Period Effects on Fertility for Parity Cohorts, Egypt: 1965- 1980.

by
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The use of period cumulative age based rates as summary measures of fertility and its trends may be further refined by specifying the occurrence/exposure rates to allow for different parity and duration in parities distributions. Also, such an analysis does not allow for a detailed investigation of sources of change and the groups mainly responssible for this change.

This paper presents a detailed investigation of period fertility trends in Egypt. It focusses on parity groups and changes in quantum and tempo of fertility of these groups. The analysis is further refined by controlling for age within each parity considered.

The source of data used throughout this paper is the Egyptian Fertility Survey (EFS 80). The EFS 80 is a retrospective fertility survey collected from a sample of 8788 ever married Egyptian women in 1980. The survey was conducted by the Centre Agency of Public Mobilization and Statistics Details are available in CAPMAS 1983.

The traditional age based form of period analysis of fertility in Egypt portrays a picture of declining fertility. The cumulative fertility rates up to specified ages for different time periods are provided in table(1). For each age considered, it is clear that if women pass through their reproductive lives experiencing the rates of 1965- 69 they would have extra births than those experiencing the rates of 1970- 74 and the same observation holds true when comparing 1970- 74 rates with 1975- 79 rates. By age 40, the difference between 1965- 69 and 1970- 74 is around a whole birth and only .2 birth between 1970 -74 and 1975- 79.

Table(1): Cumulative Fertility up to Specified Ages for different Five Year Periods before the Survey

age	years before the survey		
	0- 4 (1975- 79)	5- 9 (1970- 74)	10- 14 (1965- 69)
20	.497	.610	.822
25	1.774	1.949	2.446
30	3.200	3.351	4.046
35	4.939	5.127	6.127

Source: Calculated from Capmas, 1983; Vol.II Table 4.18.

Is the slow down in the rate of decline mainly due to structural changes in the parity and duration in different parities distributions or is it an actual slow down in the period fertility performance, and if the latter is true, what are the parity groups most ressponssible for these changes.

I) Parity Specific Analysis

The parity specific analysis performed in this paper would shed light on the afore mentioned questions as well as provide a more in depth analysis of fertility trends. The analysis considers period parity cohorts, defined as groups of women attaining a specified parity in a given period. Three five years periods are chosen: 1965- 69, 1970- 74 and 1975- 79. These cohorts are followed up to the end of each period and their fertility behaviour within the specified period subjected to detailed investigations. For example, women reaching parity i during 1965- 69 are followed up to 1970 and the speed and magnitude of their movements into parity i is compared to women reaching the same parity during 1970 -74 and followed up to 1975.

I.1) Methodology

This type of analysis is considered in details in Rodriguez & Hobcraft (1980) and the current paper uses the same methodology and retains the same summary indices suggested by these authors. A brief exposition of the methodology is provided here.

The basic form of analysis is the construction of a cohort life table for each period parity cohort. Such an analysis is not a complete cohort life table but a restricted cohort life table. The restriction imposed is the end of each five year period considered. Thus each cohort is followed for a maximum of 5 years.

The basic life table function considered is B(x). B(x) is the cumulative birth function and provides the probability of moving from parity i to parity (i+1) within x years duration in parity i. It is the complement of the survivorship function: 1(x). Due to the restriction of the period of analysis, the maximum value of x is for 5 years. Since the majority of movements out of specified parities occur within this span of time, the restriction of the analysis to this 5 year span would not bias or limit the trend inferences.

The construction of the birth function is slightly complicated by te censoring of events, since not all women reaching parity i in the time period are exposed for the full five years. For example, women reaching parity i during 1974 are allowed less than one year of exposure. The methodology for

constructing life tables for censored events is adopted. The basic starting point is the construction of conditional probabilities of movement from parity i to parity (i+1) within n units of time (from y to (y+n). These probabilities q(y, y+n) are then used to obtain the birth function.

The usual analogy of life table measures with fertility measures and the summary indices considered here are clarified by referring to movement from marriage to first birth for the 1975-79 marriage cohort.

Suppose the total number of women getting married in 1974-79 is the radix of the life table and that death in this case is the incidence of having a 1st birth. Hence,

l(0)	Total number of women getting married during 1974-79.
q(x,x+n)	Conditional probability of dying. This is equivalent to probability of having a 1st birth during x to x+n duration of marriage for those who have been married for x duration and who have not yet had a 1st birth. In fertility analysis q(x, x+n) is usually denoted by b(x, x+n).
d(x, x+n)	Unconditional probability of dying; Probability of having a first birth during x to x+n duration of marriage to all those married during 1974- 79.
q(0, x+n)	Probability of dying from 0 to (x+n), or simply the proportion having a first birth after (x+n) duration in marriage. This is usually referred to as the Birth function B(x+n).

The Birth function is usually the focus of attention in fertility studies unlike the mortality analysis in which l(0)-the complement of B(x)- is of more concern.

B(x+n) may be calculted using the conditional probabilities as follows:

$$B(x+n) = B(x) + (1-B(x))q(x,x+n).$$

note that B(0)= zero, q(0,n)= d(0,n).

The basic information required to obtain the conditional probabilities is a cross tabulation of women marrying during 1974- 79 by duration of exposure and termination status.

The duration of exposure refers to the interval from marriage to either first birth or interview, whichever comes first.

Termination status is divided into two categories:
1- women reaching 1980(end of period of analysis) in the interval of exposure. this includes women without a first birth and women having both the first birth and interview in the same interval of exposure. This category is denoted by C(x,x+n). C implies censoring within interval x to x+n.

2- women having first births in the interval x to (x+n) and reaching end of period of analysis (1980) later. This category is denoted by E(x, x+n).

Starting with total women getting married during 1975- 79 as N(0), the values of q(x, x+n) are calculated as follows:

$N(x+n) = N(x) - C(x,x+n) - E(x,x+n)$

$N^*(x) = N(x) - C(x,x+n)$

$q(x,x+n) = E(x,x+n) / N^*(x)$

The remaining life table functions are easily derived from the conditionnal probabilities.

Life table functions were calculated for monthly intervals for the three time periods under investigation and for different birth orders. The results are summarised using the birth function at selected yearly intervals. B(5) (5 years which is equivalent to 60 months) is chosen as the analog for the parity progression ratio and as the most convenient indicator of the quantum of fertility. This measure was denoted Q.

The measures chosen to reflect the distribution of birth intervals which portray the tempo of fertility are M and T. As previously indicated, these are the same measures used by Rodriguez and Hobcraft(1980). M denote the median of the distribution. It is the duration by which 50 percent of the women who will have a subsequent birth within five years will have had it. T is the trimean which is equal to ((q1+ 2M+ q3)/4). q1 and q2 are the first and third quartiles respectively. The trimean is a sensitive measure of location and contains some information about the shape of the distribution.

I.2) Applications

The birth functions at selected yearly intervals and different time periods and birth orders are presented in tables 2 to 7 and figures 1 to 6. Table(8) is a summary table for selected indices.

Before commenting on these tables, we should stress that truncation may bias the analysis for earlier time periods, especially for higher order births. Thus the analysis will focuss on the three most recent periods.

Table(2) Birth Function from Marriage to 1st Birth at Selected Yearly Intervals for Different Periods.

Yearly Intervals	Period				
	<1960	1960-64	1965-69	1970-74	1975+
1	.1732	.1817	.2046	.1865	.2461
2	.6767	.6648	.6803	.6732	.7045
3	.8427	.8164	.8293	.8344	.8543
4	.9079	.8164	.8293	.8344	.9161
5	.9450	.9327	.9273	.9372	.9465

source: special calculations EFS 80.

Table(3) Birth Function from 1st to 2nd Birth at Selected Yearly Intervals for Different Periods.

Yearly Intervals	Period				
	<1960	1960-64	1965-69	1970-74	1975+
1	.0823	.0908	.0659	.0754	.0539
2	.5636	.5145	.5154	.4957	.4851
3	.8686	.8124	.8179	.7778	.7919
4	.9426	.9078	.9165	.8957	.9105
5	.9740	.9475	.9572	.9410	.9529

source: special calculations EFS 80.

Table(4) Birth Function from 2nd to 3rd Birth at Selected Yearly Intervals for Different Periods.

Yearly Intervals	Period				
	<1960	1960-64	1965-69	1970-74	1975+
1	.0948	.0855	.0813	.0500	.0517
2	.5615	.5159	.4582	.3974	.3725
3	.8816	.8115	.7854	.7011	.7119
4	.9713	.9225	.9163	.8707	.8731
5	.9888	.9584	.9523	.9294	.9286

source: special calculations EFS 80.

Table(5) Birth Function from 3rd to 4th Birth at Selected Yearly Intervals for Different Periods.

Yearly Intervals	Period				
	<1960	1960-64	1965-69	1970-74	1975+
1	.1087	.0795	.0652	.0650	.0450
2	.5600	.4972	.4322	.3734	.3833
3	.8812	.8146	.7620	.6879	.6867
4	.9617	.9212	.9100	.8622	.8412
5	.9878	.9664	.9572	.9372	.9030

source: special calculations EFS 80.

Table(6) Birth Function from 4th to 5th Birth at Selected Yearly Intervals for Different Periods.

Yearly Intervals	Period				
	<1960	1960-64	1965-69	1970-74	1975+
1	.1324	.0906	.0501	.0531	.0539
2	.5733	.4953	.4288	.3869	.3286
3	.9074	.8382	.8174	.7089	.6775
4	.9765	.9243	.9224	.8621	.8182
5	.9937	.9604	.9743	.9187	.8947

source: special calculations EFS 80.

Table(7) Birth Function from 5th to 6th Birth at Selected Yearly Intervals for Different Periods.

Yearly Intervals	Period				
	<1960	1960-64	1965-69	1970-74	1975+
1	.1823	.0838	.0977	.0665	.0488
2	.4528	.5116	.4456	.3689	.3351
3	.8167	.8403	.7845	.6848	.6735
4	.8701	.9372	.9234	.8284	.8204
5		.9781	.9645	.9099	.8845

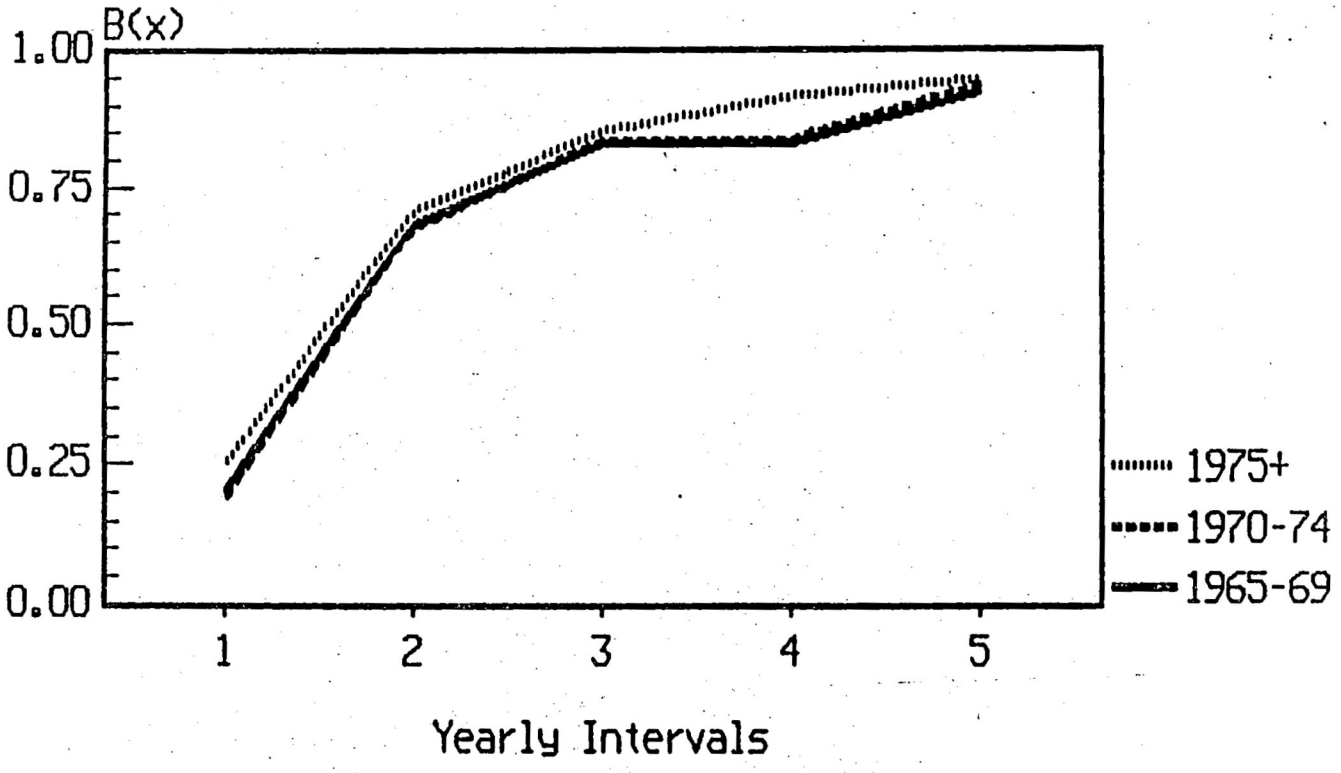
source: special calculations EFS 80.

Table(8) Summary Indices of Period Differentials in the Quantum and Tempo of Fertility at Different Parities

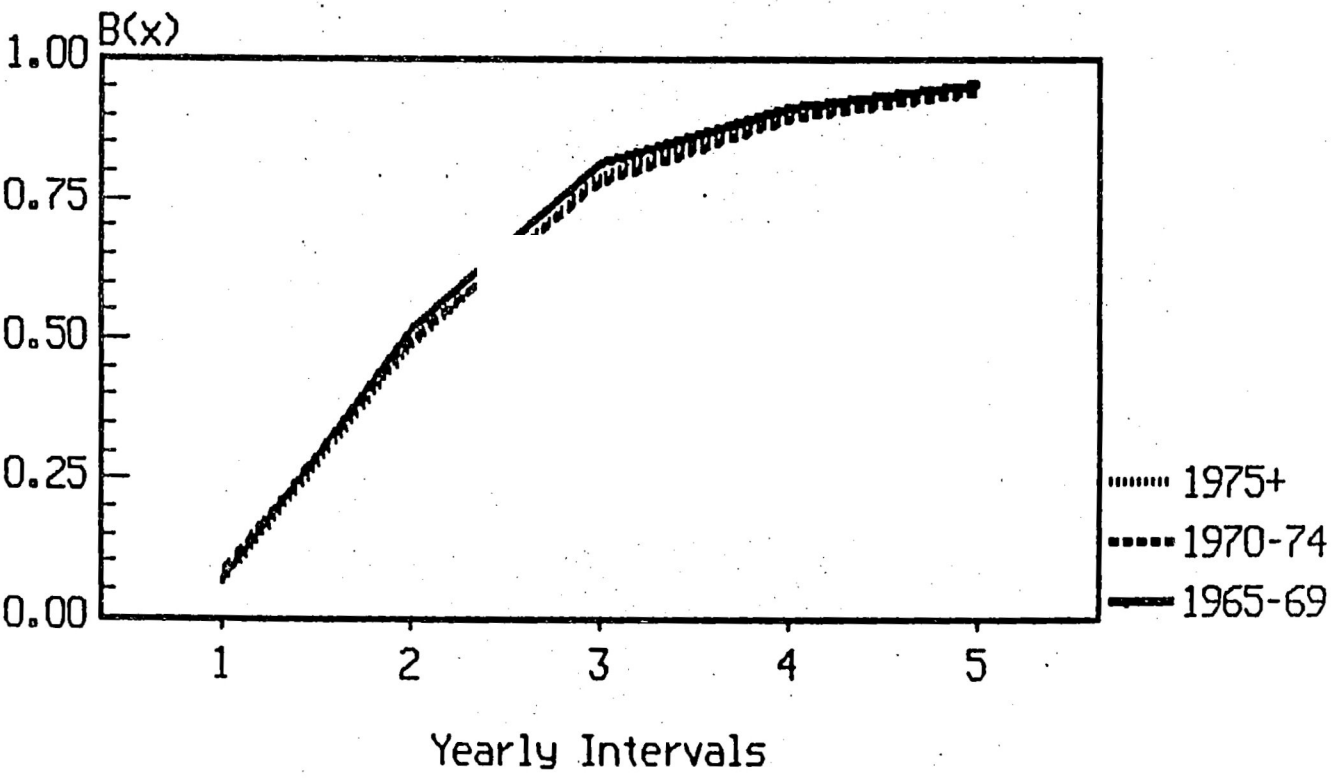
Parity	Sum. Ind.	Period				
		<1960	1960-64	1965-69	1970-74	1975+
1	Q	.945	.933	.927	.937	.946
	T	18.5	18.4	17.4	18.3	17.3
	M	17.7	17.5	16.0	17.5	16.4
2	Q	.974	.947	.957	.941	.953
	T	22.0	22.7	23.3	23.8	24.1
	M	22.0	22.6	23.0	23.3	23.7
3	Q	.989	.958	.952	.929	.929
	T	22.1	23.1	24.4	26.8	27.0
	M	22.0	22.7	24.4	26.2	26.5
4	Q	.988	.966	.957	.937	.903
	T	22.0	23.8	25.6	27.4	26.6
	M	21.8	23.7	25.2	26.9	26.1
5	Q	.994	.960	.974	.919	.895
	T	21.7	23.6	25.8	26.3	27.7
	M	22.0	23.6	25.4	26.0	27.5
6	Q		.978	.964	.910	.884
	T		23.4	25.0	26.9	27.6
	M		23.3	24.9	26.5	27.6

source: special calculations EFS 80.

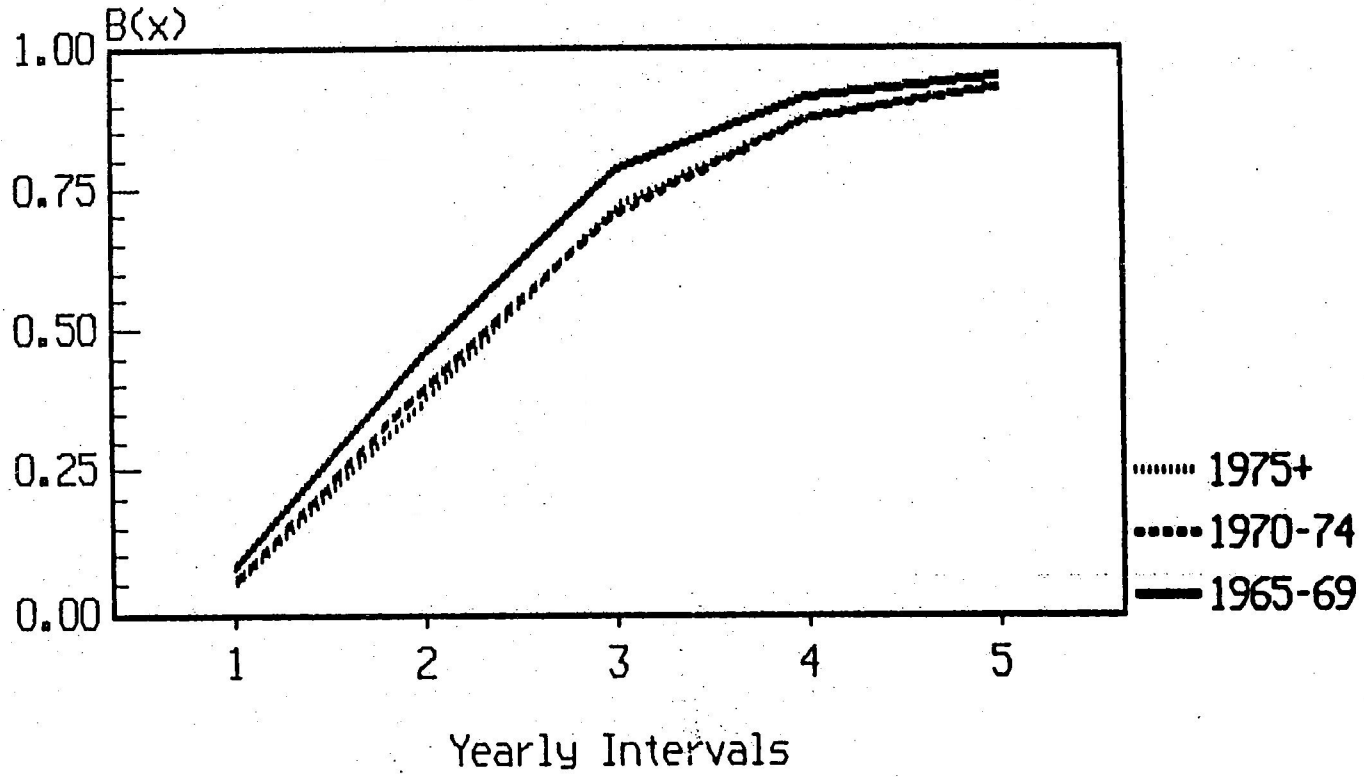
Fig(1). Birth Function from Marriage to First Birth at Selected Yearly Intervals for Different Time Periods.



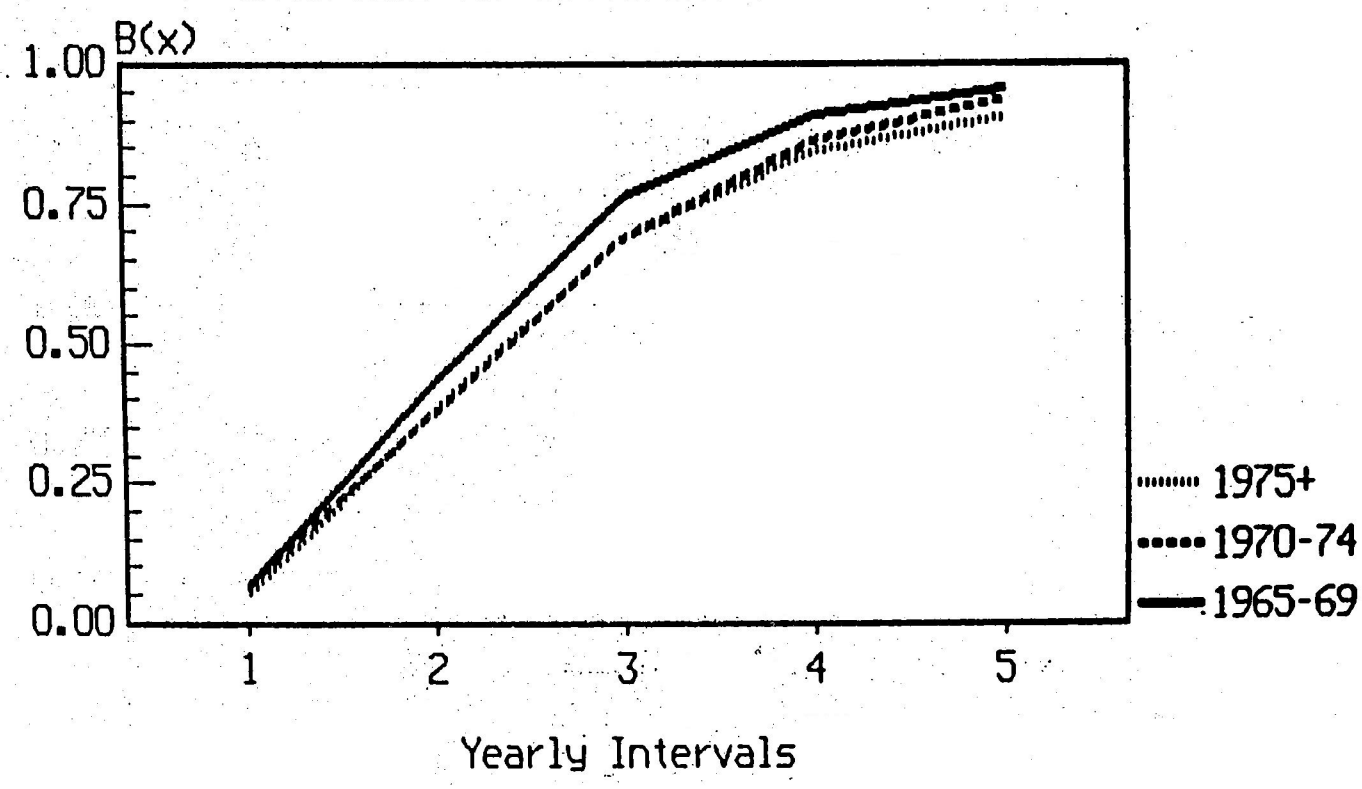
Fig(2) Birth Function from First Birth to Second Birth for Selected Yearly Intervals for Different Time Periods



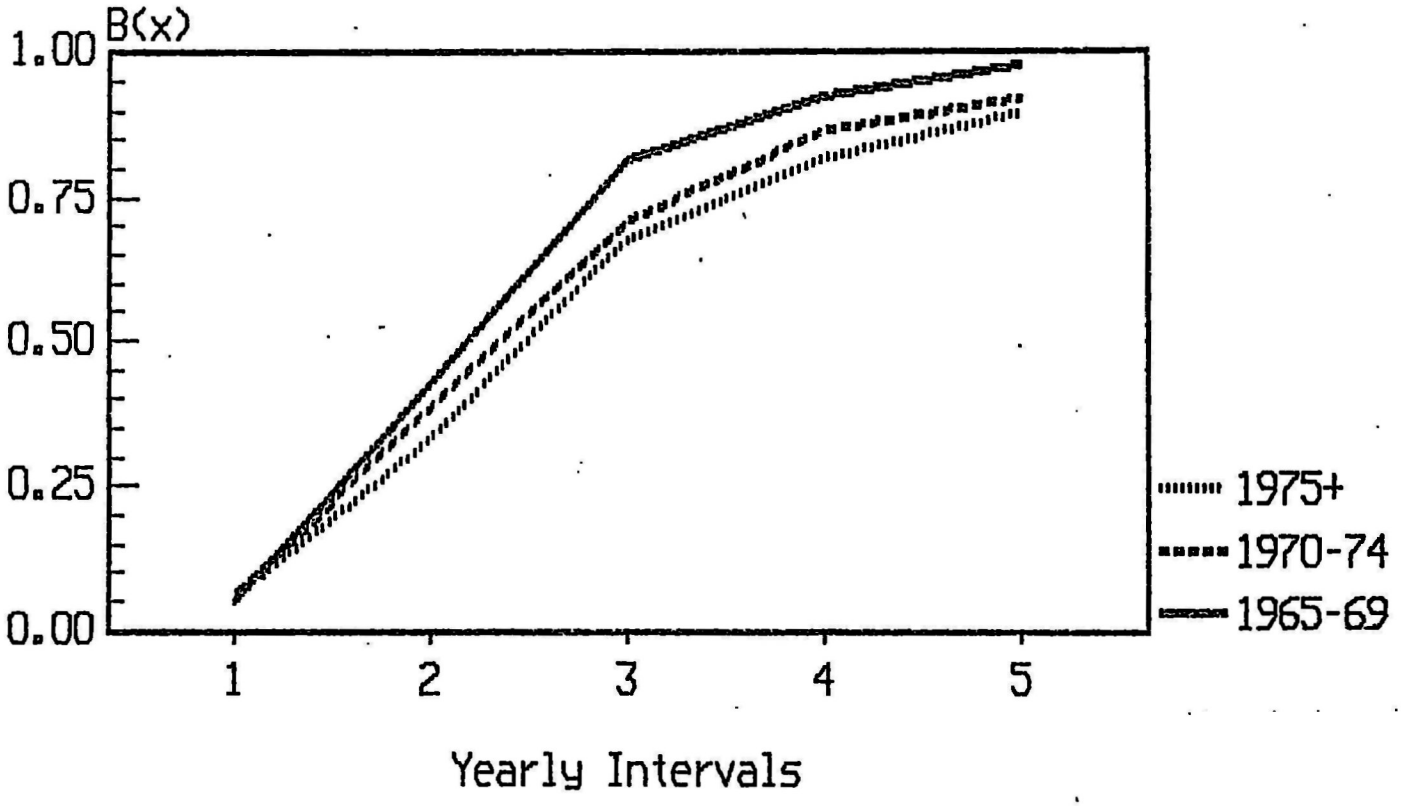
Fig(3) Birth Function from Second Birth to Third Birth for Selected Yearly Intervals for Different Time Periods



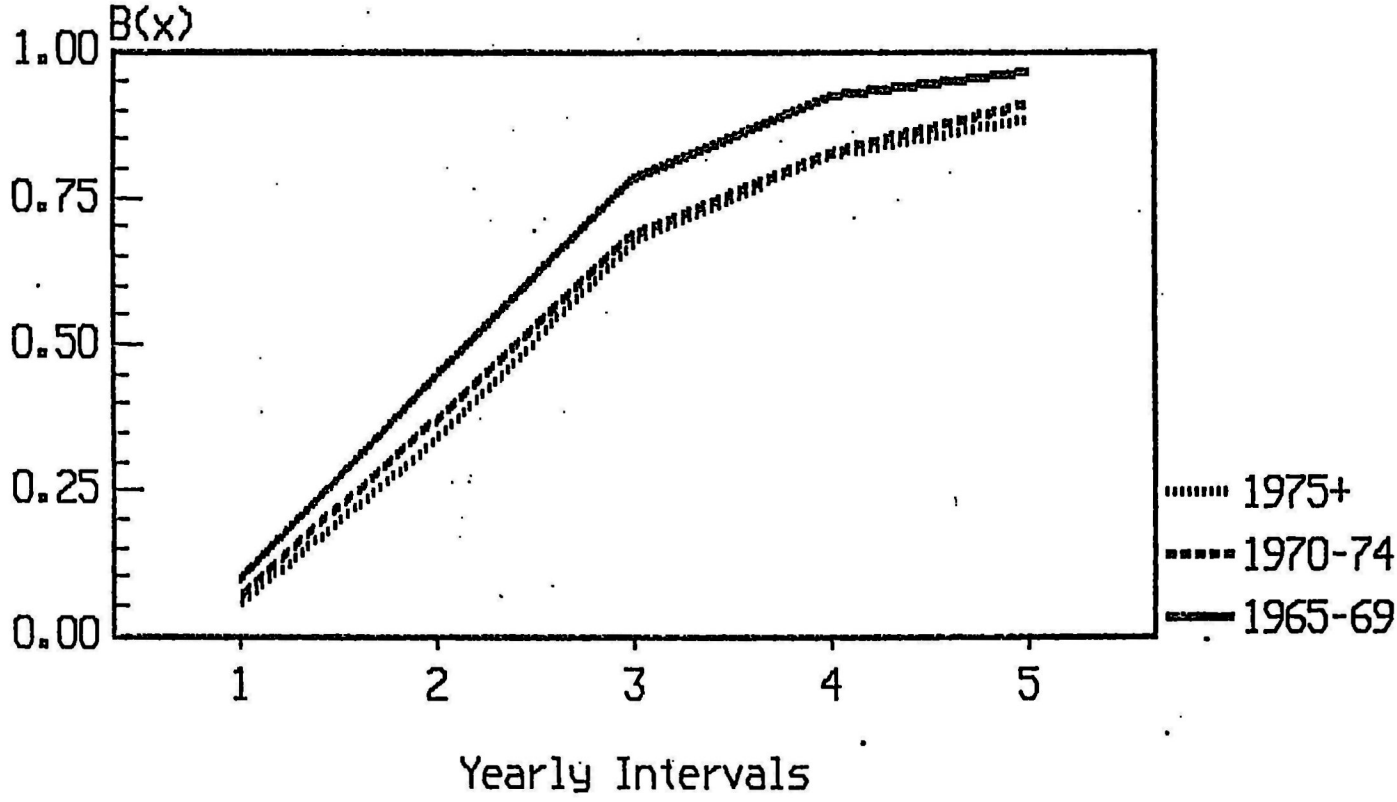
Fig(4) Birth Function from Third Birth to Fourth Birth for Selected Yearly Intervals for Different Time Periods



to Fifth Birth for Selected Yearly Intervals for Different Time Periods



Fig(6) Birth Function from Fifth Birth to Sixth Birth for Selected Yearly Intervals for Different Time Periods



I.3) Comments:

Judging by the proportion of women moving from marriage to first birth within 5 years of marriage duration, the three time periods are fairly similar in quantum. The main difference is in the shape of the movement. Clearly, both the 1965-69, 1970-74 have witnessed a slow down (not fully captured in the summary measures but clearly portrayed in figure (1)) in this movement within 3 to 4 years of duration of marriage (B(4)= .829, .834 as compared to .916). Such a slow down may be closely related to both the 1967 and 1973 wars. A catching up is demonstrated in the fifth year.

Movements from first to 2nd birth are fairly similar in the three time periods.

The difference in fertility between 1965-69 and 1970-74 can be clearly spotted starting from 2nd order birth. The change between 1965-69 and 1970-74 occurs in both the tempo and quantum. T changed from 24.4 to 26.8 and Q decreased from .952 to .929. As graph 3 indicates, these changes started from the first yearly interval. On the other hand, the shape and level of fertility is rather identical within 1970-74 and 1975+.

Starting from the third order birth, some changes are occuring between 1970-74 and 1975+. These changes are much more moderate than those occuring between 1965-69 and 1970-74.

The previous analysis strongly indicate that there was an actual slow down in period fertility change. A possible bias in this result may be due to differential in age composition of women within the different parity groups. To control this bias and to refine the analysis, the following section repeats the analysis for different age groups at the start of the interval within each parity.

II) Parity Specific Analysis with Age Control

Summary measures of the birth function for different time periods with age control are provided in tables(9) to (14) for different parity cohorts.

Table (9): Summary Measures of the Birth Function from Marriage to First Birth, with Age Controls, for Different Periods.

Age At Mar.	Summary Measure	Period				
		<1960	1960-64	1965-69	1970-74	1970+
<15	Q	.855	.837	.901	.856	.902
	T	21.7	22.6	20.3	20.8	20.3
	M	20.6	21.7	19.7	19.5	19.7
15-16	Q	943	.920	.921	.937	.838
	T	19.5	20.0	18.5	21.3	19.5
	M	18.3	18.6	17.8	20.1	18.8
17-18	Q	.939	.950	.838	.941	.956
	T	17.8	17.1	18.8	17.6	16.9
	M	17.3	16.5	17.9	16.8	16.2
19+	Q	.993	.962	.959	.966	.955
	T	15.3	16.8	15.7	18.6	14.9
	M	14.9	16.0	14.6	18.6	14.2

Source: Special calculation EFS 80

Table (10): Summary Measures of the Birth Function from First to Second Birth, With Age Controls, for Different Periods.

Age At First Birth	Summary Measure	Period				
		<1960	1960-64	1965-69	1970-74	1975+
<16	Q	.983	.936	.941	.940	.924
	T	22.6	21.8	22.7	25.0	25.8
	M	22.7	21.4	22.2	24.5	25.9
16-17	Q	.969	.942	.966	.947	.960
	T	21.4	22.8	22.8	23.3	23.7
	M	21.4	22.2	22.9	22.8	22.4
18-20	Q	.956	.962	.946	.847	.952
	T					
	M	22.4	23.6	22.9	23.0	22.7
21+	Q		.989	.932	.937	.968
	T		21.3	22.2	23.2	23.5
	M		20.7	22.5	22.6	23.0

Source: Special calculations EFS 80

Table (11): Summary Measures of the Birth Function from Second to third Birth, with Age Controls, for Different Periods.

Age At Second Birth	Summary Measure	Period				
		<1960	1960-64	1965-69	1970-74	1975+
<18	Q	.953	.650	.976	.929	.931
	T	21.5	23.6	23.4	26.9	26.4
	M	21.1	23.3	23.7	26.4	26.6
18-19	Q	.972	.974	.936	.941	.945
	T	21.4	22.2	26.4	24.2	30.8
	M	21.2	21.7	27.2	24.5	31.0
20-22	Q	.971	.955	.963	.954	.914
	T	23.6	23.9	24.5	22.7	27.8
	M	23.5	23.3	24.4	23.3	26.9
23+	Q		.861	.937	.911	.893
	T		24.8	25.4	27.1	26.0
	M		24.7	25.5	26.8	2.5

Source: Special calculations EFS 80

Table (12): Summary Measures of the Birth Function from Third to Fourth Birth, with Age Controls, for Different Periods.

Age At Third Birth	Summary Measure	Period				
		<1960	1960-64	1965-69	1970-74	1975+
<20	Q	.986	.964	.951	.931	.840
	T	21.3	21.6	24.6	28.2	28.3
	M	21.6	22.0	24.2	27.8	27.6
20-21	Q		.970	.961	.951	.919
	T		24.0	24.0	26.2	26.1
	M		23.6	24.0	25.8	25.1
22-24	Q		.966	.933	.918	.904
	T		24.9	26.0	26.6	27.4
	M		24.8	24.7	25.8	26.9
25+	Q		.986	.964	.936	.881
	T		24.1	26.7	28.8	26.3
	M		24.0	26.3	28.5	26.1

Source: Special calculation EFS 80

Table (13): Summary Measures of the Birth Function from Fourth to Fifth Birth, with Age Controls, for Different Periods.

Age At Fourth Birth	Summary Measure	Period				
		<1960	1960-64	1965-69	1970-74	1975+
<22	Q	.970	.941	.980	.928	.911
	T	18.5	19.8	23.7	24.5	23.2
	M	17.5	19.6	23.1	24.1	23.0
22-23	Q		.956	.948	.933	.885
	T		22.9	25.8	27.8	26.7
	M		22.9	25.0	27.7	26.5
24-26	Q		.951	.946	.882	.920
	T		26.2	26.4	28.3	28.3
	M		25.9	26.1	28.7	28.1
27+	Q		.988	.939	.919	.865
	T		23.8	25.9	26.3	29.3
	M		23.3	25.8	26.1	29.6

Source: Special calculations EFS 80

Table (14): Summary Measures of the Birth Function from Fifth to Sixth Birth, with Age Controls, for Different Periods.

Age At Fifth Birth	Summary Measure	Period				
		<1960	1960-64	1965-69	1970-74	1975+
<24	Q		.977	.910	.927	.849
	T		20.0	21.4	26.1	26.9
	M		18.2	21.4	25.3	26.8
24-25	Q			.953	.901	.901
	T			25.3	27.7	27.4
	M			25.5	27.7	27.3
26-28	Q			.957	.914	.917
	T			25.4	26.8	27.1
	M			25.2	26.8	26.9
29+	Q			.994	.907	.838
	T			26.1	27.4	31.1
	M			25.4	26.5	31.7

Source: Special calculations EFS 80

The prior comments that pointed out to no change in the quantum of movements from marriage to first birth, require re-explanations. Table (9) points to major changes in quantum between 1965-9 and 1970-74 for both those marrying very young (less than 15) and between (17-18). Those changes are in opposite directions and their overall effects cancel out. The same comments hold between 1970-74 and 1975+, but for different ages at marriage (<15 and 15-16). For those marrying at ages over 19, it remains true that the three time periods are similar in quantum.

Movements between first and second birth, as provided in table (10), remained similar between 1965-69 and 1970-74 for those having their first birth less than 16 and over 21. Otherwise, the proportion moving to second birth within 5 years of first birth shows a considerable decline. Unfortunately, a reverse change (an increase in quantum) can be easily spotted between 1970-74 and 1975+ for those having their first birth after age 17. The change in overall measures (with no control for age), presented in table (3) have been greatly subdued due to changes in opposite directions.

Apart from very minor exceptions, table (11) up to (14) do confirm the prior conclusion, which is that significant changes starting from the second parity cohorts are occuring in both tempo and quantum of fertility between 1965-69 and 1970-74.

The changes in fertility between 1970-74 and 1975+, do not seem as modest as implied by the overall analysis, for example, inspecting table (12), it is obvious that the magnitude of change for each age group considered (except 22-24) between 1970-74 and 1975+ is more than double fold the change between 1965-69 and 1970-74. This is true for some other age controls, in different parities, but since the decline has not been shared by all age groups, the overall effect is smaller.

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