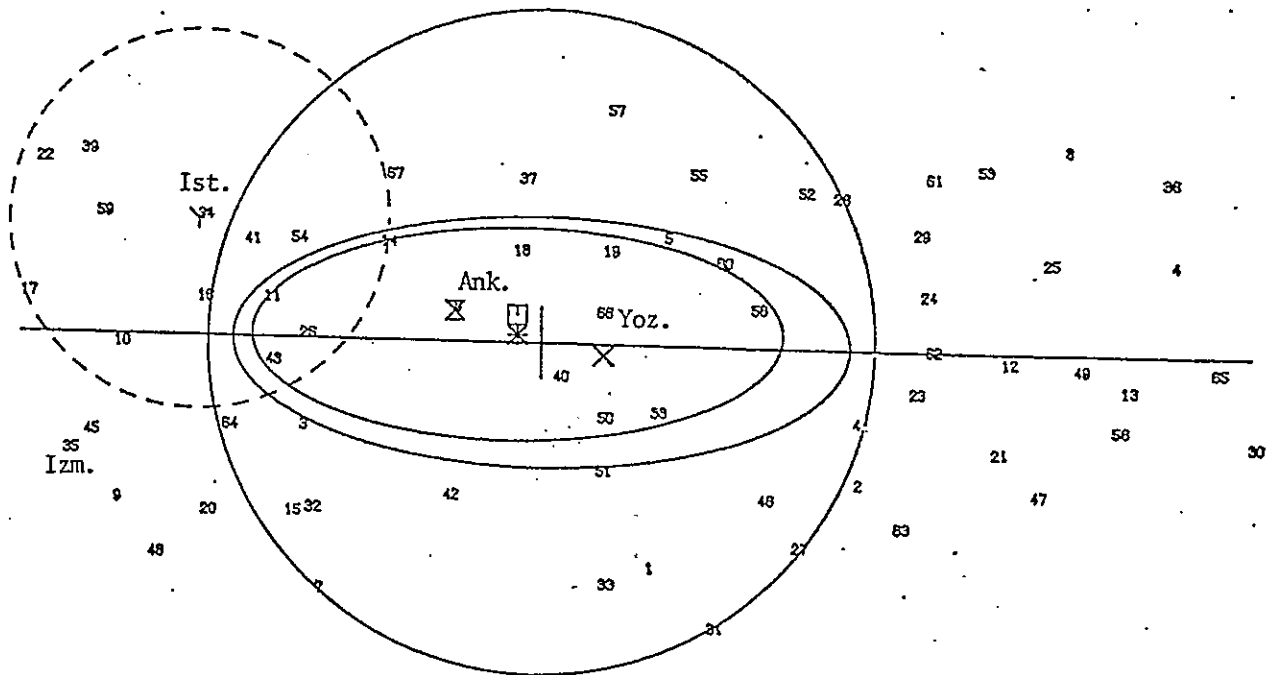


FIGURE 15. Bivariate spatial statistics for total number of out-migrants from villages (to province center) between 1965-70, aggregated for each province (for legend, see Appendix C)

population of villages, point of maximum potential moves from Ankara to Tokat; and for the number of out-migrants, it moves from Istanbul to Ankara.

Principal axis is in northeast-southwest direction, for the village population; and in a east-west direction, for the number of out-migrants.

III.2.d. Bivariate Aspatial Statistics—Correlation

Among the three origin-oriented variables, the permanent resident population of the villages and the number of out-migrants from the villages are not as strongly associated to each other, as were the permanent resident population of the province centers and the number of in-migrants. The correlation coefficients between the permanent resident population of the villages and the number of out-migrants range between 0.62 and 0.72.

As it was the case between in-migration rates and the population of the province centers, the degree of association between the out-migration rates and the permanent resident population of the villages is very low; the correlation coefficients range between -0.10 and 0.19.

	Correlation coefficients	
	<u>All provinces</u>	<u>Excludes three metropolises</u>
p_i and m_i	0.62	0.63
$\log(p_i)$ and $\log(m_i)$	0.72	0.69
p_i and m_i/p_i	0.19	-0.11
$\log(p_i)$ and m_i/p_i	0.14	-0.10

III.3. Synthesis: Destination-oriented Versus Origin-oriented Variables

In the two previous subsections of III.1 and III.2, destination- and origin-oriented variables are analyzed in detail. In this section, findings related to the destination- and origin-oriented variables are summarized, compared, and synthesized. Furthermore, correlation analysis between destination- and origin-oriented variables are carried out.

III.3.a. Univariate Aspatial Statistics

Population of province centers range from approximately 10,000 to 1.5 million with a mean of 100,000, and a median of 45,000. Population of villages (aggregated for each province) range from 70,000 to 700,000 with a mean of approximately 300,000. The number of in-migrants to each province center ranges from 700 to 160,000; and the number of out-migrants from villages (aggregated for each province) range from 800 to 70,000. The mean number of in-migrants to province centers, or in other words, the mean number of out-migrants from villages (aggregated for each province) is 10,000; median number of in-migrants is about 4,000. In-migration rates range from 3 percent to 19 percent with a mean of 10 percent; out-migration rates range from 1 percent to 12 percent with a mean of 3.5 percent (see Table 1).

The number of in-migrants and out-migrants, as well as population of province centers and villages, are all highly skewed towards lower values; but the degree of skewness, as well as value of kurtosis, coefficient of variation are much more for population of province centers and the number of in-migrants than it is for the population of villages and the number of out-migrants. Distribution of the population of villages and the number of out-migrants are more close to normal distribution than the distribution of the population of province centers and the number of in-migrants (see Figures, 1, 2, 8, and 9).

Entropy values for the number of in-migrants is 3.219, and for the number of out-migrants, 3.868; and the maximum value is 4.205 (which equals to $\log 67$, where 67 is the number of provinces). The respective redundancy values¹ are 0.2344 and 0.0801. Thus, the degree of organization for the number of in-migrants is greater than it is for the number of out-migrants.

On the other hand, all of the above stated three measures of the univariate aspatial statistics, i.e., skewness, kurtosis, and coefficient

¹Redundancy is an index which makes the cross-comparison of entropy values with different respective maximum entropy values: $R = 1 - \frac{H}{H_{\max}}$, H is observed (aposteriori) entropy value; H_{\max} is the maximum (apriori) entropy value [Hodge and Gatrell, 1976, p. 217; and Merchand, 1972, p. 238].

of variation, are lower for the in-migration rates than they are for out-migration rates. The distribution of in-migration rates for the province centers is more close to normal distribution than the distribution of out-migration rates for the villages (see Figures 3 and 10).

III.3.b. Spatial Analyses--Mapping of the Variables

The three metropolises which are in the western half of the country, have the largest permanent resident population, and the largest number of in-migrants. The three metropolises attract about half of the total village-to-province-center migrants. However, they have the median values for in-migration rates (see Table 2, and Figures 4 and 5). The provinces of the three metropolises, after Konya, have the largest village population. However, when the data are adjusted for "rural"-village-to-province-center migration, then village population of Istanbul and Izmir decrease drastically to a medium value. The provinces of two of the metropolises, i.e., Istanbul and Ankara, have the largest out-migration rates, and the largest number of out-migrants (see Table 4, and Figures 11, 12 and 13).

After the three metropolises, the province centers which have the largest permanent resident population, and the largest number of in-migrants are in the western half of the country, i.e., in South, West, and Southeast Turkey (Adana, Bursa, Eskisehir, and Gaziantep); and next in Central Turkey (Konya and Kayseri). On the other hand, the province centers which have the lowest permanent resident population and the lowest number of in-migrants are in the north and south corners of the eastern end of the country, i.e., in Northeast and Southeast Turkey (see Figure 4, and Lists 2 and 3). High in-migration rates are for small province centers in East, Central, West, and Northeast Turkey. On the other hand, the lowest in-migration rates are in the two opposite extreme regions of the country, i.e., in Southeast and in Thrace which is in the Northeast corner of Turkey (see Figure 5, and Lists 2 and 3).

Among the provinces with nonmetropolitan province centers, provinces with large province centers, in Central, South-Southeast Turkey have the largest

number of out-migrants and out-migration rates (see Figures 12 and 13, and List 4). On the other hand, provinces with the lowest number of out-migrants are in provinces with small province centers in the eastern half of the country, i.e., in Southeast and East Turkey. The provinces with the lowest out-migration rates are in provinces with small province centers in West Turkey (in provinces which have good-fertile agricultural land), and in Southeast Turkey (with ethnic minority groups) (see Figures 12 and 13, and List 5).

III.3.c. Bivariate Spatial Statistics

For both destination- and origin-oriented variables, the relative dispersion is close to, but less than 1.0 (between 0.82 and 0.94, which indicates that there is neither obvious centrality nor peripheral, but slight centrality. The destination-oriented variables are slightly more central than the origin-oriented variables (see Table 3). Likewise, standard distance, and minor and major radii, of the standard deviational ellipse are smaller for destination-oriented variables than they are for origin-oriented variables. The largest values for these three measures are for village population, and the smallest values are for the number of in-migrants.

The degree of directional bias, measured as skewness (0.59) is medium. Correlation coefficients between the x and y coordinate values are very low (between 0.03 and 0.23): correlation coefficients are larger for destination-oriented variables (-0.23) than they are for origin-oriented variables (between -0.03 and 0.13).

The bivariate weighted and unweighted mean, and the bivariate median for all destination- and origin-oriented variables are in Central Turkey around Ankara and Yozgat. There is not much difference in the location between the bivariate unweighted mean and the bivariate median, which indicates that the distributions are not lopsided in their density and spacing (see Figures 6, 7, 14 and 15).

For all variables, the bivariate unweighted mean is near Yozgat, east of Ankara. However, the bivariate weighted mean and the bivariate median are around Ankara for "province center population" and for the "number of in-migrants"; and for "village population" and for the "number of out-migrants" they move eastward and are located between Ankara and

and Yozgat. Therefore, the measure of eccentricity for the permanent resident population of the province centers and the number of in-migrants are slightly larger than the measure of eccentricity for the permanent resident population of the villages, and the number of out-migrants—this is especially true when only the rural villages are considered (see Table 3).

Even though for all destination- and origin-oriented variables, bivariate weighted and unweighted mean and the bivariate median are in Central Turkey, the location for the point of maximum potential is in Northwest Turkey, at Istanbul for all variables, except for village population for which it is still in Central Turkey, at Ankara. When only "rural" villages are considered, then point of maximum potential for permanent resident population of villages and for the number of out-migrants moves eastward from Ankara to Tokat, and from Istanbul to Ankara, respectively (see Table 5, and Figures 6, 7, 14 and 15).

It is interesting to note that, for both the destination- and origin-oriented variables, the point of bivariate weighted and unweighted mean, and bivariate median which indicate best location for public facilities and services in terms of criteria of either equity or efficiency, respectively, are located in Central Turkey, near Ankara (which is the capital city of Turkey). However, point of maximum potential which indicates the best location for profit-maximizing activities, is located at Istanbul for all variables except population of villages, and for the number of out-migrants when the data are adjusted such that only the rural villages are considered.

The principal axis, in all cases, is basically in an east-west direction. For the population of province centers and for the number of in-migrants it is in southeast-northwest direction strongly tilted towards Istanbul. However, for the population of villages, it is in northeast-southwest direction; and for the number of out-migrants from the villages, it is in a perfectly east-west direction.

In summary, when destination-oriented and origin-oriented variables are compared in terms of spatial statistics the differences are: (1) the relative dispersion of origin-oriented variables indicates slightly more peripherality; (2) likewise, the standard distance, the minor and

major radii of the standard deviational ellipse are larger for origin-oriented variables, especially for village population; and (3) the bivariate median and the bivariate weighted mean for destination-oriented variables are located around Ankara, whereas for origin-oriented variables they are located slightly more eastward, between Ankara and Yozgat; and (4) consequently, since bivariate unweighted mean is around Yozgat for all variables, the measure of eccentricity for origin-oriented variables is slightly less than for destination-oriented variables (this is especially true when only rural villages are considered); (5) the point of maximum potential is at Istanbul for all variables except for village population for which it is at Ankara (however, when only "rural" villages are considered, point of maximum potential moves eastward for both the village population and the number of out-migrants); and (6) the principal axis for destination-oriented variables is tilted towards Istanbul, whereas, for origin-oriented variables it is either tilted away from Istanbul or it is in east-west direction.

The above stated differences between destination- and origin-oriented variables in terms of the bivariate spatial statistics indicate the possibility that the flow of village-to-province-center migrants is from East towards West Turkey, mainly towards Istanbul. This inference is further supported by the original study where migration flows are also studied in more disaggregated way [Gedik, 1977].

TABLE 5. Location of bivariate spatial statistics for destination- and origin-oriented variables

	Bivariate unweighted mean	Bivariate weighted mean and bivariate median	Point of maximum potential	Principal axis
Permanent resident population of province centers (p_j)	Yozgat ¹	Ankara ²	Istanbul	Southeast-Northwest
No. of in-migrants (m_j)	"	"	"	"
Permanent resident population of villages (p_i)	"	Yozgat ³	Ankara (Tokat)	Northeast-Southwest
No. of out-migrants (m_i)	"	"	Istanbul (Ankara)	East-West

- NOTES: 1) South of Yozgat
 2) South of Ankara
 3) West of location for bivariate unweighted mean (between Ankara and Yozgat)
 4) Locations in the parentheses refer to data which is adjusted for "rural"-village-to-province-center migration.

III.3.d. Bivariate Aspatial Statistics—Correlation¹

The population of the province centers, p_j , and the number of in-migrants, $m_{.j}$, are very highly associated; the correlation coefficients range between 0.89 and 0.99. On the other hand, the degree of association between village population, p_i , and the number of out-migrants, $m_{i.}$, range only between 0.62 and 0.72 (see Table 6, and Figures 16 and 17).

It is interesting to note that the number of out-migrants from villages, $m_{i.}$, is more highly associated with the population of the province centers, p_j , than it is with the population of the villages, p_i . For example, while the correlation coefficients between number of out-migrants, $m_{i.}$, and the village population, p_i , range between 0.62 and 0.72; the correlation coefficients between the number of out-migrants, $m_{i.}$, and the population of province centers, p_j , range between 0.71 and 0.92.

Both the in-migration rates and the out-migration rates are not associated with the population of province centers or with the population of villages, respectively. On the other hand, out-migration rates, $m_{i.}/p_i$, are associated with the population of the province centers, p_j , with correlation coefficients between 0.59 and 0.73; however, these correlation coefficients decrease to about 0.35 and -0.40 when the three metropolises are excluded.

The correlation coefficients between the number of out-migrants and the in-migrants range between 0.77 and 0.93 which indicates to the significance of the within-province migration. This inference about the significance of the intra-provincial migration is also supported by the original study where the migration flows are analyzed also in more disaggregated way [Gedik, 1977].

¹The values of correlation coefficients are calculated for two data sets: (1) all cases are included; and (2) extreme cases, i.e., the three metropolises are excluded. None of the scattergrams had nonlinear form.

TABLE 6. Correlation coefficients between variables

	All provinces	Excludes three metropolises	
Destination-oriented variables	Population of province centers (p_j) and number of in-migrants ($m_{.j}$)	0.99	0.94
	$\log(p_j)$ and $\log(m_{.j})$	0.94	0.89
	Population of province centers (p_j) and in-migration rates ($m_{.j}/p_j$)	-0.06	-0.08
	$\log(p_j)$ and $\log(m_{.j}/p_j)$	-0.06	-0.15
Origin-oriented variables	Population of the villages (p_i) and number of out-migrants ($m_{i.}$)	0.62	0.63
	$\log(p_i)$ and $\log(m_{i.})$	0.72	0.69
	Population of the villages (p_i) and out-migration rates ($m_{i.}/p_i$)	0.19	-0.11
	$\log(p_i)$ and $\log(m_{i.}/p_i)$	0.14	-0.10
Destination-oriented versus origin-oriented variables (where $i = j$)	Population of the province centers (p_j) and number of out-migrants ($m_{i.}$)	0.92	0.68
	$\log(p_j)$ and $\log(m_{i.})$	0.81	0.71
	Population of villages (p_i) and number of in-migrants ($m_{.j}$)	0.47	0.48
	$\log(p_i)$ and $\log(m_{.j})$	0.63	0.57
Destination-oriented versus origin-oriented variables (where $i \neq j$)	Population of province centers (p_j) and out-migration rates ($m_{i.}/p_i$)	0.73	0.40
	$\log(p_j)$ and $\log(m_{i.}/p_i)$	0.59	0.35
	$\log(p_i)$ and ($m_{.j}/p_j$)	0.60	
	Population of province centers (p_j) and population of villages (p_i)	0.50	0.53
	$\log(p_j)$ and $\log(p_i)$	0.68	0.64
	Number of in-migrants ($m_{.j}$) and number of out-migrants ($m_{i.}$)	0.93	0.77
Destination-oriented variables	$\log(m_{.j})$ and $\log m_{i.}$	0.86	0.79
	In-migration rates ($m_{.j}/p_j$) out-migration rates ($m_{i.}/p_i$)	0.37	

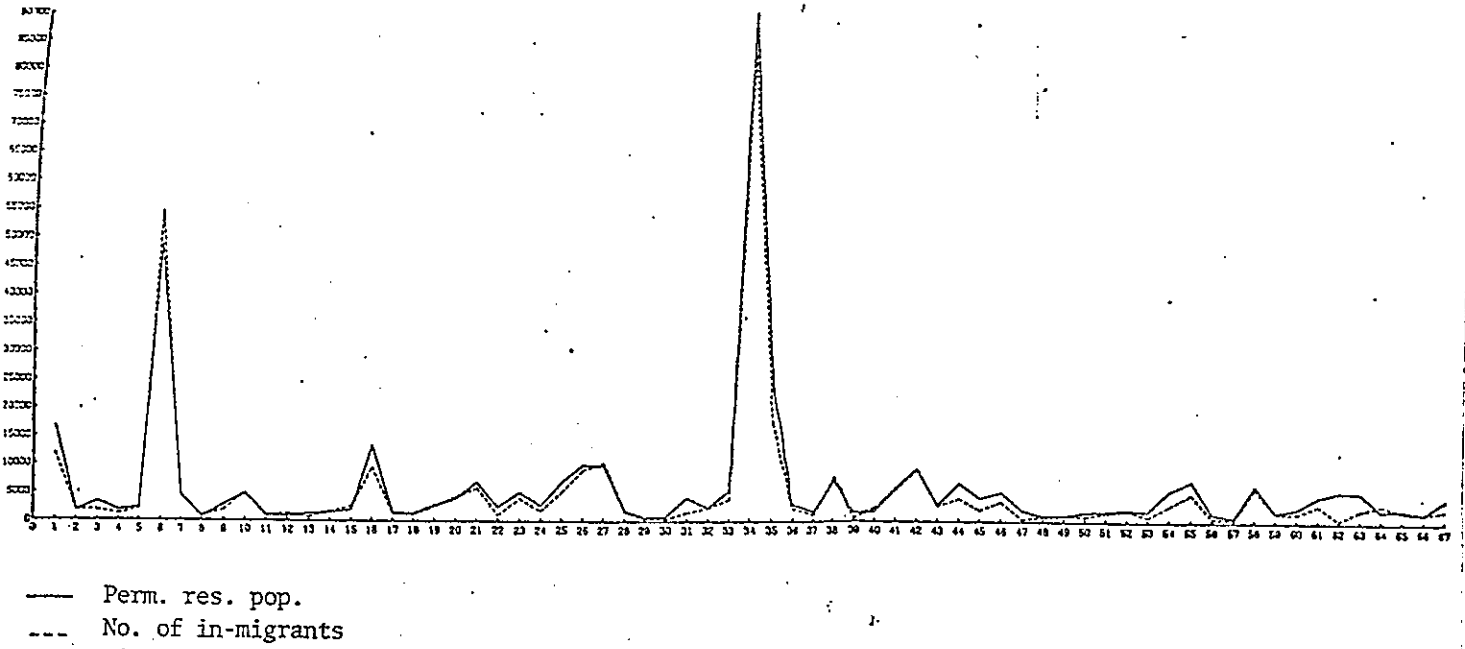


FIGURE 16. Permanent resident population of province centers in 1965 versus total number of in-migrants to province centers

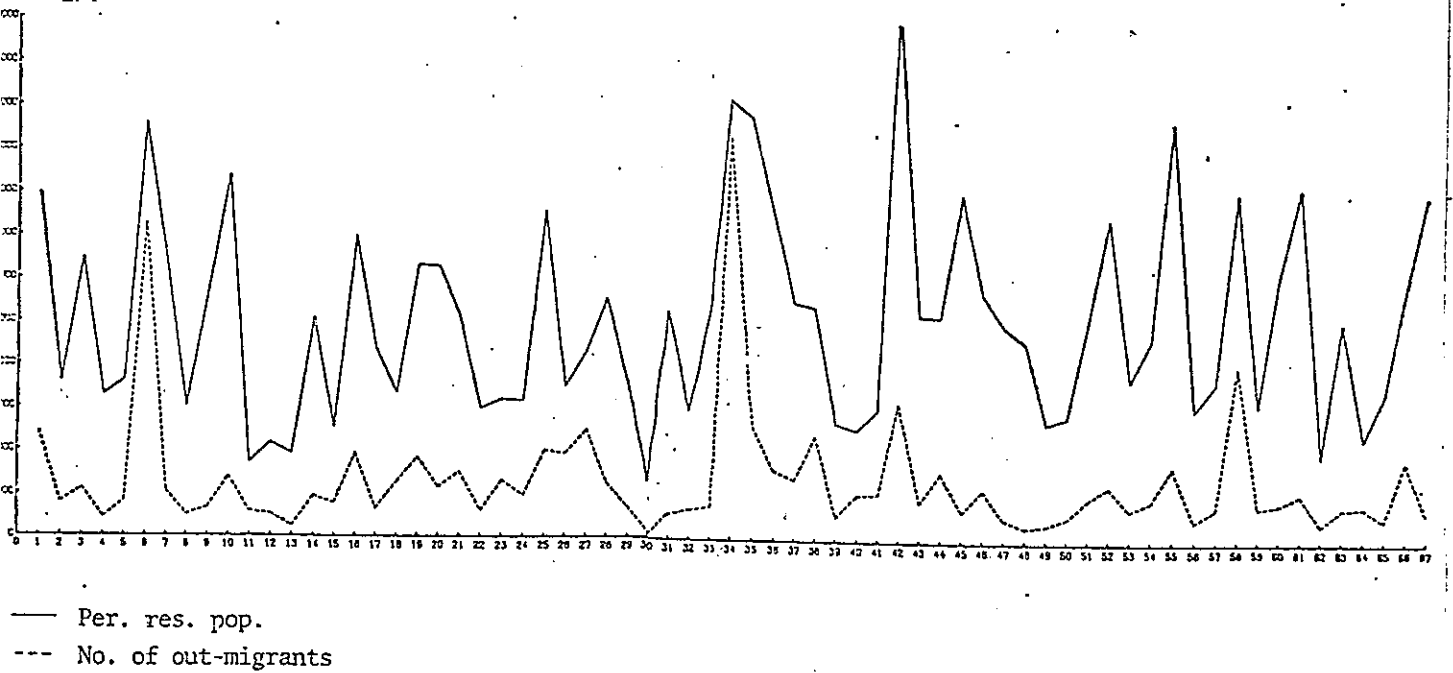


FIGURE 17. Permanent resident population of villages in 1965 versus total number of out-migrants from villages

IV. CONCLUSION

Destination-oriented, and origin-oriented variables are analyzed in detail in Sections III.1 and III.2, respectively. In Section III.3, these findings are summarized, compared, and synthesized. In this section, only the major findings will be summarized briefly.

- (1) The province centers, with little variation, attract in-migrants in fairly constant proportion to their population; whereas, the villages (aggregated for each province) show relatively more variation in terms of their out-migration rates (mean for in-migration rates is 10%, and for out-migration rates 3%).
- (2) The number of in-migrants to province centers and the number of out-migrants from villages are highly associated with each other. This indicates the significance of the intra-provincial migration which is also supported in the original study [Gedik, 1977].
- (3) Differences in spatial statistics between the destination- and origin-oriented variables indicate that the flow of village-to-province-center migration is from East towards West Turkey, and mainly towards Istanbul [see also Gedik, 1977].
- (4) The findings indicate to the possibility that the population of the province centers, which might be a proxy variable for various factors (such as, information, or previous migrants, etc.) play a pivotal role both in the decision to out-migrate from the villages in that province, and in the decision where to migrate.¹ This inference is based on the findings that the population of province centers is highly related both to the number of in-migrants ($r=0.89 - 0.99$) and to the number of out-migrants from that province ($r=0.68 - 0.92$) (see Table 6).

1

Further analyses indicate that the pivotal roles of the population of the province centers occur because of the existing village migrants in the province centers; such that, previous village migrants (which is a proxy variable for relatives or friends) seem to be the dominant factor not only in the destination choice about where to migrate, but also in the decision to migrate from the villages [Gedik, 1977].

(5) The three metropolises of Istanbul, Ankara, and Izmir which are in the western half of the country, have the largest permanent resident population and the number of in-migrants (see Figure 4, and List 2). Approximately half of the village-to-province-center migration is directed to these metropolises: Istanbul attracts 24 percent; Ankara, 16 percent, and Izmir, 5 percent (see Table 2).

Furthermore, the villages in the provinces of two of the metropolises that is, Istanbul and Ankara, have the largest number of out-migrants and out-migration rates (10-12%) (see Figure 13, List 5, and Table 4).

However, the three metropolises have the medium values for in-migration rates (9-13%) (see Figure 5, Table 2, and List 2).

(6) The basic spatial pattern of the number of in-migrants, out-migrants, and the respective migration rates, usually depend whether the province is in the western or in the eastern half of the country and/or according to the population size of its province center. Generally speaking, those provinces which are in the western half of the country (i.e., West, Central, and South-Southeast Turkey) and which have large population center, have the largest number of in-migrants, out-migrants, and out-migration rates; whereas, provinces which are in the eastern half of the country, and which have small province center, have the smallest number of in-migrants, out-migrants, and out-migration rates (on the average, villages in the western half of the country have higher literacy rates, better agricultural land, and more income, than the villages in provinces in the eastern half of the country):

(a) The first five largest non-metropolitan province centers are in the western half of the country (i.e., in West, South-Southeast, and Central Turkey). Consequently, they also have the largest number of in-migrants.¹

1

These province centers are Adana (South Turkey); Bursa and Eskisehir (West Turkey); Gaziantep (South-Southeast Turkey); and Konya and Kayseri (Central Turkey) (see List 2, and Figure 4).

- (b) Provinces which have large province centers and which are in the western half of the country, have the largest number of out-migrants¹ and the out-migration rates.² The rest of the provinces with large numbers of out-migrants and out-migration rates are still observed in the western half of the country-- except such provinces as Erzurum and Elazig in East Turkey, and Samsun in Black Sea region-- regardless of the size of the province centers.
- (c) Lowest number of out-migrants and in-migrants are found in provinces with small province center in the eastern half of the country.³
- (d) Largest in-migration rates are observed for some of the small province centers in various different regions.⁴
- Lowest in-migration rates are found in the two opposite ends of the country, i.e., in Southeast and in Northwest (Thrace) Turkey.⁵
- (e) As previously stated, largest out-migration rates are found in provinces with large province center in western half of the country (i.e., in West, Central, and South-Southeast Turkey); whereas, lowest out-migration rates are found in provinces which have small province center in various regions, especially in West Turkey (in provinces with good fertile land) and in Southeast Turkey (in provinces with ethnic minority groups).⁶

1

Such as, Konya, Sivas, and Kayseri (Central Turkey); Gaziantep and Adana (South-Southeast Turkey); Eskisehir and Bursa (West Turkey), etc. (see List 4, and Figure 12).

2

Such as, Gaziantep (South-Southeast Turkey); Eskisehir (West Turkey); Sivas and Kayseri (Central Turkey), etc. (see List 4, and Figure 13).

3

For number of out-migrants, the provinces are in Southeast and East Turkey, such as, Bitlis, Mus, Agri, Tunceli, Artvin, Bingol, Siirt, Van, etc. (see List 5, and Figure 12); and for the number of in-migrants, in Southeast and Northeast Turkey (Hakkari, Mardin, Gumushane, Tunceli, Bitlis, Siirt, and Artvin (see List 3, and Figure 4)).

4

In West, East, Central, and Northeast Turkey, such as, Usak, Burdur, Bolu, Bingol, Kirsehir, and Artvin, etc (see List 2, and Figure 5).

5

Such as, Mardin, Hatay, Urfa, Hakkari in Southeast Turkey; and Kirklareli and Edirne in Thrace (see List 3, and Figure 5).

6

Such as, Manisa, Mugla, and Aydin in West Turkey; and Hakkari, Mardin, and Bitlis in Southeast Turkey (see List 5, and Figure 13).

REFERENCES

- Bachi, Robert (1976), "Geostatistical Analysis of Internal Migration," Journal of Regional Science, Vol. 16, No. 1, pp. 1-19.
- Gedik, Ayse (1977), "A Causal Analysis of the Destination Choice of Village-to-Province-Center Migrants in Turkey, 1965-70," Doctoral Dissertation, Department of Urban, Planning, University of Washington, November 1977.
- _____, (1978), "Sizes of Different Migration Flows in Turkey, 1965-70: Possible Future Directions and Towards Comparative Analysis." University of Tsukuba, Japan, December 1978. (Institute of Socio-Economic Planning, Discussion Paper No. 36.)
- Hodge, D. and A. Gatrell (1976), "Spatial Constraint and the Location of Urban Public Facilities," Environment and Planning A, Vol. 8, p. 217.
- Marchand, Bernard (1972), "Information Theory and Geography," Geographical Analysis, Vol. 4, pp. 234-257.
- State Institute of Statistics (1970) . Census of Population by Administrative Division, Ankara: S.I.S.,
- Üner, Sunday and Ashish K. Chakraverti (1975). Methodological Approach to Socioeconomic Factors as Determinants of Rural-Urban Migration in Turkey. Population Series No. 1, Ankara: Hacettepe University, Institute of Population Studies.

Appendix A
AVAILABLE DATA

This appendix is in two sections. In the first section, characteristics of the available data are explained. In the second section, possible deficiencies in the data are discussed.

A.1. Characteristics of the Available Data

The source of the available data is the one hundred population census of 1970.¹ "In Turkey, a complete enumeration of population is taken in years ending with 0 and 5. The censuses are carried out in a single day and cover de facto population within the country's boundaries" [S.I.S., 1970, p. vii].

The migration data is based on the answers given to the questions "where is your permanent residence now?" and "where was your permanent residence in 1965 Census Day?" "Usual place of residence is defined in the population census as the place chosen with the purpose of continuous settlement. For army and public servants the work place has been considered as the usual place of residence" [Uner and Chakraverti, 1975, p. 5].

The permanent resident population of Turkey in 1965-70 quinquennial period is 30,111,009. By definition, this population excludes ages 0-4, those who died between 1965 and 1970, those who are nomads, those permanent residence in 1965 and/or in 1970 were in foreign countries or were unknown. Among this permanent resident population of approximately 30 million, those persons whose permanent residence on the 1970 Census Day is not the same as it was in 1965 Census Day are regarded as "migrant." The data do not show the step migration between 1965 and 1970 Census Days. Furthermore, the data do not include the return migrants (that is those people who migrated after the 1965 Census Day, but who returned to the place of origin before the 1970 Census Day.

A.2. Possible Deficiencies in the Data

Enumerated population and permanent resident population are not equal to each other (see Tables A.5 and A.6). The reasons are as follows: (1) the permanent resident population of 1970 does not include ages zero through four, while the enumerated population of 1970, includes all ages; and (2) while the permanent resident population in 1965, as coded on the 1970 Census Day, excludes those who died between 1965 and 1970, while they are included in the enumerated population of 1965. Differences between enumerated and permanent resident populations in 1970 are much less than the differences between the enumerated and permanent resident populations of 1965.

Some of the reasons for the difference between the permanent resident population and the enumerated population, in addition to the reasons stated above, might be as follows:

1. Loss of memory: On the 1970 Census Day, people may remember wrongly about their place of permanent residence five years ago on the 1965 Census Day; therefore there might be unintentional misreporting.
2. Psychological attachment to the place of origin: People may consider the place where they came from still to be their place of permanent residence even though they moved their residence to a new settlement due to retirement, work, or study.
3. Temporary migration: There may be a temporary movement of people due to tourism, or work which would inflate the enumerated population.
4. Military garrisons: The way in which men in compulsory military service were enumerated, and the way these men answered about their place of permanent residence during the period they were in the military service, are uncertain.
5. Boundary changes: There may be changes in the administrative boundaries of the settlements between the 1965 and 1970 Census Days. Also administrative boundaries may not correspond to the people's perception of these boundaries. This problem is especially relevant to the metropolitan areas.

Permanent resident population of province centers and villages are adjusted "approximately" to account for the ages between zero and four, and for those who died between 1965 and 1970. This adjustment of permanent resident population made the relatively more direct comparison of enumerated and permanent resident populations possible. The subsequent comparisons of these two populations indicate the possibility that the permanent resident population of the province centers in 1965, as coded in 1970, are inflated; whereas, the permanent resident population of villages in 1965, as coded in 1970, is deflated. There seems to be a bias in the data toward city areas.

This bias might have occurred because the people living in the villages near the city areas might have considered their permanent residence to be in the city area, whereas they are reported in the enumerated population as living in the village area. Another reason might be that when people who migrated from villages to city areas a short time before the 1965 Census Day, considered the place of their permanent residence on the 1965 Census Day to be the city area, while, in fact, it was in a village. These two reasons may have occurred because in the culture of the Turkish people, the city is redeemed and is associated with civilization. Therefore, the answers of the people concerning the place of their permanent residence may have been biased toward city areas.

The possible effects of this bias might be as follows:

1. Permanent resident population of province centers in 1965 is inflated.
2. Permanent resident population of villages in 1965 is deflated.
3. Number of village-to-province-center migrants is deflated.
4. In-migration rate for each province center are deflated.
5. Out-migration rates from villages in a province may have been either inflated or deflated according to the degree of disproportionate deflation in the number of out-migrants from villages and the permanent resident population in villages in 1965.

For the comparison of enumerated and permanent resident population of the province centers, enumerated population of the metropolises are adjusted as follows (see Table A.4).

The enumerated population of the city areas of the three metropolises of Istanbul, Ankara, and Izmir, as they are presented in the published tables of the census, are misleading. For Ankara and Izmir, those district centers which are an integral part of the province center are excluded. Therefore, the enumerated population for the city areas of these metropolises is unreasonably low, and consequently, the differences between the enumerated and the permanent resident population for these three metropolises are very large. The enumerated population for the city areas of these provinces is adjusted so that the enumerated population of those district centers which are an integral part of the metropolises is included. For Istanbul, there is no population listed for the province center, but all the population in city areas is listed under district centers. In order to calculate the population in the city area of the province center of Istanbul, the population of all the district centers, except those which are listed in Table A.4, are summed. Needless to say, in this study, the adjustments made on the enumerated population of the metropolises is based on the judgement of the author, and therefore these adjustments are rather arbitrary. In order to facilitate comparison between the different studies, the State Institute of Statistics' definition of the boundaries of these metropolises, and coding-presentation of the migration data near metropolitan areas should be done in more detailed level, such as in terms of individual settlements.

TABLE A.1. Adjustment of enumerated population of the three metropolises in 1965

Metropolis	Enumerated population of the metropolis	District centers	Enumerated population of district centers	Adjusted enumerated population of the metropolis
Istanbul	1,792,071	Adalar	15,219	1,747,898
		Gatalca	5,811	
		Silivri	6,114	
		Sile	2,788	
		Yalova	14,241	
Ankara	130,520	Yenimahalle	86,222	905,660
		Cankaya	470,454	
		Altindag	218,464	
Izmir	329,052	Bornova	30,445	442,071
		Karsiyaka	82,574	

Source: Census of Population, 1965, S.I.S., Ankara.

TABLE A.2. Enumerated versus permanent resident population of province centers

Province Center	Population in 1965		Population in 1970	
	Enumerated (1965 Census)	Permanent resident (1970 Census)	Enumerated (1970 Census)	Permanent resident (1970 Census)
Adana	289,919	276,364	347,454	299,610
Adiyaman	22,153	27,620	31,263	30,217
Afyon	44,026	54,499	53,497	48,878
Agri	24,168	29,346	29,577	25,563
Amasya	34,168	37,481	36,646	31,928
Ankara	130,520	815,042	114,419	1,002,984
Antalya	71,833	74,996	95,616	84,552
Artvin	9,847	11,579	13,109	10,468
Aydin	43,483	45,965	50,563	43,558
Balikesir	69,341	79,759	85,004	78,503
Bilecik	9,722	16,996	11,744	11,872
Bingöl	11,727	14,285	17,220	15,342
Bitlis	18,725	22,896	20,842	18,816
Bolu	21,700	25,001	26,944	23,215
Burdur	29,268	32,149	32,746	31,473
Bursa	211,644	219,818	275,953	248,609
Canakkale	22,789	24,201	27,042	21,897
Cankiri	21,450	23,422	26,124	21,234
Corum	41,574	45,440	54,576	45,432
Denizli	64,331	63,558	82,372	68,776
Diyarbakir	102,653	113,116	149,566	122,346
Edirne	46,091	40,823	53,806	36,127
Elazig	78,605	84,421	107,364	85,839
Erzincan	45,197	45,206	58,352	45,895
Erzurum	105,317	114,694	133,444	92,678
Eskisehir	173,882	165,306	216,373	173,660
Gaziantep	160,152	161,514	227,652	184,642
Giresun	25,331	31,195	32,522	30,465
Gumushane	8,092	12,661	12,440	9,563
Hakkari	6,129	12,995	9,640	10,639
Hatay	57,855	68,277	66,520	59,091
Isparta	42,901	40,362	50,905	44,395
Icel	86,692	90,776	112,982	112,982
Istanbul	1,792,071	1,493,916	2,203,337	1,753,005
Izmir	329,052	407,642	400,048	444,324
Kars	41,376	49,692	53,338	44,458
Kastamonu	23,485	28,439	29,338	25,481
Kayseri	126,653	120,106	160,985	131,898
Kirklareli	24,790	26,638	27,431	23,125
Kirsehir	24,861	26,970	33,173	27,471
Kocaeli	89,547	97,540	120,694	103,524
Konya	157,934	152,518	200,464	157,799
Kütahya	49,301	47,151	62,222	48,351
Malatya	104,428	110,261	128,841	113,887
Manisa	69,711	67,767	72,276	61,382
Maras	63,284	84,543	110,761	88,859
Mardin	30,974	32,632	33,740	28,074
Mugla	16,408	17,824	18,624	17,145
Mus	15,687	18,249	23,058	18,339
Nevsehir	21,121	28,983	25,685	25,616
Nigde	21,663	31,462	26,936	26,319
Ordu	27,303	35,449	38,483	32,932
Rize	26,989	31,766	30,532	25,163
Sakarya	86,124	90,896	101,283	89,515
Samsun	107,510	118,843	134,061	115,890
Siirt	25,480	25,338	29,544	22,863
Sinop	13,354	14,940	15,096	12,533
Sivas	108,320	107,814	133,979	109,439
Tekirdag	27,069	30,685	35,387	30,432
Tokat	37,368	41,171	44,110	39,042
Trabzon	65,516	74,493	80,795	71,100
Tunceli	5,825	9,099	9,366	8,009
Urfa	73,498	88,245	100,654	85,058
Usak	35,517	36,095	46,392	41,262
Van	31,431	40,006	46,751	38,899
Yozgat	23,081	28,473	27,047	25,459
Zonguldak	55,404	68,661	77,135	68,220

TABLE A.3. Enumerated versus permanent resident population of villages

Province Center	Population in 1965		Population in 1970	
	Enumerated (1965 Census)	Permanent resident (1970 Census)	Enumerated (1970 Census)	Permanent resident (1970 Census)
Adana	480,414	441,488	509,709	417,529
Adiyaman	215,825	199,741	233,113	192,033
Afyon	377,146	359,188	391,333	343,114
Agri	193,541	181,822	217,738	174,402
Amasya	202,713	201,136	209,937	190,632
Ankara	574,541	532,022	574,354	478,328
Antalya	357,253	354,809	401,326	344,163
Artvin	179,997	167,377	186,433	162,538
Aydin	358,965	314,642	377,946	304,621
Balikesir	477,989	465,441	488,043	449,424
Bilecik	102,685	95,178	95,255	86,411
Bingöl	130,120	120,461	142,500	115,757
Bitlis	110,256	107,055	125,534	103,113
Bolu	313,480	282,397	319,445	274,729
Burdur	140,815	140,221	148,627	137,525
Bursa	420,456	387,795	431,222	379,306
Canakkale	268,564	243,420	263,459	234,955
Bankiri	206,975	185,527	207,620	176,563
Corum	388,535	351,153	394,083	336,136
Denizli	345,630	349,794	369,851	343,094
Diyarbakir	313,449	285,676	342,704	272,368
Edirne	201,063	166,664	196,447	158,759
Elazig	216,547	178,216	225,360	172,941
Erzincan	201,189	176,511	197,927	172,369
Erzurum	475,818	422,120	488,130	420,722
Eskisehir	214,769	195,292	213,462	182,570
Gaziantep	266,811	242,323	276,458	222,412
Giresun	352,946	309,245	360,773	305,409
Gümüşhane	230,774	201,487	237,168	194,778
Hakkari	69,805	72,054	81,518	72,915
Hatay	302,544	297,700	349,012	295,560
Isparta	169,689	167,891	185,733	165,206
Icel	321,891	295,760	344,643	291,714
Istanbul	501,752	570,776	815,695	692,477
Izmir	613,114	548,433	674,132	573,766
Kars	488,950	427,442	506,777	408,978
Kastamonu	374,475	309,772	364,500	304,972
Kayseri	344,985	303,282	361,869	296,777
Kirklareli	172,530	153,556	164,550	147,639
Kirsehir	154,836	144,759	160,263	137,227
Kocaeli	198,987	170,311	197,223	168,677
Konya	768,044	685,138	824,532	668,661
Kütahya	310,997	292,546	329,758	286,125
Malatya	305,584	290,781	331,332	282,371
Manisa	482,688	447,579	506,448	447,341
Maras	333,333	320,101	363,926	303,086
Mardin	307,787	278,934	333,240	269,326
Mugla	275,643	257,546	298,180	256,006
Mus	166,213	153,635	89,361	150,186
Nevsehir	156,606	161,581	172,285	173,049
Nigde	292,488	285,233	322,669	275,013
Ordu	460,278	417,668	490,680	404,233
Rize	217,545	208,769	242,986	211,394
Sakarya	279,142	262,905	306,775	266,346
Samsun	558,843	541,252	585,467	506,232
Siirt	189,312	170,583	209,478	165,986
Sinop	228,001	206,203	219,273	193,742
Sivas	536,501	449,783	520,547	418,956
Tekirdag	190,484	175,925	185,595	166,947
Tokat	371,949	345,035	394,252	336,722
Trabzon	478,290	455,993	520,685	448,134
Tunceli	130,935	111,647	127,930	106,592
Urfa	300,415	283,979	332,607	272,726
Usak	133,403	133,808	137,586	126,330
Van	206,154	191,426	237,536	189,742
Yozgat	370,417	327,365	376,345	310,819
Zonguldak	492,728	445,852	522,750	443,822

Appendix B

ADJUSTMENT OF THE DATA FOR "RURAL"-
VILLAGE-TO-PROVINCE-CENTER MIGRATION

The purpose of this appendix is to adjust the available migration data such that it approximates the "rural"-village-to-province-center migration. Permanent resident population of villages in 1965, number of village-to-province-center out-migrants; and consequently, the number of in-migrants, and the in-migration rates for province centers are adjusted so that they include only the rural villages.

In Turkey, urban and rural dichotomy is defined by population size, urban being 10,000 or more. Only several province centers have populations less than 10,000, but the differences are insignificant. Therefore, all the province centers can be considered as urban (see Table B.1). However, the population of villages with more than 10,000 ranges from just above 10,000 to 90,000. Villages with more than 10,000 population occur only in eight provinces: i.e., provinces of Adana, Ankara, Istanbul, Izmir, Kayseri, Manisa, Urfa, and Zonguldak. During 1965-70 the percentage of urban villages in the total enumerated village population, ranges from approximately 2 percent for Ankara, to 60 percent for Istanbul, and it is 7 percent for all Turkey (see Table B.2).

TABLE B.1. Province centers with enumerated population of less than 10,000 in 1965 or in 1970

Province centers	Enumerated Population	
	1965	1970
Artvin	9,847	(13,109)
Bilecik	9,722	(11,744)
Gumushane	8,092	(12,440)
Hakkari	6,129	(9,640)
Tunceli	5,825	(9,366)

Source: Census of Population, 1965, and 1970, S.I.S., Ankara.

TABLE B.2. Provinces with villages with enumerated population of more than 10,000

Provinces	Percentage of village population with more than 10,000 population		
	1965	Average of 1965-70	1970
Adana	2.34	3.26	4.13
Ankara	1.42	1.82	2.23
Istanbul	60.70	62.34	72.00
Izmir	25.40	26.55	30.20
Kayseri	2.94	3.15	3.35
Manisa	1.72	1.87	2.01
Urfa	4.16	4.24	4.31
Zonguldak	9.49	9.50	9.52

Source: Census of Population, 1965, S.I.S., Ankara

Ideally, if the available migration data were in terms of individual villages, then those villages which are urban, i.e., those with more than 10,000 population could be eliminated from the analysis. However, while the available data about the enumerated population of villages are in terms of individual villages, available data about permanent resident population of the villages, and number of out-migrants from the villages are such that the villages in each province are aggregated. Because of the nature of the available data, enumerated population of individual villages is used to make adjustments to calculate "rural" village-to-province-center migration. Therefore, adjustments made in the data are approximate, and are across-the-board. The adjustments are as follows:

- Permanent resident population of rural villages in 1965: The percentage of the urban villages in the total "enumerated" village population in each province is assumed to be the same also for the "permanent resident" population of villages. Therefore, this percentage is used to calculate the total number of permanent resident population of urban villages in each province, which is then subtracted from the total permanent

resident population of villages in that province. The remaining figure is assumed to be the permanent resident population of rural villages.

- Number of out-migrants from rural villages (to province centers) between 1965-70: The method used here is the same as the one described above. The only difference is that the percentage of urban villages is in terms of average of 1965-70 enumerated population, instead of 1965 enumerated population. This is because of the fact that the available migration figures concern the quinquennial period between 1965-70. Out-migration rates are assumed to be the same for all villages in each province (regardless of whether they are urban or rural villages).
- Number of in-migrants to province centers (from rural villages) between 1965-70: Since these eight provinces with villages of more than 10,000 population send village migrants to all sixty-seven province centers, the number of "rural"-village-to-province-center in-migrants are less than the numbers of village-to-province-center in-migrants, for all of the sixty-seven province centers.

As a result of these adjustments, the permanent resident population of villages in 1965, and the number of out-migrants from villages between 1965-70, decreased for those eight provinces which have urban villages. The largest decrease among them are for Istanbul (60%), Izmir (25%), and Zonguldak (10%).

The number of in-migrants decreased for all province centers. Since intra-provincial migration is significant, the largest decreases in the number of in-migrants occurred only for those province centers whose provinces had a high percentage of urban villages (as well as a large number of village out-migrants). Therefore, the largest decreases are still for Istanbul (25%), Izmir (13%), and Zonguldak (7%).

Since, both the village population, and the number of out-migrants are reduced in approximately the same ratio, the out-migration rates remained the same. On the other hand, since the total number of in-migrants decreased while the population of the province centers remained the same, in-migration rates decreased for all province centers. The largest decreases occurred for Istanbul and for Izmir; in-migration rates decreased for Istanbul from 11 percent to 8 percent; and for Izmir from 9 percent to 7 percent.












Appendix C
BIVARIATE SPATIAL STATISTICS

Bivariate Median Program

The Bivariate Median program (BVMN) used in this study was developed by Dr. Richard Morrill, Department of Geography, University of Washington. Mr. Allan Sari, a graduate student in the Department of Civil Engineering subsequently modified this program in 1976. These modifications were not extensive. They dealt primarily with the modification of the plotting software used to generate the spatial plots appearing in this study. Correspondence regarding the availability of this program should be addressed to Dr. Morrill.

The legend for the maps about bivariate spatial statistics and definitions of the terms used in the legend are expressed below.

a) Legend for the maps

-  Potential mean distance
-  Standard distance
-  Mean deviations around bivariate median
-  Minimum and maximum standard deviation
-  Bivariate mean (weighted)
-  Bivariate mean (unweighted)
-  Bivariate median
-  Orthogonal median
-  Principal axis
-  Data point of minimum travel
-  Point of maximum potential

Bivariate weighted mean (measure of equity):

$$\text{minimum } w_j r_j^2$$

(w_j is weights; r_j is radial distance)

Bivariate median (measure of efficiency, minimum aggregate travel):

$$\text{minimum } w_j r_j$$

Point of maximum potential:

$$\text{maximum } \frac{w_j}{r_j}$$

Standard distance (from bivariate weighted mean);

$$S_d^2 = S_x^2 + S_y^2 = \frac{\sum w_j (x_j - \bar{x})^2}{\sum w_j}$$

$$S_y^2 = \frac{\sum w_j (y_j - \bar{y})^2}{\sum w_j} \quad \bar{x} = \frac{\sum w_j x_j}{\sum w_j}$$

$$\bar{y} = \frac{\sum w_j y_j}{\sum w_j}$$

Relative dispersion: This measure quantifies gross spatial dispersion of a distribution. It is equal to ratio of standard distance of the distribution (weighted) over standard distance of the territory. Standard distance of territory is not the standard distance of the unweighted distribution, but a standard unweighted dispersion of points if the points were uniformly distributed over the area.

$$\text{Standard distance of the territory} = \left[1/12 (x_{\max} - x_{\min})^2 + 1/12 (y_{\max} - y_{\min})^2 \right]^{1/2}$$

if < 1 : centrality

if > 1 : peripherality

Principal axis: It indicates directional tendency in a spatial distribution. Maximum positional variation occurs in the same direction, and vice versa; the sum of the square of deviations measured perpendicularly from the principle axis is a minimum.

Minimum and maximum standard deviation: These measures are the minor and major radii of the standard deviational ellipse, and describe the components of spatial dispersion parallel (major radius) and perpendicular (minor radius) to the directionality of the distribution described by the principal axis.

$$\text{Skewness} = 1 - \frac{\text{minimum variation}}{\text{maximum variation}}$$

- if 0: no directional bias, circularity
- if 1: all on one line, linearity (same directional orientation as the principal axis)

When skewness (which is a measure of whether the distribution is circular or linear, and which is affected by the shape of the territory) was estimated, it was found to be 0.59. The value of 0.59 indicated medium skewness, but with a slight "linearity" which seems to be due to the shape of the territory.

Eccentricity

The measure of "eccentricity" is estimated as

$$E = \sqrt{(\bar{x}_p - \bar{x})^2 + (\bar{y}_p - \bar{y})^2} / d$$

where \bar{x}_p and \bar{y}_p correspond to bivariate weighted mean, and \bar{x} and \bar{y} correspond to bivariate unweighted mean; and d is standard unweighted distance.

Bachi estimates this measure using not the bivariate unweighted mean of the distribution but those of the theoretical uniform distribution. He does not give the values for \bar{x} and \bar{y} for Turkey [Bachi, 1976]. Therefore, for calculation of the measure of eccentricity in this study, the bivariate unweighted mean of the distributions, and not those of the theoretical uniform distribution, is used.

Table D.1. Permanent resident population of province centers, number of in-migrants, and the in-migration rates

Province center	Permanent resident population of province centers (in 1965)	Number of in-migrants	In-migration rates		
Adana	276,364	23,387 (22,820)	8	Istanbul	1,493,916
Adiyaman	27,620	3,563	13	Izmir	407,642
Afyon	54,499	3,613	7	Kars	49,692
Agri	29,346	2,242	8	Kastamonu	28,439
Amasya	37,481	3,902	(7)	Kayseri	120,106
Ankara	815,042	108,881 (107,412)	10	Kirklareli	15,745
Antalya	74,996	8,633	13	Kocaeli	1,231
Artvin	11,579	1,749	12	Kirsehir	26,970
Aydin	45,965	3,692	(11)	Kocaeli	4,702
Balikesir	79,759	9,637	15	Konya	10,864
Bilecik	16,996	1,837	8	Konya	17,768
Bingol	14,285	2,682	12	Kutahya	5,420
Bilis	22,896	1,449	11	Malatya	7,920
Bolu	25,001	3,392	19	Manisa	3,995
Burdur	32,149	5,145	6	Maras	6,859
Bursa	219,818	18,717	14	Mardin	927
Canakkale	24,201	2,659	16	Mugla	1,869
Cankiri	23,422	2,429	(13)	Mus	2,238
Corum	45,440	5,102	9	Nevsehir	1,790
Denizli	63,558	8,409	13	Nigde	3,151
Diyarbakir	113,116	11,571	(8)	Ordu	4,211
Edirne	40,823	2,311	11	Rize	1,871
Elazig	84,421	7,816	10	Sakarya	5,691
Erzurum	45,206	3,655	11	Samsun	9,810
Erzincan	114,694	10,277	13	Sirt	1,594
Eskisehir	165,306	17,943	6	Sinop	1,066
Gaziantep	161,514	20,588	9	Sivas	11,752
Giresun	31,195	3,548	8	Tekirdag	3,315
Gunushane	12,661	1,115	9	Tokat	3,219
Hakkari	12,995	738	11	Trabzon	6,101
Hatay	68,277	3,189	13	Tunceli	1,135
Isparta	40,362	4,722	11	Urfa	4,402
Icel	90,776	7,795	11	Usak	6,428
			6	Van	4,177
			(5)	Yozgat	28,473
			5	Zonguldak	4,608
			12		
			9		

Note: The values in parentheses refer to the data which are adjusted for "rural"-village-to-province-center migration. Only those values which are different than the values for village-to-province-center migration for more than 1,000 for absolute numbers, and 1 percent for rates, are listed.

Table D.2. Permanent resident population of villages, number of out-migrants, and the out-migration rates

Provinces	Permanent resident population of villages (in 1965)	Number of out-migrants	Out-migration rates		
Adana	441,488	17,955	4	Istanbul	70,159
Adiyaman	(431,157)				(26,422)
Afyon	199,741	5,791	3	Izmir	19,991
	359,188	8,251	2		(14,683)
	101,000				

•
•
•

•
•
•

•
•
•