an account on factors affecting fertility in Greece (1930-1975)

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I. introduction

Demographers used to classify the countries in three groups before the Second World War:

a. less developed countries (high birth rates and high death rates)
b. countries in demographic transition period[1] (rather high birth rates and low death rates)
c. countries with low birth and death rates.

In 1930's the Eastern and Southern Europe belonged to the group (b)—the birth rates were above 30‰—but in the Western and Northern Europe, where the demographic transition was already completed, the birth rates were rather low.

Nowadays, this differentiation among European countries has diminished. Their level of fertility is about the same irrespective of the fact that there are existing differences in infant mortality, educational level, economic development and other socioeconomic factors affecting fertility.

Although the level of development of Greece is lower than most of the rest of the European countries (see Table I), its fertility level is quite similar to the rest. Nevertheless, Greece may be considered as a plausible application of the demographic transition theory. As it will be also seen, the factors which are generally believed to affect fertility seem to apply quite well in the case of Greece.[2]

II. fertility indices

There are various indices through which the frequency of births is measured.

According to the crude birth rate (ratio of a year's registered births to the total mid-year population), there has been an almost 50% decline between the years 1928-1975.

In the Table II and diagram I, this drastic decline is clearly shown.

1. Demographic transition: the term is usually given to the sum of variations which occur in fertility and mortality rates, when a traditional society becomes industrialized. According to this theory a gradual change is observed from high death and birth rates (very low or not at all population growth), to lower death but still high birth rates (accelerated population growth), ending by low death and low birth rates, when the society becomes highly industrialized (very low or not at all population growth). For a better understanding of the demographic transition theory see also: Michael S. Teitelbaum, «Relevance of Demographic Transition Theory of Developing Countries», A special Science Compendium.

2. The official demographic life of Greece started in 1828, when the first census took place, after the Independence War of 1821. The registration of vital events started in 1860, but various historical facts and political changes ever since, contributed for the poor quality of the results. The only comparatively reliable data on vital events is that of the period 1930-39 and after 1956.

TABLE I. *Selected Demographic Social and Economic Characteristics for Some European Countries: Comparison to Greece*

Countries	Population mid-1975 estimated	Distribution of population by age, 1975			Birth rate per 1000 1970-75 Average	Death rate per 1000 1970-75 Average	Natural increase	Infanty mortality per 1000 live births	Life expectancy at birth 1970-75 Average	Literacy	Per capita public education expend's 1972	Per capita GNP 1973	Per capita GNP growth rate 1965-73	Per capita energy consumption 1973
		0-14 yrs	15-64 yrs	65+yrs										
	(mil)	(%)	(%)	(%)			(‰)		yrs	(%)	%	%	%	(kg. coal equiv.)
France	52.9	24	63	13	17.0	10.6	6.4	16	73	97	135	4,540	5.0	4,491
Germany Fed. Rep.	61.9	22	64	14	12.0	12.1	0.1	20	71	99	189	5,320	4.0	5,993
Greece	*8.9*	*24*	*64*	*12*	*15.4*	*9.4*	*6.0*	*27*	*72*	*80*	*26*	*1,870*	*7.6*	*2,066*
Hungary	10.5	20	67	13	15.3	11.5	3.8	34	70	97	68	1,850	2.7	3,502
Italy	55.0	24	64	12	16.0	9.8	6.2	26	72	93-95	103	2,450	4.2	3,103
Spain	35.4	27	62	11	19.5	8.3	11.2	15	72	86	31	1,710	5.3	2,021
Sweden	8.3	21	64	15	14.2	10.5	4.7	10	73	99	410	5,910	2.4	5,973
United Kingdom	56.4	24	62	14	16.1	11.7	4.4	18	72	98-99	161	3,060	2.3	5,588
Yugoslavia	21.3	26	66	8	18.2	9.2	8.0	43	68	80	38	1,060	6,0	1,744

Sources: 1) Hansen D. Royer and the Staff of the Overseas Development Council, «The US and World Development Agenta for Action 1976», *Overseas Development Council 1976*, p. 141.
2) Nortman Dorothy, Hofstatter, «Population and Family Planning Programs: A Factbook, Reports on Population and Family Planning», *Population Council*, number two (seventh edition), October 1975, p. 17.

TABLE II. *Crude Birth Rates 1931-1940, 1949-1975*

Year	Births per thousand population	Year	Births per thousand population
1931	30.8	1957	19.3
1932	28.4	1958	19.0
1933	28.6	1959	19.4
1934	31.1	1960	18.9
1935	28.2	1961	17.9
1936	27.9	1962	18.0
1937	26.2	1963	17.5
1938	25.9	1964	18.0
1939	24.8	1965	17.7
1940	25.5	1966	18.0
1949	18.6	1967	18.9
1950	20.0	1968	18.2
1951	20.3	1969	17.4
1952	19.3	1970	16.5
1953	18.4	1971	16.0
1954	19.2	1972	16.0
1955	19.4	1973	15.4
1956	19.7	1974	16.1
		1975	15.7

Source: NSSG, *Statistical Yearbook of Greece 1976*, Athens 1977.

DIAGRAM I. *Crude Birth Rates, 1921-1940, 1949-1975**

Source: NSSG, *Statistical Yearbook of Greece*, 1976.

* Data is not available for the period 1941-1948.

TABLE III. *Live Born per 1000 Women at the Specified Age Groups 1933-37, 1956-75*
Age of mother

Year	15-19	20-24	25-29	30-34	35-39	40-44	45-49	TFR
1933-37	18.2	129.4	205.5	178.5	141.1	51.6	12.6	3,684
1956	14.2	101.1	157.8	109.7	59.2	10.2	3.2	2,322
1957	14.8	97.9	153.6	110.4	56.2	17.1	2.9	2,264
1958	15.0	99.2	151.2	110.7	51.8	15.4	2.2	2,227
1959	17.9	104.9	155.4	110.6	49.8	13.6	2.0	2,271
1960	17.4	105.8	150.9	108.3	46.4	13.0	1.8	2,218
1961	16.4	99.1	144.8	101.0	51.7	13.5	1.5	2,140
1962	16.3	107.3	144.7	104.9	47.2	12.7	1.3	2,172
1963	17.9	110.9	141.3	100.8	45.0	11.9	1.4	2,148
1964	21.8	131.3	147.2	102.3	44.5	11.4	1.2	2,298
1965	25.5	120.0	147.6	99.3	44.2	10.8	1.4	2,244
1966	27.9	124.1	152.7	101.0	43.4	10.4	1.1	2,303
1967	31.3	132.4	162.3	101.6	45.1	10.2	1.3	2,421
1968	32.9	133.8	158.6	97.6	43.4	9.8	1.1	2,386
1969	34.3	130.9	151.1	94.2	44.3	9.8	1.0	2,328
1970	36.9	143.7	152.6	93.4	42.3	9.3	1.1	2,401
1971	36.4	143.5	149.0	90.2	41.2	9.5	0.9	2,354
1972	37.7	141.9	146.4	87.2	38.9	9.2	0.9	2,311
1973	39.2	140.7	140.6	82.1	37.8	9.0	0.9	2,252
1974	44.3	155.5	142.7	83.0	37.2	9.1	0.8	2,363
1975	44.7	153.9	138.9	80.5	35.4	8.7	0.8	2,314

Sources: 1)NSSG, *Vital Statistics of Greece, 1956-1974.*
2)NSSG, *Statistical Yearbook of Greece 1976,* Athens 1976, p. 18,40.

This index being too general, is mostly appropriate for international comparisons, but it is unsafe to base very definite conclusions on its evidence alone, for it mixes together men and women, as well as many population groups whose fertility varies widely, and weight is mainly given to the fertility experience of large groups.

The fertility decline is also ascertained by the age specific fertility rates (ratios of births by age of mother, to women in each age interval, usually in five years' age interval), which are most precise fertility indices, for they are not significantly distorted by variations in age composition, either in the total population or among the women in child-bearing ages, and they identify approximately a few stages in the reproductive careers of the different age groups of women.

Thus, during the period 1933-37 and 1956-75, these rates have suffered a continual decline, as clearly shown in the diagram II (see also Table III). The decline of fertility rates has occurred, as it will be discussed later on, mainly in mothers over the age of 30 and in birth orders beyond the second.

The total fertility rate (TFR) (resulting from the sum of age specific fertility rates multiplied by five), summarizes rather effectively the frequency of births of a particular year. The rates fluctuate since 1956 above 2000 (Table III, diagram III); in 1975 for example—latest available year—there is a correspondence of 2.3 children per woman of reproductive age.

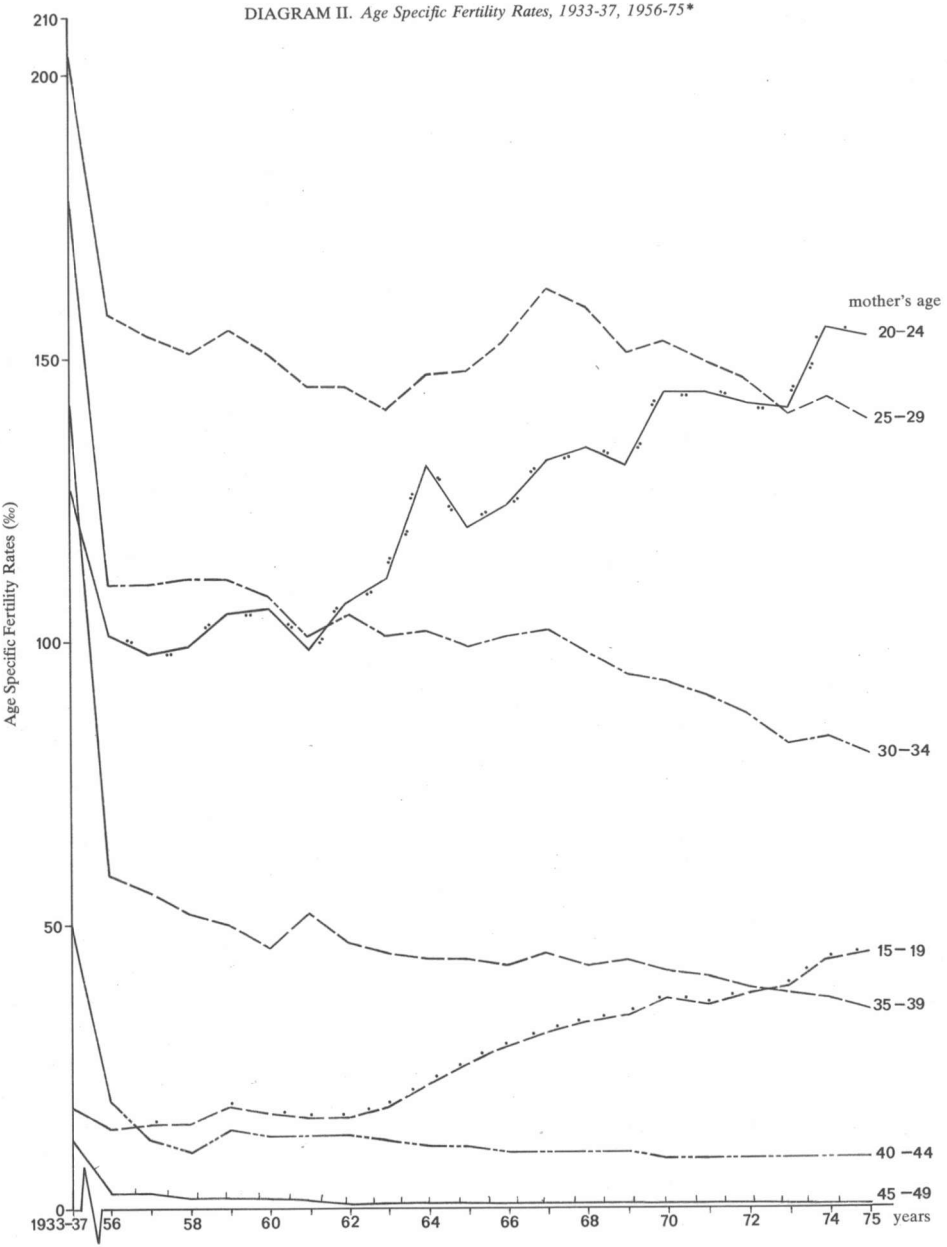
Finally, considering the net reproduction rates (NRR), i.e. the rates indicating the number of daughters ever born to the cohort of women of child-bearing period, mortality of the women taken into account as well, it may be seen that the women hardly replace themselves.

TABLE IV

Period	Net reproduction rates (NRR)
1933-37	1.26
1956-59	1.06
1960-64	0.98
1965-69	1.05
1970-74	1.07

Sources: 1) D. Trichopoulos, P. Papaevangelou, *The Population of Greece, World Population Year, 1974, CICRED,* Series, p. 34.
2) NSSG, *Vital Statistics of Greece, 1970-74.*

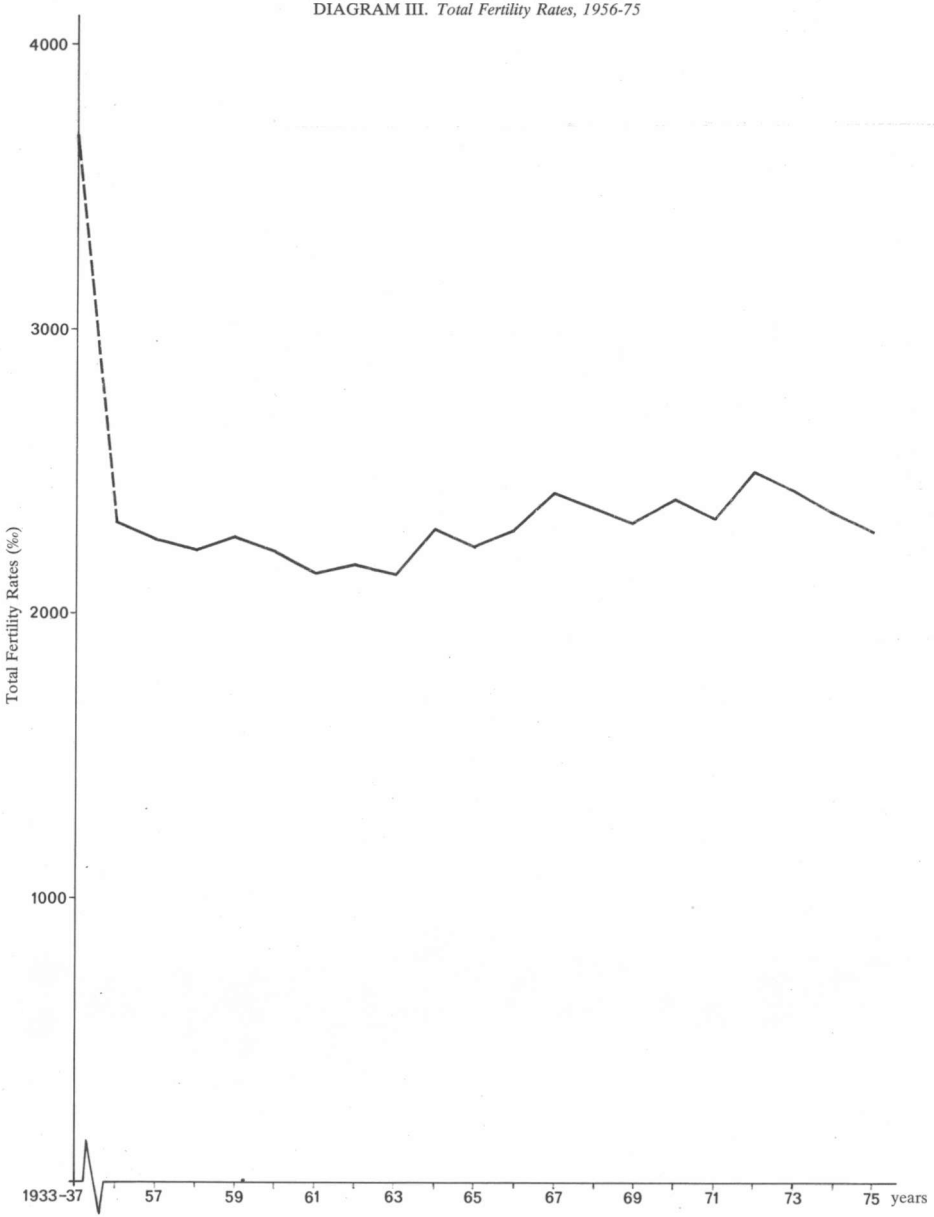
DIAGRAM II. *Age Specific Fertility Rates, 1933-37, 1956-75**



Source: Table III.

* Data is not available for the period 1938-55.

DIAGRAM III. *Total Fertility Rates, 1956-75*



Source: Table III.

Adult mortality in Greece being among the lowest in Europe and indeed in the whole world (1971-75: 8.6 deaths per 1000 population, 1961: 7.6 deaths per 1000 population),[3] the relatively low NRR are mainly due to the low birth rates.

III. factors affecting fertility

Lacking a deep and detailed contemporary survey on Greek fertility, the approach to the reasons for such a fertility evolution was done through the use of incomplete statistical data, thoughts and assumptions.

Thus, the following is only an attempt to pinpoint factors that have been traced, by international fertility surveys so far upon the subject.

a. *Median Age of Marriage*

The median age of marriage, being a demographic factor influencing natural fertility, has been reduced between 1961 and 1974 by one year for the males and by about two years for the females.

TABLE V. *Median Age of Marriage*

Year	Males	Females
1928	28.1	23.3
1961	29.1	24.7
1965	29.0	24.1
1971	28.4	23.1
1974	28.1	22.9

Source: NSSG, *Vital Statistics of Greece 1974*, Athens 1977.

Yet, the above reduction in the age of marriage did not even lead to a slight increase in fertility rates. On the contrary, an actual reduction has occurred.

There is an unequal distribution of fertility, leading to a relative peak in the three first years of marriage. This holds not only in general, but also particularly, i.e. in the urban, semi-urban and rural areas. So, in 1974, 66% of births were registered in the urban areas, 60% in the semi-urban and 55% in the rural areas.[4]

b. *Maternity Age*

The median maternity age has also been reduced by two years, between 1961-74 (1961: 28.2 — 1974: 26.2): [5] parents prefer to bear all children they wish—usually up to two—early in the marriage.

The slight decline in maternity age does not necessarily indicate an increase in fertility prospects, since it is only combined with a small increase in the first age groups fertility rates (i. e. the age groups 15-19, 20-24 appear to have a comparatively higher fertility for 1974, than for 1961. See also Table III and diagram II). This statement is reinforced by the extremely high percentages of births of first and second order. So, in 1974 the 80% of the births were first and second rank births. For the third order onwards the rates fall sharply.[6]

c. *Infant Mortality*

Infant mortality is generally considered as a demographic factor influencing fertility; usually a decline in the infant mortality rates reinforces the decline in fertility rates. Parents decide to bear the number of children they wish and not more, since the survival ratio is great.

Infant mortality in Greece has been considerably reduced since 1931, when it was 134‰, while in 1949 it was 42‰ and in 1975 it was 27‰ (see also Table VI, diagram IV). On the other hand, the heavy losses of young children along with the comparatively low natality, derange the population composition and contribute for the lowering of the percentage of children 0-15 in the population structure.

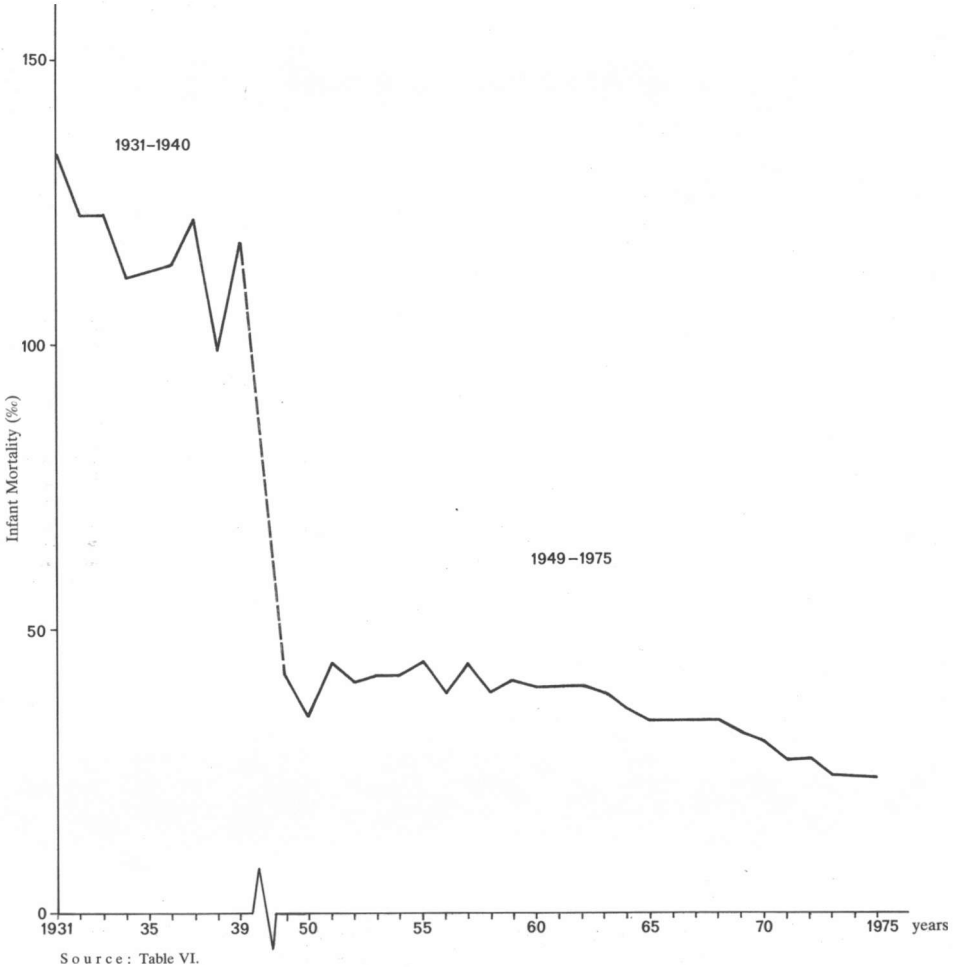
1. Using the regression analysis technique assuming that there is a linear relationship of the type $Y=a+bX$ between fertility as expressed by the crude birth rates (Y) on the one hand and the infant mortality rates (X) on the other, for the years 1931 and onwards (data is given in the Tables II and VI), it has been found that a strong correlation exists between the two variables (adjustment has been made for the gap of information between the years 1940, 1949).

The correlation coefficient $\rho=0.97$ indicates that the prediction of taking the infant mortality rates as an explanatory factor of the fertility evolution is accurate. The positive sign indicates that the higher the infant mortality the higher the crude birth rates are expected to be. The coefficient of determination $\rho^2=0.93$ indicates that 93% of the variance in the crude birth rates is accounted for by the variance of the infant mortality rates.

Using the values of the constants a and b (which were found to be statistically significant), calculated by the least squares method, in the equation $Y=a+bX$, i.e. $a=13.66$ and $b=0.12$, the relationship is plotted in scattegram I.

3. NSSG, *Statistical Yearbook of Greece, 1976*, Athens 1976, p. 37.
4. NSSG, *Vital Statistics of Greece 1974*, Athens 1977, p. 73,74.
5. NSSG, *Vital Statistics of Greece 1961-1974*.
6. NSSG, *Vital Statistics of Greece 1974*, Athens 1977, p. 76.

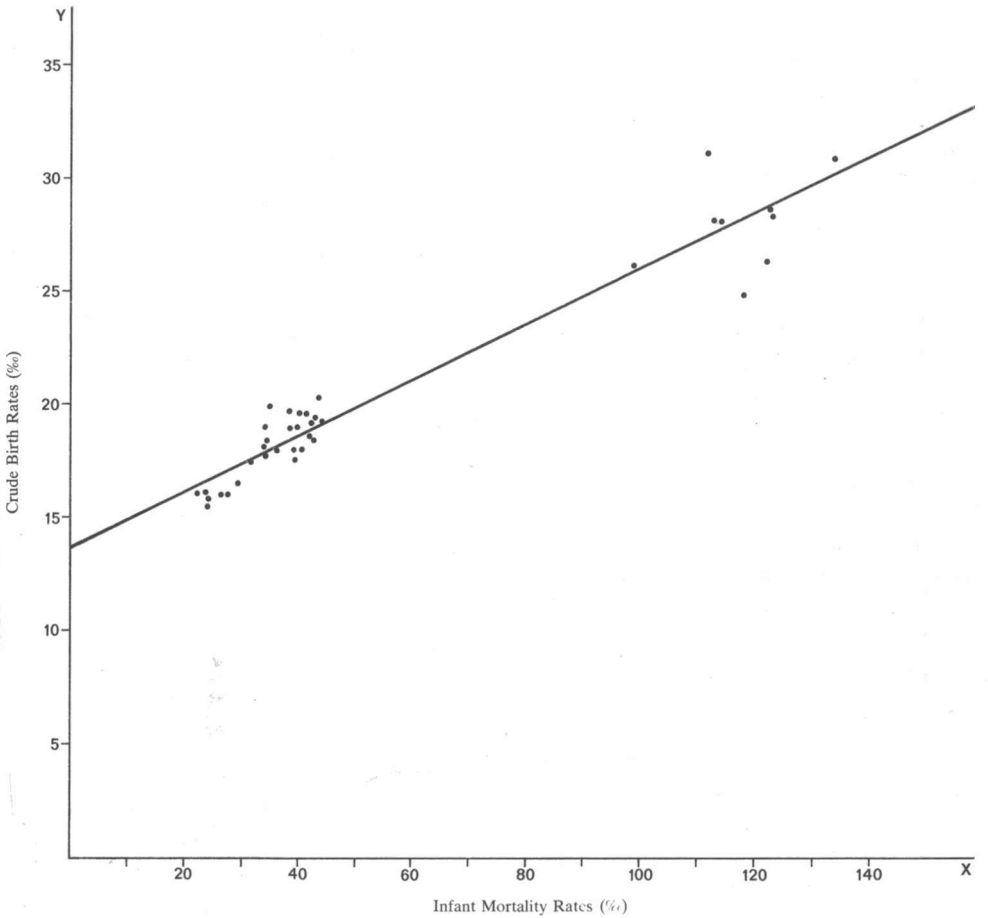
DIAGRAM IV. *Infant Mortality Rates, 1931-40, 1949-75**



Source: Table VI.

* Data is not available for the period 1940-1948.

SCATTEGRAM I. *Plot of the Crude Birth Rates (Y) and the Infant Mortality Rates (X) showing the regression line for predicting Y from X, 1931-40, 1949-75*



Source: Tables II and VI.

2. Next, the linear function of the form Y=bX, without constant, has also been tested but it proved inappropriate: births will continue to occur irrespectively of the infant mortality level. The same variation has been tested to be true for all the following examined variables.

With both methods 1 and 2, when applying the Durbin-Watson statistic it is found that a positive autocorrelation exists between residuals of successive observations. That leads to a next step: the application of the Cochrane-Orcutt iterative technique.

3. Applying the Cochrane-Orcutt technique, it has

TABLE VI. *Infant Mortality Rates, 1931-1940, 1949-1975*
Deaths under one year of age

Year	Infant deaths by 1,000 births
1931	134
1932	123
1933	123
1934	112
1935	113
1936	114
1937	122
1938	99
1939	118
1940	—
1949	42
1950	35
1951	44
1952	41
1953	42
1954	42
1955	44
1956	39
1957	44
1958	39
1959	41
1960	40
1961	40
1962	40
1963	39
1964	36
1965	34
1966	34
1967	34
1968	34
1969	32
1970	30
1971	27
1972	27
1973	24
1974	24
1975	27

Source: NSSG, *Statistical Yearbook of Greece, 1976,* Athens 1976, p. 37.

been found that the correlation coefficient between the residuals is RHO=0.94. The coefficient of determination ρ^2=0.96, a=17.86 and b=-0.03.

The negative sign of b reveals a negative relationship between the crude birth rates and the infant mortality rates. This is in fact the opposite to what is generally believed according to the theory of demography. Therefore, we may conclude that the sign of b was positive in the first case, where the least squares method was used, because of the existing autocorrelation.

4. Under the assumption that there must be a time lag between the change in infant mortality and the change in fertility (people need some time in order to change their fertility behaviour), we test the correlation between the crude birth rates and a 3-year moving average of infant mortality rates.

Applying first the ordinary least squares method and testing for autocorrelation by the Durbin-Watson statistic, it reveals a positive autocorrelation (D.W.=0.92). Therefore, we proceed with the Cochrane-Orcutt technique which gives a correlation coefficient between the successive residuals RHO= 0.55, ρ^2 =0. 84, a= 10.85, b=0.19 (when infant mortality rates are increasing by 1 unit the crude birth rates are increasing after 3 years by 0.2) and ρ^2 in terms of changes =0.17 (17% of the variance in the annual change of the crude birth rates can be explained by the variance of the annual change in the infant mortality rates).

d. *Abortion*

There is no statistical data concerning induced abortion in Greece due to the sensitivity of the subject on the one hand and to its illegacy on the other.

Yet, abortion is widely practiced all over the country and it is estimated by Professor Louros, that the number is as great as 100,000 induced abortions per year. Considering the annual number of live births recorded during the last decade in Greece (about 154,000), the ratio induced abortions to live births becomes two abortions every three live births.

The fertility survey conducted by the University Centre of Biometric and Demographic Research under the direction of V. Valaoras in 1962-64 and in 1966-67, revealed that in Greater Athens Area correspond four abortions per woman in average, and in the locations with population up to 100,000 inhabitants two abortions per woman. The main conclusion derived in that survey is that abortion constitutes the main reason of the fertility decline. The correspondence for the married women is 75 induced abortions per 100 married women.[7]

With the use of available data Polychronopoulou and Trichopoulos (1969) later estimated that induced illegal abortions were responsible for about 40% of the reduction of the fertility of Greek population.[8]

7,8. D. Trichopoulos, G. Papaevangelou. *The Population of Greece, World Population Year, 1974, CICRED* Series, p. 9,10,36.

e. *Place of Residence*

It is generally considered that fertility in rural areas is higher than that of the urban areas. This is also valid in Greece as it results from the available demographic data of 1961 and 1971 (see Table VII).

Nevertheless, high urbanization has intervened with high rural fertility: people from rural areas, who settle in the urban centers adopt the «small family» notion, and consequently this results in an overall fertility decline.

TABLE VII. *Differential Fertility by Permanent Residence and Age of Mother; Areas: Urban, Semi-urban, Rural 1961, 1971*

	Age specific fertility rates		
	1971		
	Areas		
Age of mother	Urban	Semi-urban	Rural
15-19	19.20	35.50	40.39
20-24	124.73	163.05	176.22
25-29	146.93	159.08	171.80
30-34	83.40	86.61	94.34
35-39	39.05	41.20	44.58
40-44	7.79	9.16	12.23
	1961		
	Areas		
15-19	14.42	12.79	18.71
20-24	83.85	92.48	112.56
25-29	124.55	145.98	167.69
30-34	86.13	107.90	122.68
35-39	38.26	48.92	67.64
40-44	7.19	12.75	21.86

Sources: 1) NSSG, *Results of the Population and Housing Census, 1961, 1971.*
2) NSSG, *Vital Statistics of Greece, 1961, 1971.*

f. *Level of Education*

It is widely believed that the higher the educational level the lower the fertility level. As parents become more educated, practice a more effective family planning, preferring to have a small number of children, so that they will have more opportunities for higher education, and for a higher quality of life in general.

Therefore, some explanation may be traced concerning the fertility trends. Thus, in 1936-38, the percentage of illiterate fathers was 12.5 and that of illiterate mothers 53.0. In 1974, these percentages fell off to 1.1 for the fathers and 2.1 for the mothers.[9]

In an attempt to correlate fertility with education, the regression analysis technique is used firstly with crude birth rates and the percentages of the illiterate grooms for a number of years (1936-38, 1956-74) and secondly with the crude birth rates and the percentages of the illiterate brides for the same years (data is given in the Tables II and VIII).

1. By the method of the ordinary least squares a strong correlation is revealed between fertility and illiteracy. In the case of illiterate grooms the correlation coefficient $\rho = 0.97$, i.e. it can be said that the higher the percentage of illiterate grooms the higher the population fertility level. The coefficient of determination in the relationship specified in the form of $Y=a+bX$. $\rho^2 = 0.94$, i.e. 94% of the variance in the crude birth rates is accounted for by the variance in the rates of illiterate grooms. In the case of illiterate brides $\rho = 0.98$ and $\rho^2 = 0.97$, i.e. the correlation is even stronger than in the case of the grooms.

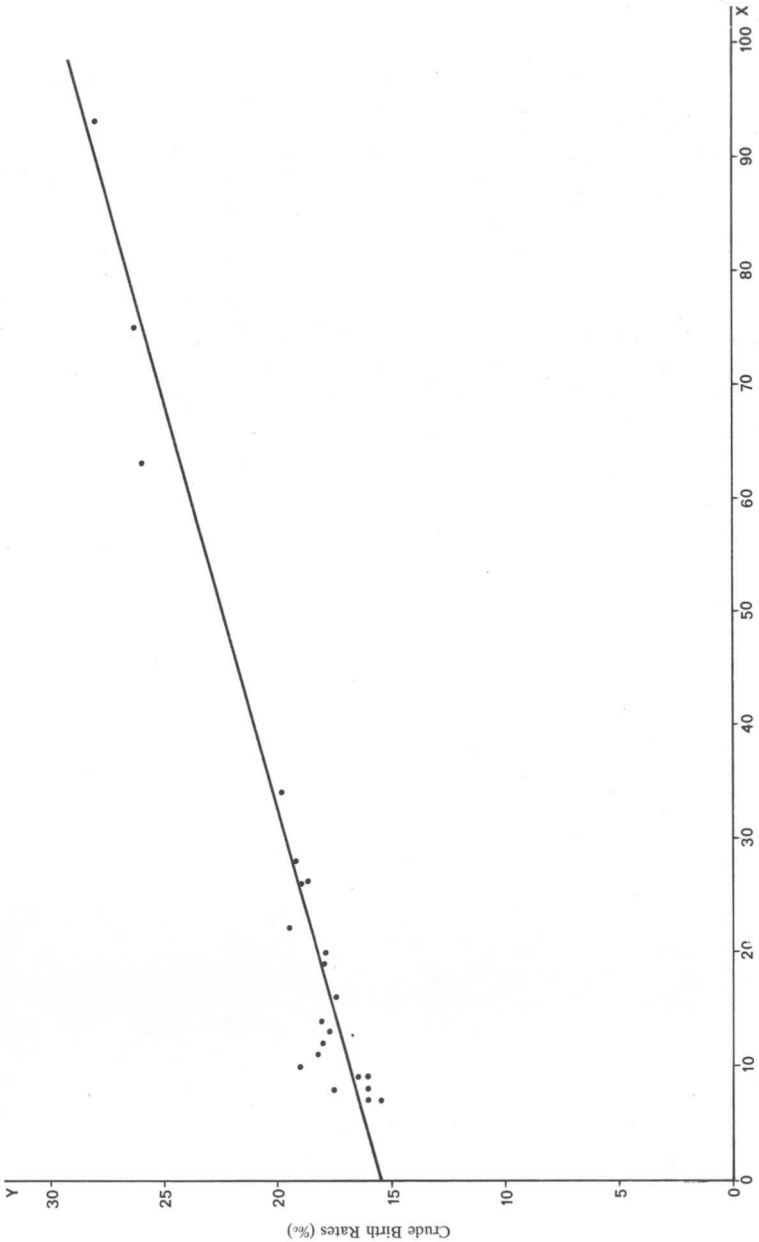
9. NSSG, *Vital Statistics of Greece, 1974,* Introduction, Athens 1977, p. XV.

TABLE VIII. *Illiterate (‰) Grooms and Brides, 1936-1938, 1965-1974**

Year	Grooms	Brides
1936	93	344
1937	75	315
1938	63	278
1956	34	92
1957	28	74
1958	26	70
1959	22	61
1960	26	66
1961	20	54
1962	19	50
1963	16	40
1964	14	39
1965	13	34
1966	12	29
1967	10	25
1968	11	25
1969	8	19
1970	9	18
1971	8	15
1972	9	16
1973	7	11
1974	7	11

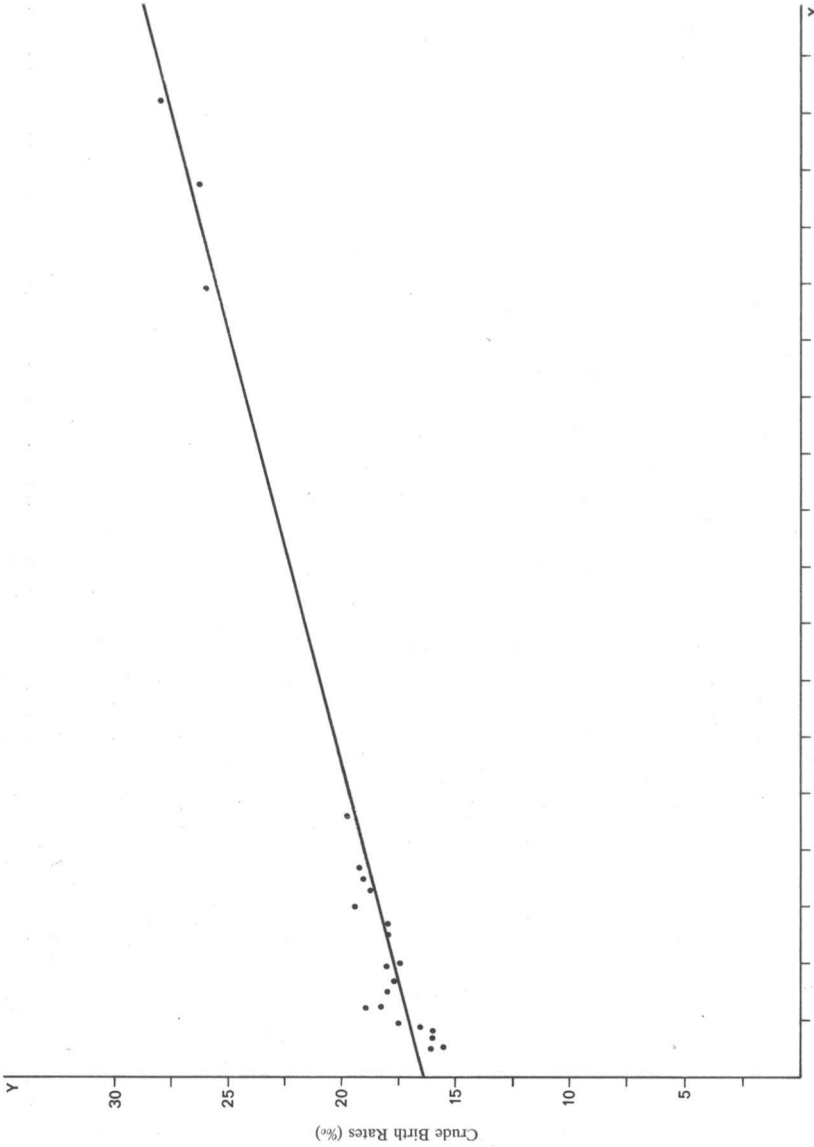
* For the period 1939-55 data is not available.
Source: NSSG, *Statistical Yearbook of Greece 1936-38, Vital Statistics of Greece 1956-74.*

SCATTEGRAM II. *Plot of the Crude Birth Rates (Y) and the Rates of Illiterate Grooms (X), 1936-38, 1956-74*



Source: Tables II and VIII.

SCATTEGRAM III. *Plot of the Crude Birth Rates (Y) and the Rates of Illiterate Brides (X), 1936-38, 1956-74*



Source: Tables II and VIII.

Using the values of the constants a and b (a= 15.62 for the grooms and a =16.46 for the brides and b= 0.14 for the grooms and b= 0.03 for the brides the corresponding relationships are plotted as in scattegrams II and III.

2. When applying the Durbin-Watson statistic it is found that there is a positive autocorrelation. Therefore we proceed with the Cochrane-Orcutt technique allowing also for the gap of information between 1939-1956 and only in the case of brides, since the illiteracy of grooms and the illiteracy of brides are also autocorrelated. In this case we find RHO=0.65, ρ^2=0.82, a=15.95, b=0.04 and ρ^2 in terms of changes 0.14. Therefore, when the level of illiteracy of brides decreases by 10 units the crude birth rate decreases by 0.4.

3. Assuming a time lag of one year between the change in the illiteracy of brides and the change in the fertility behaviour, we apply first the ordinary least squares method, but because there is a positive autocorrelation (tested by the Durbin-Watson statistic), we proceed with the Cochrane-Orcutt technique, which gives RHO= 0.90, ρ^2 0.81, a= 15.77, b= -0.04 and ρ^2 in terms of changes= 0.20. The negative sign of b is opposite to the theory of demography (it is generally believed and tested by many fertility surveys, that when illiteracy decreases fertility is influenced negatively too).

g. *Working Mothers*

Unfortunately, there is no data correlating fertility to the mother's occupation. The only systematic evidence on the subject is the research work done by C. Safilios-Rothschild, who has used a stratified sample of 896 Athenian working and non working women. The results of the survey indicate that: «the variable of work commitment is a very crucial variable for the understanding of the relationship between women's work and their level of fertility. While working status tends to depress the level of fertility, this decrease is much more significant for women with high rather than with low work commitment. And although infecundity and subfecundity is much more frequent among women with high rather than with low work commitment, it affects only a very small percentage (15.2 percent) of all high work commitment women. The decrease in fertility is, therefore, largely realized through the consistent and early use of 'safe' birth control techniques (occasionally including abortion)».[10]

Obviously, there is an inverse relationship. The supply of work of women is negatively influenced by maternity. Still, the matter should be further examined, in order to provide working mothers special measures and thereby confine the influence of their economic activity to fertility behaviour to the smallest possible extent.

h. *Economic Status*

Fertility differs by level of economic status of the household. It could be said that the higher the level of income the lower the fertility level; but this is not the rule. One meets with a lot of differentiations internationally, depending mainly on the economic development of the country. Since there is no data correlating fertility to income in Greece, father's occupation is taken firstly as a comparative index correlating economic status with fertility.

In Table IX, the distribution of fertility by father's occupation is shown for the years 1961 to 1971. In all these years the main bulk of fertility is found among the agricultural workers, and this reinforces, to some extent, the differentiation discussed in paragraph e, between rural and urban fertility. On the other hand, the lowest fertility is found among administrative, executive and managerial workers and among technicians and workers of mines, salt-marsh and related workers.

In examining further the correlation between the fertility level and the economic status we use the indexes of crude birth rates on the one hand and of the gross national income on the other (data is given in the Tables II and X).

1. The correlation coefficient found in this case is high as in the cases of infant mortality and illiteracy. It is found that $\rho = -0.92$, i.e it can be generally said that as the economic status becomes higher the fertility level diminishes. The coefficient of determination (the relationship has been specified in a similar form as above) ρ^2= 0.85, indicates that 85% of the variance in the crude birth rates is accounted for by the variance in the gross national income. The corresponding relationship is plot (by the use of a= 20.90 and b=−0.0001) and presented in the scattegram IV.

2. Testing for autocorrelation we find D.W.=1.23, therefore, we proceed with the Cochrane-Orcutt technique and we find RHO=0.39, a=21.23, b=−0.0001, ρ^2=0.87, ρ^2 in terms of changes= 0.46.

3. Assuming that a time lag of one year is needed to the population after the change in the gross national income for changing their fertility behaviour, we use the ordinary least squares method first and the Cochrane-Orcutt technique secondly (since it is found again a positive autocorrelation). In this case RHO= 0.46, ρ^2= 0.84, a= 20.76, b= 0.0001 and ρ^2 in terms of changes= 0.21. Therefore, when the gross

10. C. Safilios-Rothschild, «The Relationship between Work Commitment and Fertility», *International Journal of Sociology of the Family*, Vol. 2, March 1972, p. 69.

TABLE IX. *Percentage Distribution of Legitimate Live Births in Greece by Father's Profession, 1961-1971*

Code number	Father's profession	Legitimate live births (%)										
		1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
	Greece, total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.0	100.00	100.00
0	Professional technical and related workers	3.29	3.53	4.08	4.24	4.53	4.98	4.98	5.24	5.59	6.14	6.45
1	Administrative executive and managerial workers	0.95	1.36	1.68	2.00	1.93	2.18	1.98	2.02	2.22	2.38	2.54
2	Clerical workers	3.17	3.33	3.92	4.49	4.81	5.11	5.30	5.74	6.00	6.78	6.68
3	Sales workers	6.44	6.15	6.09	6.47	6.48	6.64	7.76	7.73	7.84	8.06	8.38
4	Agricultural, animal husbandry and forestry workers, fishermen, hunters and related workers	48.58	46.50	43.54	41.26	38.37	37.03	36.15	34.91	33.83	30.17	28.45
5	Technicians and workers in mines, salt-marsh quarries and related workers	0.55	0.56	0.46	0.45	0.45	0.41	0.40	0.36	0.30	0.25	0.25
6	Transport equipment, operators and labourers	5.90	6.21	6.56	6.48	7.13	7.62	7.80	8.06	8.13	8.71	9.12
7-8	Technicians and workers (excl. agriculture) Manual workers	24.30	24.71	25.89	26.82	28.56	28.42	29.25	29.50	29.61	31.19	31.79
9	Service workers	5.96	5.02	5.15	4.25	5.55	5.75	5.50	5.63	5.70	5.62	5.52
	Workers not classified by occupation	0.86	2.36	2.63	3.54	2.19	1.85	0.88	0.81	0.78	0.70	0.82

Source: NSSG, *Vital Statistics of Greece, 1961-1971.*

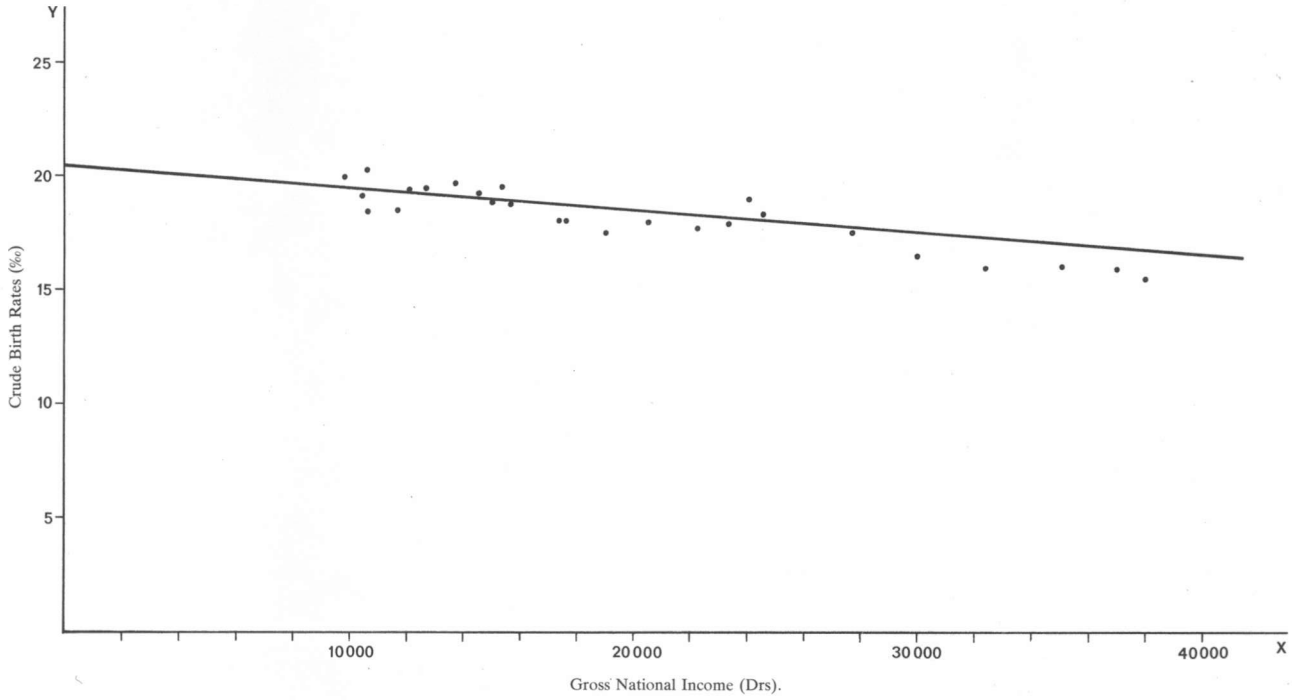
TABLE X. *Per Capita Gross National Income (GNI), 1949-1975* at Factor Cost (At constant 1970 prices)*

Year	Gross National Income (in Drs)	Year	Gross National Income (in Drs)
1949	10,664	1962	17,456
1950	9,880	1963	19,162
1951	10,606	1964	20,543
1952	10,536	1965	22,323
1953	11,758	1966	23,349
1954	12,036	1967	24,180
1955	12,740	1968	25,532
1956	13,790	1969	27,754
1957	14,555	1970	29,968
1958	14,926	1971	32,395
1959	15,366	1972	35,127
1960	15,764	1973	37,969
1961	17,409	1974	37,055

* For the period 1931-48 data is not available.

Source: Hellenic Republic Ministry of Coordination, National Account Service, *National Accounts of Greece, 1958-1975,* number 23, Athens 1976, Tables 31 and 49.

SCATTEGRAM IV. *Plot of the Crude Birth Rates (Y) and the Gross National Income (X), 1949-74*



Source: Tables II and X.

TABLE XI. *Emigrants' Distribution by Sex and Age Groups: 1965-75 Absolute Numbers and Percentage Distribution*

	1965				1966				1967			
	Absolute numbers		Percentages		Absolute numbers		Percentages		Absolute numbers		Percentages	
Age	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
All ages	65.271	51.755	100.0	100.0	46.254	40.434	100.0	100.0	22,736	19,726	100.0	100.0
0-14	4.786	4.688	7.3	9.1	4,866	4,505	10.5	11.2	4,080	3,635	17.9	18.4
15-44	56.791	43.065	87.0	83.2	37,742	32,204	81.6	79.6	16,484	13,723	72.5	69.6
45-64	3.358	3.426	5.2	6.6	3,322	3,191	7.2	7.9	1,926	2,032	8.5	10.3
65+	336	576	0.5	1.1	324	534	0.7	1.3	246	336	1.1	1.7

	1968				1969				1970			
	Absolute numbers		Percentages		Absolute numbers		Percentages		Absolute numbers		Percentages	
Age	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
All ages	27.175	23.554	100.0	100.0	51,566	39,833	100.0	100.0	52,927	39,571	100.0	100.0
0-14	4,303	3,986	15.8	16.9	5,225	4,889	10.1	12.3	5,872	5,323	11.1	13.4
15-44	20.470	16.814	75.3	71.4	43,835	32,600	85.0	81.8	44,212	31,849	83.5	80.5
45-64	2.032	2.269	7.5	9.6	2,203	1,944	4.3	4.9	2,606	2,041	4.9	5.2
65+	370	485	1.4	2.1	303	400	0.6	1.0	237	358	0.5	0.9

	1971				1972				1973			
	Absolute numbers		Percentages		Absolute numbers		Percentages		Absolute numbers		Percentages	
Age	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
All ages	33.810	27.705	100.0	100.0	24.061	18,602	100.0	100.0	14,536	12,616	100.0	100.0
0-14	5,779	5,318	17.1	19.2	4,151	3,898	17.3	21.0	2,466	2,430	17.0	19,3
15-44	26.095	20.524	77.2	74.1	18,259	13,064	75.9	70.2	10,676	8,755	73.4	69.4
45-64	1,737	1,541	5.1	5.5	1,453	1,334	6.0	7.2	1,217	1,142	8.4	9.0
65+	199	322	0.6	1.2	198	306	0.8	1.6	177	289	1.2	2.3

	1974				1975			
	Absolute numbers		Percentages		Absolute numbers		Percentages	
Age	Males	Females	Males	Females	Males	Females	Males	Females
All ages	13.062	11.021	100.0	100.0	11,599	8,514	100.0	100.0
0-14	2.726	2.399	20.9	21.8	1,486	1,378	12.8	16.2
15-44	8.877	7.269	68.0	65.9	8,567	5,994	73.9	70.4
45-64	1,261	1,112	9.6	10.1	1,398	970	12.0	11.4
65+	198	241	1.5	2.2	148	172	1,3	2.0

Source: NSSG, *Statistical Yearbook of Greece, 1966-1976.*

national income increases by 1000 units the crude birth rate decreases after one year by 0.1 and the variance in the annual change of the crude birth rates is accounted for by 21% in the variance of the annual change of the gross national income.

i. *Emigration*

In Table XI the distribution of emigrants by age groups is presented. Although the absolute numbers for female migrants have considerably declined between 1965 and 1975, the numbers are still high and the proportions aged 15-44 remain rather constant. In Table XII, where the emigrants per 1000 population are presented, it is clearly shown the fluctuation of the per/1000 proportion 1965-1975. The age group 15-44 is seriously affected. Since migrants usually belong to the reproductive ages, the strong emigration flow had an indirect effect upon fertility.

This indirect effect is tried to be examined by the regression analysis technique using the existing data for the years 1931-38 and 1955-75 (Table XIII).

1. With the least squares method allowing also for the gap between 1939-1955, $\rho=-0.44$, i.e. exists a negative correlation between fertility and emigration (as emigration becomes higher the fertility level diminishes and this can be explained by the above mentioned thought of the loss of human reproductive capital). The coefficient of determination (in the corresponding linear relationship) $\rho^2=0.19$, i.e. 19% of the variance in the crude birth rates is accounted for by the variance of the emigration rates. The relevant regression equation (with $a=23.67$ and $b=-0.64$), is presented in the scattegram V.

2. Using next the Cochrane-Orcutt iterative technique (because in the first case the results were biased as revealed by the Durbin-Watson statistic (D.W.=0.14), i.e. a positive autocorrelation existed) RHO=0.94, $\rho^2=0.96$, $a=16.25$, $b=-0.08$ (all statistically significant): the above prediction seems to hold true when allowing for autocorrelation between the crude birth rates and the emigration rates. When emigration increases by 10 units the crude birth rates decrease by 0.8. ρ^2 in terms of changes equals 0.12, i.e. 12% of the variance in the annual change in the crude birth rates can be explained by the variance in the annual change in the emigration rates.

3. Making the assumption that there is a time lag of one year between the change in emigration and the change on the fertility level, we find, with the ordinary least squares method, $a=17.94$, $b=-0.05$, $\rho^2=0.02$. The Durbin-Watson technique reveals a positive autocorrelation (D.W.=0.18), therefore we proceed with the Cochrane-Orcutt technique. In that case RHO=0.90, $a=15.61$, $b=-0.06$, $\rho^2=0.83$, ρ^2 in terms of changes $=0.12$. Therefore, when the emigration increases by 10 units the crude birth rates decrease after one year by 0.6, and 12% of the variance of the annual change in the crude birth rates is accounted for by the variance in the annual change of the emigration rates.

Applying the multivariate analysis in order to find out the combined effect of all the above mentioned variables upon fertility, we consider the equation $Y=a+b_1x_1+b_2x_2+b_3x_3+b_4x_4$ whereas x_1, x_2, x_3, x_4, correspond to the variables of infant mortality, illiteracy of brides, emigration and gross national income.

Using first the ordinary least squares method it is found that both problems of multicollinearity and autocorrelation arise. Applying then the Cochrane-Orcutt technique, we test the equation first with all the variables and secondly excluding the infant mortality, in which case better results are obtained. The emigration and the gross national income seem to influence mainly the crude birth rates: when emigration increases by one unit the crude birth rate decreases by 0.13 and when the gross national income increases by 1000 the crude birth rate decreases by 0.2.

The autocorrelation coefficient is found to be RHO $=0.28$, $\rho^2=0.93$, ρ^2 in terms of changes $=0.65$. Therefore, 65% of the variance in the annual change of crude birth rate is accounted for by the variance in the annual change of the above mentioned variables. The only inconsistency which arises in the equation is that the coefficient b for the illiteracy of brides is negative ($b=-0.05$), which is opposite to what is generally believed in demography as mentioned before.*

In analysing further and adopting different combinations of the variables we could probably find a better equation but even in that case the conclusions which would be drawn would be of a rather general nature. This is so because the fertility index—crude birth rate—which was possible to be used here for experimenting the correlation with all the examined variables, is very general itself. Nevertheless, it can be broadly said that each of these variables has a definite influence on the fertility level.

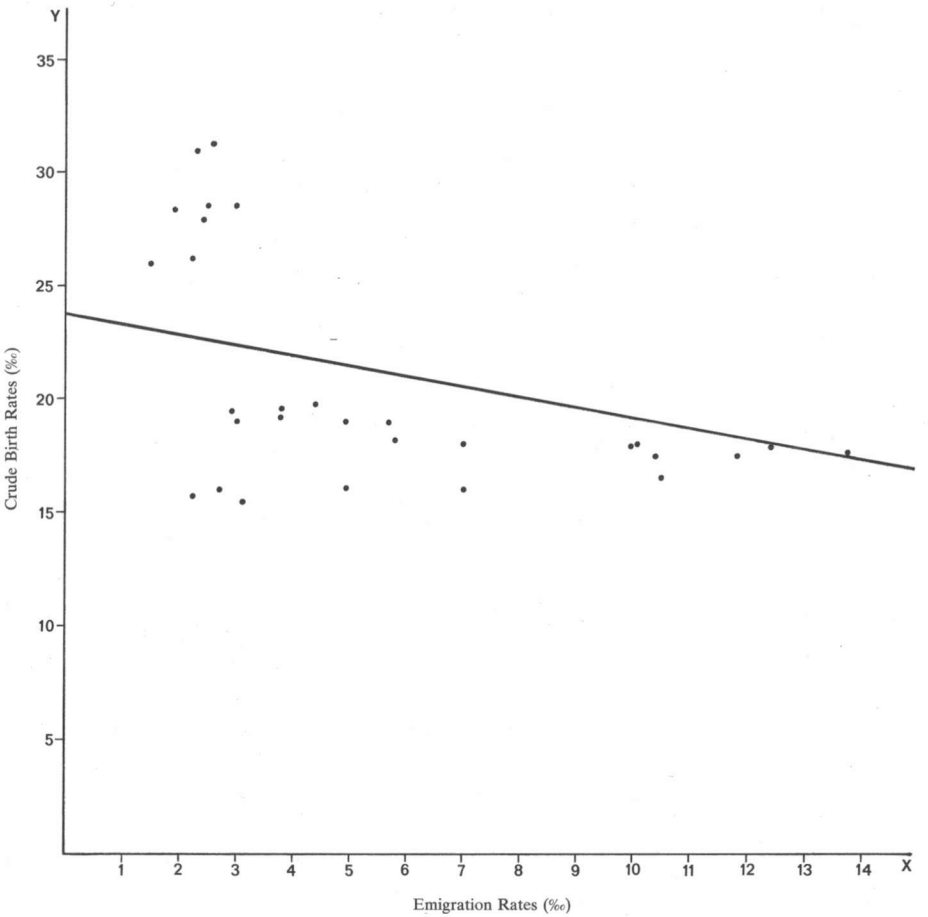
Finally, only a field fertility survey could really fully cover the actual factors which affect the fertility evolution in Greece.

IV. consequences of the declining fertility

Since fertility is a component of population growth, fertility decline is one of the main determinant factors of the small annual population growth in Greece (4.5‰ during the decade 1961-71).

* I acknowledge kind help of Mr. P. J. Momferratos in the econometric part of the study.

SCATTEGRAM V. *Plot of the Crude Birth Rates (Y) and the Emigration Rates (X), 1931-38, 1955-75*



Source: Tables II and XIII.

TABLE XII. *Emigrants per 1000 Population by Sex and Age Groups: 1965-1975*

Age groups	1965		1966		1967*		1968	
	Males	Females	Males	Females	Males	Females	Males	Females
All ages	15.7	11.7	11.0	9.1	5.4	4.4	6.3	5.2
0-14	4.3	4.4	4.3	4.2	3.6	3.4	3.8	3.7
15-44	30.6	21.7	20.2	16.2	8.7	6.8	10.6	8.3
45-64	0.4	3.8	3.9	3.5	2.3	2.2	2.4	2.4
65+	0.1	1.3	0.9	1.2	0.7	0.7	1.0	1.0

Age groups	1969		1970		1971		1972	
	Males	Females	Males	Females	Males	Females	Males	Females
All ages	12.0	8.8	12.3	8.8	7.8	6.1	5.5	4.1
0-14	4.6	4.5	5.2	5.0	5.2	5.1	3.7	3.5
15-44	22.8	16.1	23.9	16.7	14.2	10.9	9.9	6.9
45-64	2.6	2.1	2.9	2.1	1.9	1.6	1.6	1.3
65+	0.8	0.8	0.6	0.7	0.4	0.6	0.4	0.5

Age groups	1973		1974		1975	
	Males	Females	Males	Females	Males	Females
All ages	3.3	2.8	3.0	2.4	2.6	1.8
0—14	2.2	2.3	2.4	1.3	1.3	1.3
15-44	5.8	4.6	4.8	3.8	4.6	3.2
45-64	1.3	1.1	1.3	1.1	1.4	0.9
65+	0.3	0.5	0.4	0.4	0.3	0.2

Sources: 1) NSSG, *Vital Statistics of Greece, 1965-1974.*
2) Table IX: Emigrants'Distribution by Sex and Age, Groups: 1965-75 Absolute Numbers, Percentages.

* The abrupt decrease in the migration rate is due to the 1967 military coup.

The labour force and the armed forces, are directly influenced by population size and a cost benefit analysis would be necessary in order to determine, if possible, its relative optimal. On the other hand a fact prevails: population in Greece is aging because of migration and declining fertility.

In Table XIV it is shown the upward trend of the percentages of people aged 65 years and over, since 1928, as well as the declining percentages of young population.

Using more analytical data it is found that in 1971 the aging was greater in the rural areas (13.1%) than in the urban ones (9.5%) and among the women (12.2%) than among the men (10.0%).[11]

The intensive women's aging is due not only to the fact that women usually live longer than men, but mainly, to the heavy losses of men during the Second World War.

By comparing the data of people aged 65 years and over for 1961 to that of 1971 by geographic department, a considerable increase is found in the relative proportions, for all departments. Especially, in the Greater Athens Area, the increase was as great as 81% and in the department of Salonica it was 65%.[12]

The consequences of aging are of special interest: a) the younger age groups become economically

11. Prof. C. Dracatos, «A Round Table Discussion», *Iatriki,* November 1975, Volume 26, No 5, p. 435.

12. H. Symeonidou-Alatopoulou «Regional Distribution of Greek Population by Large Age Groups, 1971. Resulted Changes: 1961, 1971», *The Greek Review of Social Research,* No 23, Athens 1975, p. 113 (Table VIII) and p. 115 (Map VI).

TABLE XIII. *Emigration Rates per Thousand Population, 1931-38, 1955-75**

Year	Emigration (‰)
1930	2.3
1932	3.0
1933	2.5
1934	2.6
1935	1.9
1936	2.4
1937	2.2
1938	1.5
1955	3.8
1956	4.4
1957	3.8
1958	3.0
1959	2.9
1960	5.7
1961	7.0
1962	9.9
1963	11.8
1964	12.4
1965	13.7
1966	10.1
1967	4.9
1968	5.8
1969	10.4
1970	10.5
1971	7.0
1972	4.9
1973	3.1
1974	2.7
1975	2.2

* For the period 1939-54 emigration data is incorporated with tourism data.

Source: NSSG, *Statistical Yearbook of Greece 1932-39, 1956-76.*

overloaded for although the olders consume less than the adults, their productivity is almost non existent. National production and comsumption are appreciably affected by the age structure of the population and the relationship adults/total population gives a rough idea of the way in which the age structure of a population may influence the standard of living.

b) Conservatism which is the main characteristic of the aged, spreads out over the country and it may deeply influence the Greek life in many aspects. The example which may be referred to, is the one of Messenia and Laconia: these departments where we meet the highest percentages of aged people, there are also considered to be the most conservative areas (politically speaking), as compared with the rest of Greece).

To sum up, taking into consideration all the factors presented here, the fertility decline may be attributed to:

1) the decline in infant mortality rates
2) the high rate of abortion
3) the high urbanization
4) the higher educational level of the parents
5) the increased participation of women in the labour force.
6) the emigration flow.

The combined effect of the above factors with the effect of other socioeconomic variables, which were not possible to be analysed by the present paper without a previous extensive research on the subject, resulted to the prevailing strong preference of the young couples of having mostly up to two children in their lifespan.

In order to cover all the possible aspects and trends of fertility behaviour, the National Centre of Social Research in Athens is now sponsoring a national fertility survey, which is expected to shed lights upon interesting findings.

TABLE XIV. *Percentage Distribution of Greek Population by Large Age Groups, 1928-1971*

	Years						
Age groups	1928	1940	1951	1961	1971	1975	2000
0-14	32.2	33.0	28.8	26.7	24.9	23.9	20.4
15-64	62.0	60.7	64.4	65.1	64.0	63.9	63.3
65+	5.8	6.3	6.8	8.2	11.1	12.2	16.3
All ages	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Sources: 1) NSSG, *Statistical Yearbook of Greece, 1976,* Athens 1976, p. 18,25.
2) NSSG, *Demographic Trends and Population Projections of Greece, 1960-1985,* Athens 1966, p. 46.
3) G. Siampos, *Demographic Evolution of Modern Greece (1821-1985), Athens 1973, p. 154.*