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Subregional Population Projections for Tuscany

Campisi, D.

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SUBREGIONAL POPULATION PROJECTIONS FOR TUSCANY

Domenico Campisi*

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Institute of Systems Analysis and Computer Science, and Special Project on Transportation, of the National Research Council, Rome, Italy

INTERNATIONAL INSTITUTE FOR APPLIED SYSTEMS ANALYSIS
A-2361 Laxenburg, Austria

PREFACE

Specialization is one of the foremost traits of modern industrial development. Technical and commercial factors have interacted to make large-scale production more profitable than earlier. This process has been concomitant with a regional concentration of production activities according to the prevailing comparative advantages. Even large, and strong, economic regions tend to have an insufficiently differentiated economy. In Tuscany, Italy, it is the leather, footwear, and textile industries that constitute the economic backbone of the region. They are complemented by, and competitive with, the traditional tourist industry.

Technical progress and the development of factor costs have entailed a shift in international and interregional comparative advantages. Those industries demanding only low-skilled labor have expanded in low cost countries or regions. How these factors will affect the long-term development is a general problem of strongly specialized regions in industrialized countries.

Such questions are also at the core of the case study of systems analysis for regional industrial development undertaken by the Regional Development Group, IIASA, in collaboration with the Regional Institute for Economic Planning of Tuscany (IRPET). A third party in this collaboration is the Institute for Systems Analysis and Computer Science (IASI) of the National Research Council (CNR), Rome. In the case study, a system of economic forecasting and policy evaluation models that address the above-mentioned development issues are being built. The models have a stronger emphasis on interregional and international dependencies than those of earlier regional studies. Moreover, the role of the regional authorities in policy generation and evaluation is more clearly designed here than elsewhere. The aim of the work is to develop a computerized model system for more or less permanent use, with a direct applicability to other urbanized regions of the Tuscany type.

In this collaborative paper Domenico Campisi, IASI, Rome, summarizes his Ph.D. thesis on interregional population projections for the Tuscany region. He also shows how different assumptions about international migration and fertility affect both the total development of Tuscany and the population distribution among its urban areas. In this way the paper provides some scenarios for the population development of Tuscany up to the year 2000, which could be transformed into labor supply alternatives and into demand elements for the submodels for private and public consumption.

Laxenburg, August 1982

Boris Issaev
Leader
Regional Development Group

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SUBREGIONAL POPULATION PROJECTIONS FOR TUSCANY

Domenico Campisi

1. INTRODUCTION

The natural growth of the Tuscany region of Italy has been relatively stable since 1951 (with the natural growth rate equal to zero). This paper is one of the first contributions to the population analysis of this region. With the help of models developed at IIASA (Willekens and Rogers 1978), an attempt is made to answer questions such as: How many people will live in Tuscany in the next 10, 15, 20 years if migration flows remain constant? Will the present migration pattern persist? What effects have changes in international migration had on the population of Tuscany over the last ten years? What are the rates of change and the share of population in the subregions of Tuscany?

The main interest in Tuscany's subregional population growth is not however of a purely demographic nature. When there is large-scale migration within a region as well as between regions and countries, environmental and planning problems arise. Population growth in Tuscany is governed by migration flows rather than by natural growth patterns, since migration is the force that balances regional labor demand and supply. This is a general problem of Italian regions. At the beginning of the 20th century the economic development of Italy accelerated as a result of migration overseas. Between 1960 and 1968 many industries

grew rapidly because of internal movements from the south to the north of Italy.

Migration flows and the "tales from migrants" have recently become a part of Italian history affecting the economic and political life of the country. A better knowledge of internal and international migration can thus help to avoid future conflicts with respect to the environment, the housing market, the planning of schools and hospitals, the provision of general services, and so on.

The problem of the location of firms has received much attention in the last decades. Recent results in Italy still show that developing industrial regions are achieving competitive results even if they avoid moving labor over a short period of time*. It is thus essential to understand the effects of labor demand changes on migration and on other mobility patterns when forecasting real economic development in Tuscany.

In the second section of this paper, linkages between population and employment in Tuscany are described. In section 3 the effects of different international and internal migration and fertility patterns on the population projections are discussed, see also Campisi (1981). Section 4 presents the conclusions.

2. POPULATION AND EMPLOYMENT IN THE TUSCANY REGION

During the last decade the population of Tuscany has reached stability as a result of a decline in the natural growth rate, despite the relatively high net positive rate of migration. This long-term process began at the beginning of the 20th century, reaching relative stability in 1951 and complete stability in 1971 (Table 1).

At the regional level, population growth occurred as a result of migration flows from 1977 onwards (Tables 2 and 3), whereas at the subregional level this situation was generally present from 1971, and even earlier in some subregions (Table 4, Figure 1).

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*These results were obtained from the "Adriatic Industrial Development Model".

Table 1. Italian population per region, 1901-1978 (in 10^3 persons).

Regions	1901	1931	1951	1961	1971	1975	1978
Piedmont	3,320	3,458	3,518	3,914	4,432	4,541	4,541
Valle d'Aosta	84	83	94	101	109	114	114
Lombardy	4,315	5,596	6,566	7,406	8,543	8,838	8,910
Trentino A.A.	612	666	729	786	842	866	877
Veneto	2,586	3,487	3,918	3,847	4,123	4,278	4,321
Friuli V.G.	850	1,174	1,226	1,204	1,214	1,245	1,245
Liguria	1,046	1,423	1,567	1,735	1,854	1,867	1,859
Emilia R.	2,547	3,268	3,544	3,667	3,847	3,936	3,956
Tuscany	2,503	2,914	3,159	3,286	3,473	3,567	3,587
Umbria	579	696	804	795	776	795	808
Marche	1,089	1,240	1,364	1,348	1,360	1,390	1,404
Lazio	1,586	2,349	3,341	3,959	4,689	4,922	4,997
Abruzzi	1,465	1,545	1,277	1,207	1,167	1,211	1,228
Molise			407	358	320	330	334
Campania	2,914	3,509	4,346	4,761	5,059	5,280	5,379
Puglia	1,987	2,508	3,221	3,421	3,583	3,771	3,856
Basilicata	492	514	628	644	603	615	619
Calabria	1,439	1,723	2,044	2,045	1,988	2,034	2,058
Sicily	3,568	3,906	4,487	4,721	4,681	4,861	4,936
Sardinia	796	984	1,276	1,419	1,440	1,553	1,582
TOTAL ITALY	33,778	41,043	47,516	50,624	54,137	56,014	56,603

SOURCE: ISTAT: Social Yearbook for Italy (1975, 1981).

Table 2. Demographic flows in Tuscany (in 10^3 persons).

Year	Natural growth	Migration flow	Total growth
1970	+ 9.3	+13.4	+22.7
1971	+ 9.8	+15.3	+25.1
1972	+ 9.9	+18.0	+27.9
1973	+ 6.6	+18.3	+24.9
1974	+ 6.4	+18.6	+25.0
1975	+ 2.7	+11.7	+14.4
1976	+ 0.3	+11.5	+11.8
1977	- 3.3	+12.0	+ 8.7
1978	- 4.3	+11.6	+ 7.3
1979	- 7.3	+12.9	+ 5.6
1980	-13.5	+13.0	- 0.5
Total for period	+16.6	+156.3	+172.9

Source: Cavalieri and Maltinti (1981)

In comparing the migration rates of Italian regions in this period, a decrease in migration flows is evident. This decrease is larger for outmigration and smaller for inmigration (Table 3). In Tuscany the net positive migration flow of young people in search of their first job or completing their studies does not counterbalance the dominance of old people. In comparing the age composition of its population with that of the rest of Italy, one can see the differences in age distribution: 17 percent and 13 percent, respectively, for people over 65 years of age; 18 and 33 percent, respectively, for people under 18 years of age.

This difference in age structure has been in existence since 1971 but it became accentuated between 1975 and 1980 having effects on public expenditure caused by a rise in the number of retired persons relative to the number of persons in the productive age groups. Internal differences between the northern and southern subregions exist within Tuscany. The southern subregions (Grosseto, Siena) have a long-run decrease in population, which is explained by the high rate of emigration from Italy resulting from the change from labor- to capital-intensive agriculture.

Table 3. Inmigration and outmigration rates of Italian regions (per 10^3 persons).

Regions	Inmigration rates[a]				Outmigration rates[a]			
	1960	1965	1970	1975	1960	1965	1970	1975
Piedmont	51.48	42.69	45.46	29.52	34.47	41.89	36.42	29.36
Valle d'Aosta	28.70	31.26	38.84	28.83	23.02	27.61	33.04	24.32
Lombardy	42.00	38.17	37.44	26.45	34.45	35.48	30.67	25.14
Trentino A.A.	24.76	26.01	25.93	20.58	25.07	27.17	26.77	20.09
Veneto	28.61	26.95	28.55	22.18	38.08	27.99	28.25	20.85
Friuli V.G.	25.03	27.19	28.33	23.66	26.19	27.02	26.58	21.29
Liguria	33.72	28.94	29.13	21.87	22.33	24.41	24.53	19.77
Emilia R.	42.46	29.03	31.12	22.26	42.84	29.62	28.13	19.60
Tuscany	32.48	29.90	31.03	21.12	30.54	28.63	27.13	18.53
Umbria	25.86	20.57	21.08	17.33	31.96	24.63	25.26	15.56
Marche	30.84	25.18	28.02	20.00	37.38	27.97	29.34	19.14
Lazio	27.77	25.63	24.99	21.10	18.61	19.76	20.52	18.97
Abruzzi	20.93	24.74	24.27	23.07	28.24	27.27	27.79	22.81
Molise		19.81	21.52	21.14		25.52	26.71	24.05
Campania	20.94	23.26	24.18	22.81	24.53	25.25	31.01	25.13
Puglia	17.77	20.08	18.22	17.68	27.83	22.11	25.61	19.92
Basilicata	17.54	20.38	19.22	19.22	30.79	28.37	36.83	25.11
Calabria	16.93	21.10	18.63	21.25	27.59	26.38	31.36	25.04
Sicily	20.84	21.06	20.09	21.25	26.31	23.49	27.29	22.97
Sardinia	27.74	27.88	25.20	23.76	34.13	30.08	31.14	23.97
ITALY	0.83	1.01	1.98	1.93	0.97	1.39	2.35	0.84

[a]The regional rates do not include the international component; the gross international rates are given only for Italy as a whole.

SOURCE: ISTAT: Statistical Yearbook for Italy (1960-1978).

Table 4. Migration rates in selected Italian regions (per 10^3 persons).

Region	Inmigrants	Outmigrants	Total migrants	Internal movement	Internal movement as %	Net migration
PIEDMONT						
1955-1957	44.9	34.4	79.3	54.7	69.0	10.5
1958-1963	52.9	37.8	90.7	56.4	62.0	15.1
1964-1970	46.6	38.4	85.0	54.0	64.0	8.2
1971-1976	36.6	33.5	70.1	44.3	63.0	3.1
LOMBARDY						
1955-1957	33.4	27.6	61.0	45.7	75.0	5.8
1958-1963	45.7	32.9	78.6	55.2	70.0	12.8
1964-1970	38.5	33.0	71.5	50.1	70.0	5.5
1971-1976	31.4	27.9	59.3	40.9	69.0	3.5
VENETO						
1955-1957	25.7	35.0	60.7	39.3	65.0	-9.3
1958-1963	30.5	37.8	68.3	46.0	67.0	-7.3
1964-1970	28.1	28.5	56.6	41.5	73.0	-0.4
1971-1976	25.5	24.4	49.9	37.7	76.0	1.1
EMILIA ROMAGNA						
1955-1957	37.9	38.6	76.5	60.5	79.0	-0.7
1958-1963	42.5	42.5	85.0	64.6	76.0	—
1964-1970	31.1	29.7	60.8	44.6	73.0	1.4
1971-1976	25.8	23.3	49.1	34.9	71.0	2.5
TUSCANY						
1955-1957	30.5	28.6	59.1	43.9	74.0	1.9
1958-1963	35.9	34.4	70.3	51.1	73.0	1.5
1964-1970	30.6	28.0	58.6	41.9	72.0	2.6
1971-1976	25.4	22.4	47.8	33.1	69.0	3.0

Source: ISTAT: Social Yearbook for Italy (1975, 1981).

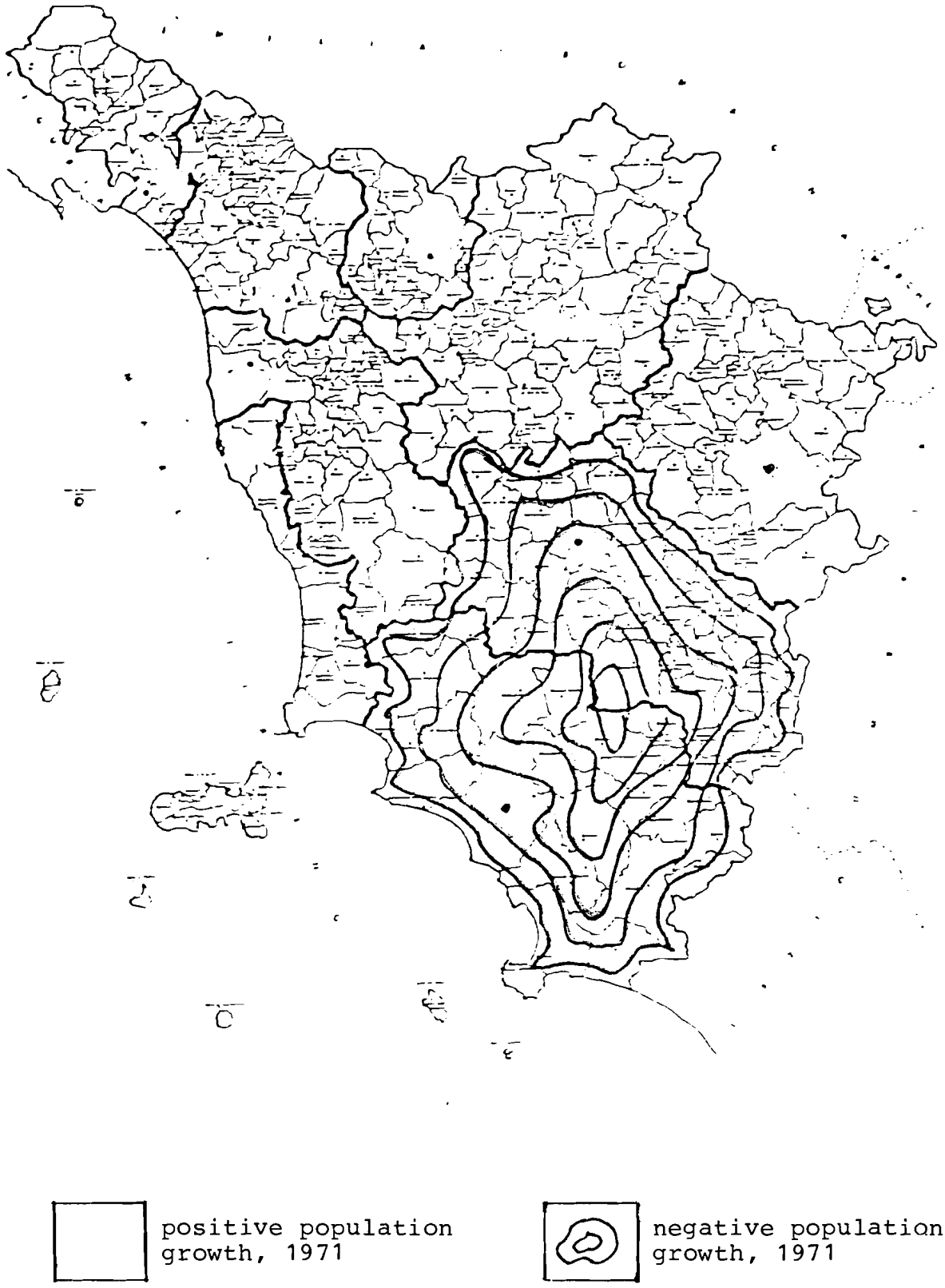

Figure 1. Population growth in Tuscany.

The subregion of Florence is of special interest because of the considerable inmigration caused by tourism, cultural and university life (many young people move there to study or to find work, but they generally return to their place of origin before producing children), and labor movements towards the industrial hinterland.

The subregions of the Tirrenian cost (Pisa, Leghorn) with harbors, chemical and mechanical industries are characterized by high rates of internal migration. They will become an integrated pole of industrial development of Tuscany.

In a national context, the existence of high levels of net migration flows in Tuscany (the largest after Lombardy, Piedmont, and Lazio) can be explained both by the good performance of the Tuscan economy and by the internal labor demand exceeding the labor supply formed by residents. Regional development studies of Tuscany indicate that the region exhibits the characteristics of a mature post-industrial economy in which the employment share of the industrial sector is falling while that of the service sector is rapidly increasing (Figure 2). The process is, however, not sufficiently widespread to absorb inexperienced people seeking employment in the service sector (this type of job accounts for more than 50 percent of total employment). This group prefer to emigrate or become unemployed, rather than to meet the internal demand for "blue-collar" labor*.

Such a situation has caused a decline in fertility rates (the family is composed of older people than in former times) and in high rates of inmigration towards the industrial areas. The involuntary unemployed, excluding new entrants to the labor force, constitute less than 3 percent of the total population, because women are more likely to enter and remain in the labor force than in the past.

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*They are referred to in Italian social studies as "intellectual unemployed".

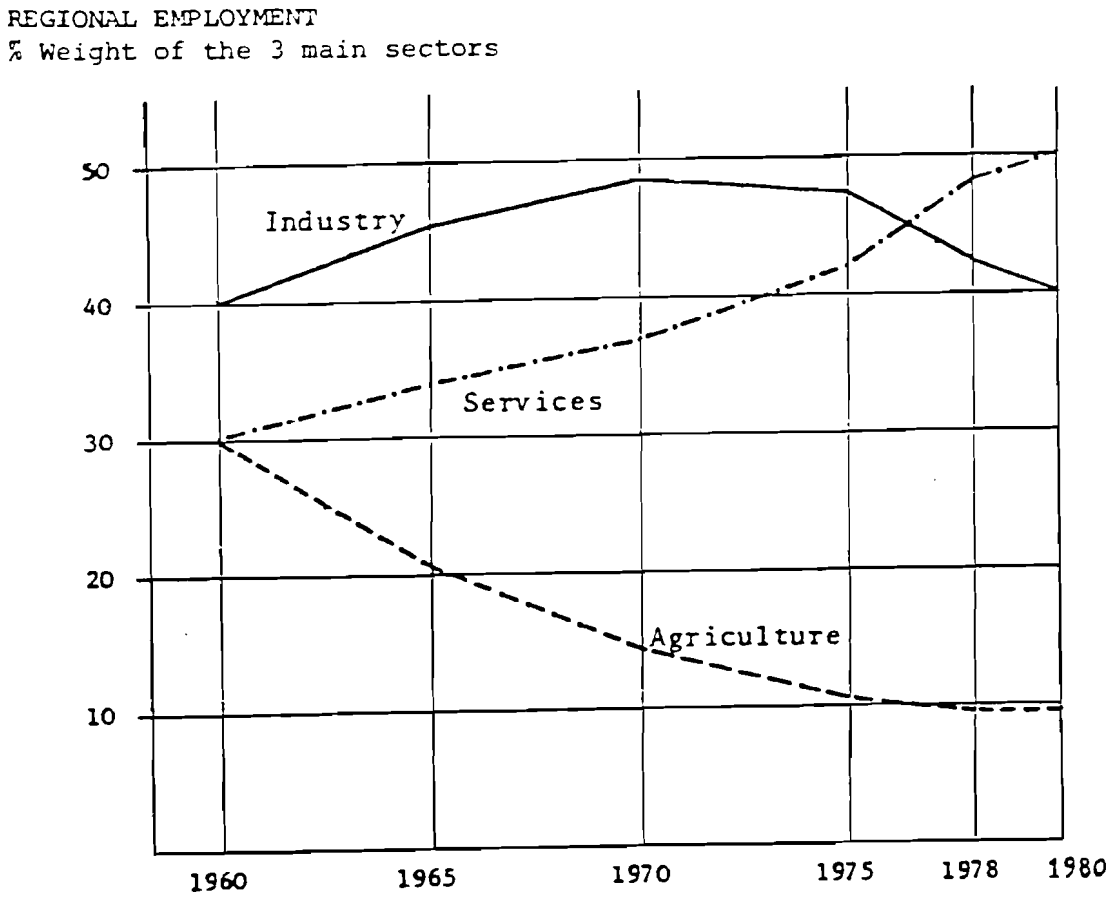

Figure 2. The sectoral composition of regional employment in Tuscany (Source: Cavalieri and Maltinti 1981).

Conflicts may occur in the labor force between male and female components, since women entering the market tend to remain (this trend is increasing), thus competing with new entrants. Tuscany may soon be one of the most industrialized regions of Italy (together with Marche, Emilia Romagna, and that part of Veneto specializing in export-oriented production). Therefore, in order to have an idea of the future labor supply, it is necessary to study the composition of the labor force not only by age but also by sex and occupation of the production sector. However, this is not being carried out in current regional population projections (Table 5).

Table 5. Population by age in Tuscany and the rest of Italy.

Age group	Tuscany		The rest of Italy	
	1975	1980	1975	1980
0-14	19.5	18.2	13.9	22.3
15-29	19.4	19.1	21.0	22.0
30-44	19.9	20.7	19.6	20.0
45-64	25.5	25.0	22.3	22.4
over 65	15.7	17.0	12.3	13.3
Total	100.0	100.0	100.0	100.0

Source: ISTAT: Social Yearbook for Italy (1981).

If migration flows (and the flows of productive labor within the region) do not balance the labor demand in total and in composition*, there may be conflicts and frictions in the labor market at the subregional, and thus at the regional level.

Some attention should thus be paid to demographic growth at the subregional level: the existing population density and spatial differences in accessibility could halt migration towards some urban areas (Florence and Prato, for example) having an effect on labor planning and forecasting for certain production sectors. It is not difficult to imagine that it may be unrealistic to utilize simple population projections for densely populated areas, since heavy congestion and pollution may encourage residents to move to low-density areas.

3. POPULATION PROJECTIONS

The dynamics of a multiregional population system are governed by fertility, mortality, and migration rates. These components determine not only the size of the population, but also its age composition, spatial distribution, and growth rates.

*Although labor demand is not considered in this paper, it is being examined in the Tuscany case study.

Modified versions of the population projection models developed at IIASA (Willekens and Rogers 1978) have been used to perform population projections for Tuscany and its subprovinces. Eleven regions were considered: the nine subprovinces of Tuscany, the rest of Italy, and the rest of the world. For each region, the age structure of population, births, deaths, and migrants was considered for the year of the most recent Italian census, 1971. For the rest of the world, a constant age structure was used, with deaths occurring only in the oldest age group and being equal to births.

This approach, which was also used in other case studies (e.g., Andersson et al. 1981), introduces external gross migration rates instead of net international migration rates (Rogers 1976; Liaw 1978, 1980).

Five alternative projections* were produced considering different immigration and inmigration schedules and fertility rates, in order to consider the effects on the Italian population system of changes in international migration patterns.

Basic results are given together with aggregate statistical data in Tables 6-10. The overall results are then summarized in Table 11.

Table 10 shows that the projection most closely approximating the actual population size of Tuscany in 1981 is based on a reduction of net migration abroad to the 1981 level plus a reduction in overall fertility in Italy by 10 percent. This reduction is in line with the actual decrease in fertility in Italy as a whole. Hence, this alternative might be used as a reference case yielding a reasonable population projection for Tuscany for the decade 1981-1991 and perhaps also for the whole period 1981-2000.

Table 10 shows a steady increase in Tuscany's share of the Italian population, and even of Florence's share of the Tuscan population. A comparison with Table 6 indicates that the popula-

*A complete analysis of population movements between the subprovinces of Tuscany and the rest of Italy has also been performed (Campisi 1981).

tion development would have been more rapid in all regions with pure 1971 data and no external migration. Table 11 also shows that population growth in Tuscany is quite sensitive to the assumptions about international migration. Even though net international migration was negative for Italy in 1971, the population of Tuscany would still have increased more rapidly if that process had been accounted for. Table 11 also shows that a reduction in net migration would have had the same effect as a reduction in fertility on the population development of Tuscany.

In comparing Tables 6 and 7, it is evident that the negative balance of external migration in 1971 would have led to a considerably slower growth of the Italian population than if it had been assumed to cancel out altogether. However, the actual development of that migration component, leading to a decrease in net losses of population in Italy through foreign migration, would have implied a larger population in 1981 than in the case where the net foreign balance had been maintained at zero, see Table 6.

Moreover, a more positive balance for Italy in international migration than that of 1971 would lead to an increase in the Tuscany/Italy share of the population and to a shift towards younger ages in the age distribution of the subregions of Tuscany. In 1971 there was a negative net flow of migrants for Italy and a positive net migration flow for the subregions of Tuscany, especially for Florence. However, for Florence this situation was reversed during the 1970s.

A reduction in fertility rates by 10 percent from the 1971 level would lead to an increase in the Florence/Tuscany population share, see Tables 9 and 10. This effect can be explained by the low (in comparison with the average level in western Europe) fertility rates in all Tuscan subprovinces except Florence.

Table 6. Population projections without external migration patterns and with fertility levels of 1971.

	Statistics			Projections		
	1971	1978	1981	1981	1991	2001
Florence	1,146,647	—	1,211,524	1,258,423	1,359,513	1,449,118
Tuscany	3,494,300	3,600,000	3,602,919	3,663,059	3,823,254	3,964,301
% share Flor./Tusc.	32.8	—	33.6	34.3	35.5	36.5
Italy	54,101,289	56,913,000	—	56,678,000	58,894,040	60,546,137
% share Tusc./Italy	6.45	6.32	—	6.46	6.49	6.54

Table 7. Population projections with external migration patterns and with fertility levels of 1971.

	Statistics			Projections		
	1971	1978	1981	1981	1991	2001
Florence	1,146,467	—	1,211,524	1,263,646	1,365,733	1,452,179
Tuscany	3,494,300	3,600,000	3,602,919	3,676,490	3,838,888	3,971,623
% share Flor./Tusc.	32.8	—	33.6	34.6	35.5	36.6
Italy	54,101,289	56,913,000	—	57,943,218	57,194,024	57,775,391
% share Tusc./Italy	6.45	6.32	—	6.57	6.71	6.87

Table 8. Population projections with a reduction in external migration from 1971 to 1980, plus fertility levels from 1971.

	Statistics			Projections		
	1971	1978	1981	1981	1991	2001
Florence	1,146,467	—	1,211,524	1,264,709	1,371,624	1,466,610
Tuscany	3,494,300	3,600,000	3,602,919	3,678,704	3,852,143	4,004,592
% share Flor./Tusc.	32.8	—	33.6	34.3	35.6	36.6
Italy	54,101,289	56,913,000	—	56,843,612	59,157,583	60,884,324
% share Tusc./Italy	6.45	6.32	—	6.47	6.51	6.57

Table 9. Population projections with external migration patterns of 1971, plus a 10 percent reduction in fertility levels from 1971.

	Statistics			Projections		
	1971	1978	1981	1981	1991	2001
Florence	1,146,467	—	1,211,524	1,264,709	1,330,478	1,388,011
Tuscany	3,494,300	3,600,000	3,602,919	3,678,704	3,424,995	3,422,102
% share Flor./Tusc.	32.8	—	33.6	34.3	38.8	40.5
Italy	54,101,289	56,913,000	—	56,843,612	55,257,871	54,743,958
% share Tusc./Italy	6.45	6.32	—	6.47	6.19	6.25

Table 10. Population projections with a reduction in external migration from 1971 to 1981, plus a 10 percent reduction in fertility levels from 1971.

	Statistics			Projections		
	1971	1978	1981	1981	1991	2001
Florence	1,146,467	—	1,211,524	1,248,528	1,336,158	1,401,519
Tuscany	3,494,300	3,600,000	3,602,919	3,631,923	3,752,900	3,829,229
% share Flor./Tusc.	32.8	—	33.6	34.3	35.6	36.6
Italy	54,101,289	56,913,000	—	56,031,822	57,467,333	58,057,789
% share Tusc./Italy	6.45	6.32	—	6.44	6.53	6.59

Table 11. Set of population projections for Tuscany with 1971 census data: deviation from actual population size in Tuscany in 1981.

	Fertility levels in 1971	10 percent reduction in fertility levels
External migration disregarded	+ 60,000	—
External migration of 1971	+ 74,500	+ 76,000
External migration of 1981	+ 76,000	+ 29,000

4. CONCLUSIONS

The analysis of current population development trends of the Tuscan subregions and of Tuscany as a whole presented in this paper points at a gradual increase in the population development of Tuscany as a whole. It also indicates a certain stability in the growth of Florence as the core area of the region. However, during the period 1971-1980 the population development shifted towards stagnation.

The IIASA model for multiregional population projections has been applied to the population system of the Tuscany region and its subprovinces, and the rest of Italy, with the aim of producing population scenarios for use in the overall model system of the Tuscany case study. Although the projections presented here may not be those that are finally used as input to the submodels of the labor market, private consumption, and the public sector, the paper nevertheless demonstrates a methodology for producing forecasts of this type.

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