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The Influence of Business Cycles on Marriage and Birth Rates

DUDLEY KIRK

THE POPULATION COUNCIL

BOTH popular thinking and scholarly literature generally assume that there is a meaningful relation between business cycles and vital events. Marriage and birth rates were low during the great depression and high during the recent period of postwar prosperity. There have been predictions that the recession of 1957–1958 would be followed by a significant and perhaps precipitous recession in births.[1]

Despite widespread interest in the subject, efforts to measure this relationship and make it more precise have been relatively few. Early attempts at investigation were greatly hampered by defects in the basic data. While these have greatly improved, there remain quite difficult logical and methodological problems both in measuring and in interpreting the degree of covariance between economic data and vital statistics. The purpose of the present paper is to review this relationship for the period since the First World War.

The most authoritative study of the subject is that of V. L. Galbraith and D. S. Thomas on "Birth Rates and the Interwar Business Cycles." Using deviations from trends, these authors found a correlation of 0.80 between employment levels (that is, the Bureau of Labor Statistics adjusted index of factory employment) and total births for the period 1919–1937, with births lagged one year.[2] More detailed analysis of the relation between employment levels and successive orders of birth suggested that the influence of employment conditions was effective both indirectly through its influence on marriages and first births, and directly

[1] Population Reference Bureau, "Recession in Births?", *Population Bulletin*, Vol. XIV, no. 6, October, 1958, p. 110.

[2] Virginia L. Galbraith and Dorothy S. Thomas, "Birth Rates and the Interwar Business Cycles," *Journal of the American Statistical Association*, Vol. 36, no. 216, December, 1941, pp. 465–476. This correlation was higher than found by Thomas for earlier periods, a finding consistent with the diffusion of the practice of family limitation to larger segments of the population. Cf. William F. Ogburn and Dorothy S. Thomas, "The Influence of the Business Cycle on Certain Social Conditions," *Quarterly Publications of the American Statistical Association*, Vol. 18, 1922, pp. 324–340; Dorothy S. Thomas, *Social Aspects of the Business Cycle*, Knopf, 1927, pp. 97–103; Dorothy S. Thomas, *Social and Economic Aspects of Swedish Population Movements, 1750–1933*, Macmillan, 1941, pp. 161–166.

on the numbers of second and higher orders of birth. However, the results of multiple correlation analysis were inconclusive as to the comparative importance of these two channels of influence.

Yule, Thomas, Hexter, and others have found that marriages respond more sensitively to fluctuations in economic conditions than births, although as early as 1925 Thomas reported that the connection between birth rates and business cycles was becoming stronger while that between marriage rates and business cycles was becoming weaker, suggesting the "interesting hypothesis that whereas a business depression formerly led to prudential restraint through abstention from marriage, it now leads to a more widespread and deliberate use of birth control."[3]

The present study follows the basic method, used by Galbraith and Thomas, in correlating trend deviations of economic measures (as independent variables) to measures of nuptiality and natality (as dependent variables). This method greatly reduces the "auto-" or serial correlation that often inflates the apparent covariance in time series, for example, when this covariance is measured by absolutes, by annual per cent change, or by deviations from moving averages.[4]

[3] Dorothy S. Thomas, *Social Aspects*, etc., *op. cit.*, pp. 99–100. Cf. G. U. Yule, "Changes in Marriage and Birth Rates in England and Wales during the Past Half Century," *Journal of the Royal Statistical Society*, Vol. LXIX, March, 1906, pp. 100–132; M. B. Hexter, *Social Consequences of Business Cycles*, Houghton Mifflin Co., 1925.

[4] The validity of inferences based on correlation coefficients of time series is open to question because of the internal auto-correlation inherent in such series. This inherent quality arises from the circumstance that time series observations are not independent of each other, that they are not randomly chosen, that the value at any one time is strongly conditioned by the magnitude at time $t - 1$. Thus time series correlations tend to be highly correlated, either positively or negatively, not only for aggregate data but also for unit rates.

Even time series of deviations from respective trends do not fully meet the statistical requirements of random, normally distributed, independent observations, but inasmuch as the secular trend has been removed, such series are freer of auto-correlative properties than the original data from which they are derived. Thus it was found that the first lead auto-correlation coefficient for fertility rates for the period 1947 through 1958 (i.e. fertility rates correlated with itself lagged one year) is 0.87, but only 0.42 for the auto-correlation of the series representing deviations from a linear least squares trend line. Similarly, the first lag auto-correlation of the index of industrial production was 0.88 for the 1947–1957 period, compared with −0.20 for its deviations from trend.

In another test developed by Bartlett, the confidence limits of the coefficient of correlation are reinterpreted on the basis of Bartlett's calculation of the number of terms involved in the correlation. Cf. Orcutt and James, "Testing the Significance of Correlation between Time Series," *Biometrika*, December, 1948, pp. 397–413. In applying this test it was found that the correlation coefficient between trend deviations of the index of industrial production and fertility rates (the latter lagged one year) for the 1947–1957 period was unaffected by any auto-correlation. These tests suggest that the methods used in this paper greatly reduce, where they do not eliminate, the influence of auto-correlation.

An alternative method for investigating the relation between economic fluctuations and marriage and fertility rates is the National Bureau of Economic Research reference cycle technique. This involves an examination of the directional movement of the various

INFLUENCE OF CYCLES ON MARRIAGE AND BIRTH RATES

Theoretically, several economic indicators may be selected to examine the relationship between business conditions and marriage and fertility rates. In a previous study, I assumed that employment indexes would be a sensitive measure of the impact of business cycles on the birth rate.[5] Similarly Galbraith and Thomas did not think it necessary to explain the use of an employment index as synonymous with the business cycle. Perhaps for a period of massive unemployment such as was experienced in the 1930's, the supposition of employment as the decisive factor is valid. But in "normal" or prosperous periods a relatively small segment of the population is directly affected by unemployment. At such times the population as a whole may well be more influenced by the general level of economic activity or by the level of income and prices than by unemployment per se.

The economic indicators selected for this study are (*a*) real per capita personal income, (*b*) the Federal Reserve Board index of industrial production, and (*c*) nonagricultural employment and unemployment as a per cent of the civilian labor force. Each of these has been related for the period 1920–1958 (omitting years most directly affected by World War II) with measures of nuptiality and natality. The measures of the latter used here are marriage rates per 1,000 *unmarried* women at ages 15–44 and general fertility rates, that is, births per 1,000 women at ages 15–44. These measures of marriage and birth rates are used to reduce the variability arising from the effects of changes in the marital status and age structure of the population. The basic data are presented in Appendix A.

Using real per capita personal income as representative of the economic indicators, Chart 1 shows its relationship with the absolute numbers of births and marriages, and Chart 2 its relationship with nuptiality and fertility.

Four separate periods are discernible:

(1) *The prosperous 1920's*, characterized by rising levels of production and per capita income, but by a marked downward drift in marriage and birth rates, the last usually identified with the spread of birth control.

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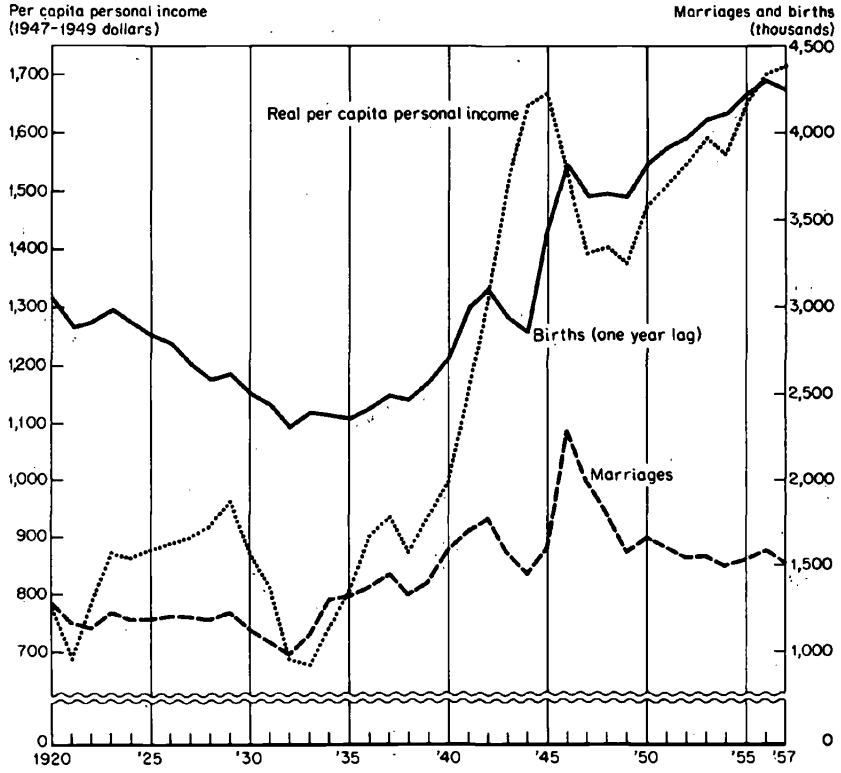
series under consideration at crucial reference dates predetermined by the National Bureau of Economic Research to represent the initial troughs, peaks, and terminal troughs of cycles of economic activity. This method is designed to analyze monthly and other short-interval data, and assumes a series of cycles. It is therefore not readily applicable to the annual data used in the present paper, and to the period under consideration, which includes only one major economic cycle. Cf. Arthur F. Burns and Wesley C. Mitchell, *Measuring Business Cycles*, National Bureau of Economic Research, Studies in Business Cycles, no. 2, 1946.

[5] Dudley Kirk, "The Relation of Employment Levels to Births in Germany," *Milbank Memorial Fund Quarterly*, Vol. 20, no. 2, April, 1942, pp. 126–138.

CHART 1

Real Per Capita Personal Income, Marriages and Births, 1920–1957

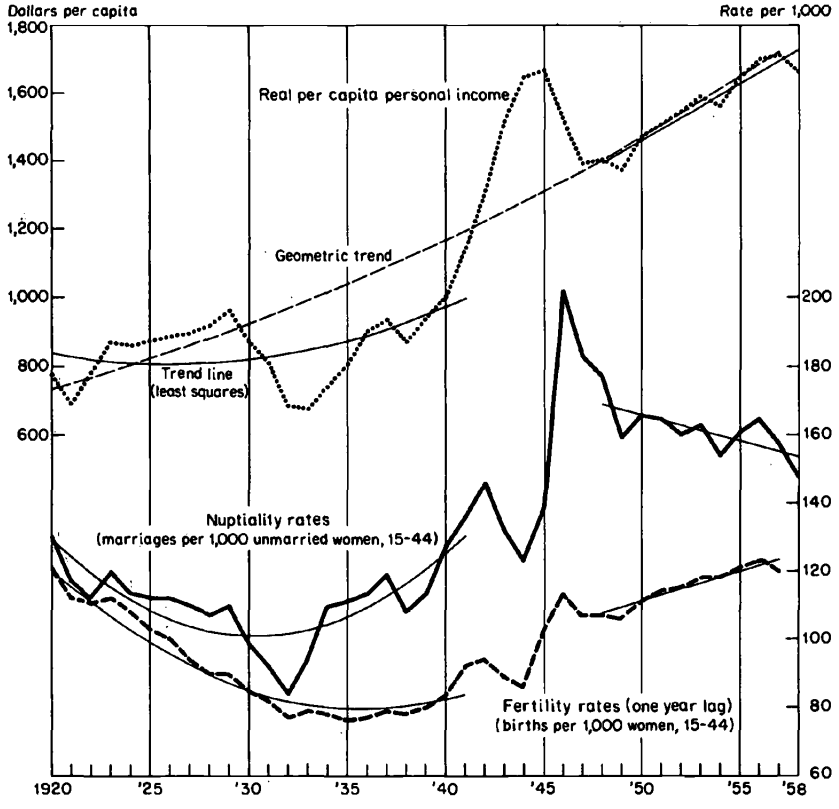


(2) *The depression 1930's*, which shows a trough in all three indexes but of quite different character. Marriage rates had already regained their 1929 level by 1934; personal income and the index of industrial production began to recover in 1935 but for the most part remained substantially below their historical secular trends, while the downward fertility curve of the 1920's seems to have leveled off to an asymptote reached in the middle 1930's.

(3) *The war years*, which introduced new factors strongly affecting the economic indexes and the marriage rates. Because of the influences of the draft, of demobilization, and of other special circumstances of the war extraneous to the present discussion, the data for the war and immediate postwar years have been omitted from the analysis.

CHART 2

Real Per Capita Personal Income, Nuptiality, Fertility, and Respective Trends, 1920–1958



(4) *The postwar decade*, in which the economy resumed its historical trend of upward growth, this trend accompanied by an upward trend in birth rates but not marriage rates, which fell from high wartime levels early in the decade and have been relatively stable since 1952.

Descriptively, the variables are highly correlated in their absolute amounts but owing to the existence of internal serial correlation such evidence is unsuitable for inferential analysis. There is only a general correspondence between the longer-range secular trends in fertility, nuptiality, and economic conditions.

The decline of fertility during the 1920's occurred in the face of economic prosperity and its downward course was not markedly accentuated by the depression. In fact, the downward drift of fertility so evident

in the 1920's was actually checked and stabilized in the depths of the depression. At its low point in 1933, the fertility rate was only 14 per cent below its 1930 level, a year which reflected the peak prosperity and employment conditions of 1929. Furthermore, there was little indication in the aggregate prewar data used here that full economic recovery and reemployment would produce anything comparable to the actual fertility trends that emerged after World War II.

Nor is there any strong indication in the prewar data that prosperity would bring about the great increase in marriage rates that has contributed substantially to the high level of fertility since World War II. The proportions of women married at each age in 1940 were not abnormally low; they were very close to those existing in 1930, following a period of prosperity.

The measurement of covariation in year-to-year fluctuations required the removal of secular trends and measurement of deviations from those trends. The precise definition of trends inevitably involves arbitrary elements. For present purposes two different approaches were experimented with.

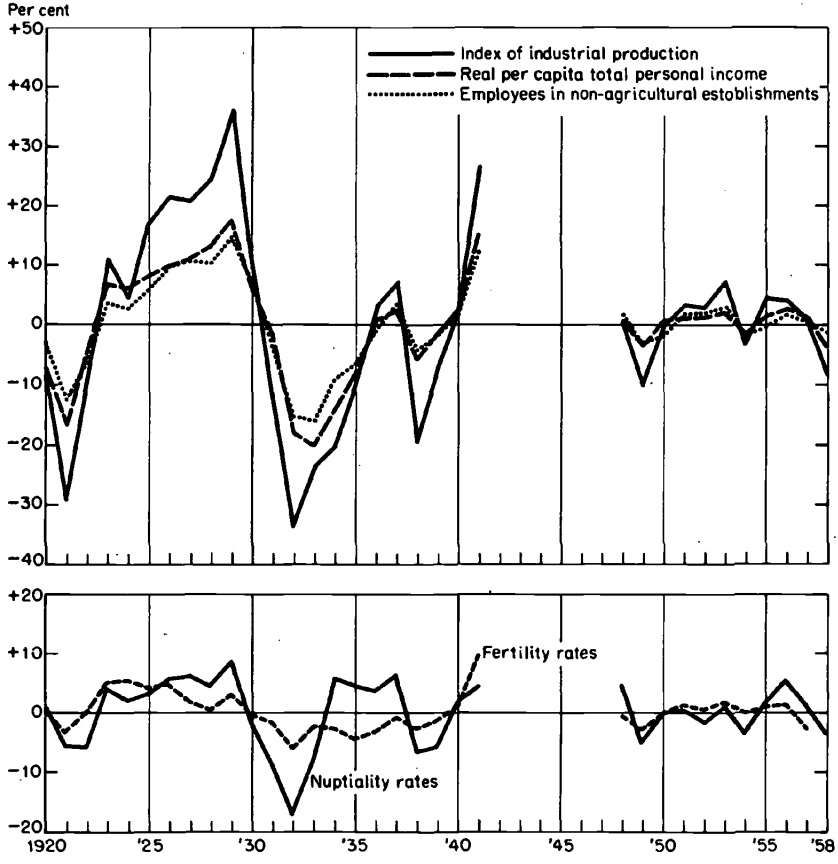
Method 1. It was assumed for this purpose that the influence of economic conditions on marriage and birth rates may best be measured in terms of their deviation from an expected rate of progress. In other words, people's judgments of economic conditions insofar as they affect marriages and births may be related to expectations of economic progress rather than to absolute levels.

After experimentation, geometric trends were computed for per capita income and industrial production, on the assumption that historically these have tended to grow by constant percentages rather than by constant amounts. Points of origin were found by averaging the figures for 1920–1922 and 1955–1957, a procedure that provided an average annual rise of 2.3 per cent for real per capita income and of 3.9 per cent for industrial production. Data on unemployment as per cent of civilian labor force was assumed to represent deviations from the secular trend in employment potential, defined as the growing size of the civilian labor force.

While economic indexes have shown consistent historical growth, it would be unreasonable, of course, to make such assumptions about marriage and birth rates. After experimentation a second degree parabola was fitted by least squares to the natality data for 1921–1942, and a linear trend was computed for the postwar period. A linear trend was computed for the marriage rates for the entire period 1920–1957, excluding the war and immediate postwar years.

CHART 3

Percentage Deviations from Computed Trends of Economic Indexes, Nuptiality and Fertility, 1920–1958



Method 2. In the second method least squares lines were fitted for all series. In each case parabolas were fitted to the data for the period 1920–1941 (1921–1942 for birth rates) and linear least squares lines for the postwar materials.

The second method assumes that marriage and birth rates might be expected to react more closely to the *absolute* changes in the economic indexes, rather than to the relation of existing economic conditions to a historical trend of economic progress. In the second method nonagricultural employment (Bureau of Labor Statistics) instead of unemployment was used as the third economic indicator.

The data and trends determined by the two methods are shown in Chart 2 and the trend deviations (for method 2 only) are presented in Chart 3. The data suggest the following generalizations:

1. Over the whole series the economic indexes show the greatest variability, the birth rates the least, with marriage rates in an intermediate position.

2. There was greater variability in all series during the interwar period than in the postwar period.

3. In most years marriage and birth rates are on the same side of the trend lines as the economic indicators, but are not so closely correlated with the economic indicators as these are with each other.

The correlations of the trend deviations under the two methods are presented in Table 1. The data presented suggest the following generalizations:

TABLE 1

Correlations of Percentage Deviations from Trends of Fertility, Nuptiality, and Economic Indexes

Period	*Independent Variable*	*Dependent Variable*	*Correlation Coefficient*[a] *Method* I	*Method* II
1920–41	Per capita income	Fertility[b]	0.74	0.77
	Industrial production	Fertility[b]	.73	.76
	Employment[c]	Fertility[b]	— .73	.76
	Per capita income	Nuptiality	.76	.68
	Industrial production	Nuptiality	.74	.76
	Employment[c]	Nuptiality	— .72	.72
1948–57[d]	Per capita income	Fertility[b]	.86	.66*
	Industrial production	Fertility[b]	.79	.78
	Employment[c]	Fertility[b]	— .65*	.57†
	Per capita income	Nuptiality	.79	.79
	Industrial production	Nuptiality	.66*	.66*
	Employment[c]	Nuptiality	— .45‡	.63*
1920–41	Nuptiality	Fertility[b]	.49*	.55
1948–57	Nuptiality	Fertility[b]	.30‡	.41‡

Note: Unless otherwise indicated, all values significant at 0.01 level.

* Significant at 0.05 level.

† Significant at 0.10 level.

‡ Not statistically significant.

[a] Methods as described in text.

[b] Fertility data related to economic indexes of preceding year.

[c] For Method 1, employment measured by unemployment as per cent of civilian labor force.

[d] 1947–1956 for Method 1.

1. The relationship between the economic indicators and natality was very stable in the interwar period, the coefficients falling within a very narrow range of 0.73–0.77, with no important difference where different independent variables or methods were employed. The coefficients in this series not unexpectedly approximate the figure of 0.80 obtained by Galbraith and Thomas for the period 1917–1937.

2. The relationship between economic indicators and nuptiality for the interwar period is also quite stable, with a range of coefficients from 0.68–0.76. The results give confidence that the method of determining the trend lines is not a decisive factor in the measure of the interrelationships in the interwar period.

3. There is much greater variability in the coefficients for the past decade, probably owing to the shorter series. The selection of years makes an important difference in the results. There is some suggestion that the relation of employment (or unemployment) to nuptiality and fertility is lower in the postwar than in the interwar period, as might be expected on a priori grounds. Otherwise, the relationships seem to be of the same general order of magnitude as in the interwar period.

4. The coefficients of correlation between nuptiality and fertility are the lowest in the series both for the interwar and postwar periods though the figures for the latter are not statistically significant.

The results of partial and multiple correlation analysis are shown in Table 2. The coefficients of multiple correlation indicate a joint effect of economic factors and nuptiality that explains 50–60 per cent of the variability in fertility in the interwar period. The coefficients for the postwar period are of questionable significance, but suggest a similar level of influence for per capita income and industrial production, though not for employment.

Partial correlation analysis indicates that the entire influence of nuptiality on trend deviations in fertility is a secondary effect of economic fluctuations. When economic factors are held constant there is effectively no correlation between nuptiality and fertility.

The level of simple correlations between economic indicators and fertility using Method 2 is 0.76–0.77, and the simple correlation between nuptiality and fertility is 0.55 (cf. Table 1). The interrelationships of these figures suggest that the economic indicators explain some 58–59 per cent of the variance in the fertility series, of which 30 per cent or about one-half is exercised through nuptiality and the remainder through the direct influence of economic conditions on fertility.

The influence of marriages on fertility is of course most observable in

connection with first births. The correlation of numbers of marriages and first births in the following year is very high. But the correlation of trend deviations for nuptiality and natality in the postwar period was lower than in the interwar period (cf. Table 1), a finding consistent with the declining percentage of first births among total births. In 1947 the

TABLE 2

Partial and Multiple Correlations among Trend Deviations of Economic Indexes, Nuptiality, and Fertility[a]

Period	Variable	Correlation Coefficient	
		Method I[b]	Method II[b]
	Nuptiality constant	*Partial Coefficient*	
1920–41	Per capita income and Fertility	0.65	0.65
	Industrial production and Fertility	.64	.64
	Employment[c] and Fertility	— .61	.62
1948–57[d]	Per capita income and Fertility	.59*	.59*
	Industrial production and Fertility	.74*	.74*
	Employment[c] and Fertility	— .53*	.44*
	Per capita income constant		
1920–41	Fertility and Nuptiality		.06*
1948–57	Fertility and Nuptiality		— .22*
	Industrial production constant		
1920–41	Fertility and Nuptiality		— .08*
1948–57	Fertility and Nuptiality		— .21*
	Employment constant		
1920–41	Fertility and Nuptiality		.004*
1948–57	Fertility and Nuptiality		.08*
	Fertility and Nuptiality with:	*Multiple Coefficient*	
1920–41	Per capita income		.77
	Industrial production		.76
	Employment		.76
1948–57	Per capita income		.68*
	Industrial production		.79*
	Employment		.58*

* Not statistically significant in the postwar period because of lack of significance in correlation between nuptiality and fertility for that period (cf. Table 1).

[a] Fertility data related in all cases to economic indexes and nuptiality of preceding year.

[b] Methods as described in text.

[c] For Method 1, employment measured by unemployment as per cent of civilian labor force.

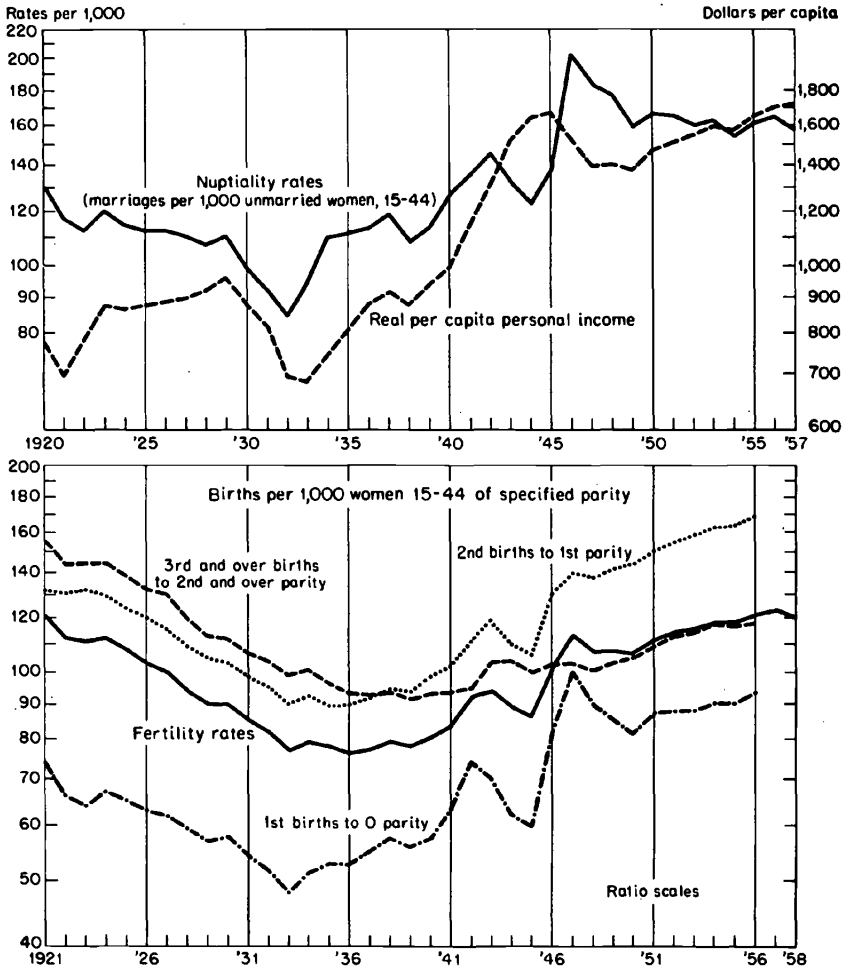
[d] 1947–1956 for Method 1.

rate of first births was 46.7 per thousand women 15–44, but had fallen by 1950 to about 33. Since 1952, it has been stable at this figure. By contrast, the rate of second and higher orders of birth has continued to rise, and is responsible for the rise in fertility and births since 1950.

General fertility rates by parity, presented in Chart 4, illustrate (*a*) the relation between marriage rates and first births and (*b*) the extent to

CHART 4

Real Per Capita Personal Income, Nuptiality Rates, and Fertility Rates by First, Second, and Third, and Higher Order Parity, 1920–1958



which total fertility reflects fluctuations in the rate of first births.[6] By contrast, the rates of second births, and particularly the rates for third and higher order births, show rather little year-to-year fluctuation. When the more immediate influence of marriages is removed, as in parity rates for higher order births, there is a clear secular trend, modified only slightly in its annual variation by economic fluctuations and even by World War II.

Further light on the relationships between economic factors and fertility may be obtained by an examination of the monthly data for the economic series as related to monthly data for fertility when both are adjusted for seasonal variation.[7] These are shown in Chart 5, fertility data being related to the economic series nine months earlier (i.e., the series for industrial production beginning in January 1948 is plotted against data for fertility beginning as of nine months later, namely October 1948). The variability in fertility has been very much less than that in the index of industrial production and other measures of economic activity. The effects of major events are reflected in both series but with different intensity. Both series responded to the outbreak of the Korean War in the summer of 1950. The recessions of 1949, 1954, and 1957–1958 stand out boldly in the economic data but their effects are not nearly so pronounced in the fertility series. There was a recent drop in fertility apparently associated with the earlier phases of the 1957–1958 recession. But much of the natality series shows almost random variability around a smooth upward trend.

General Conclusions

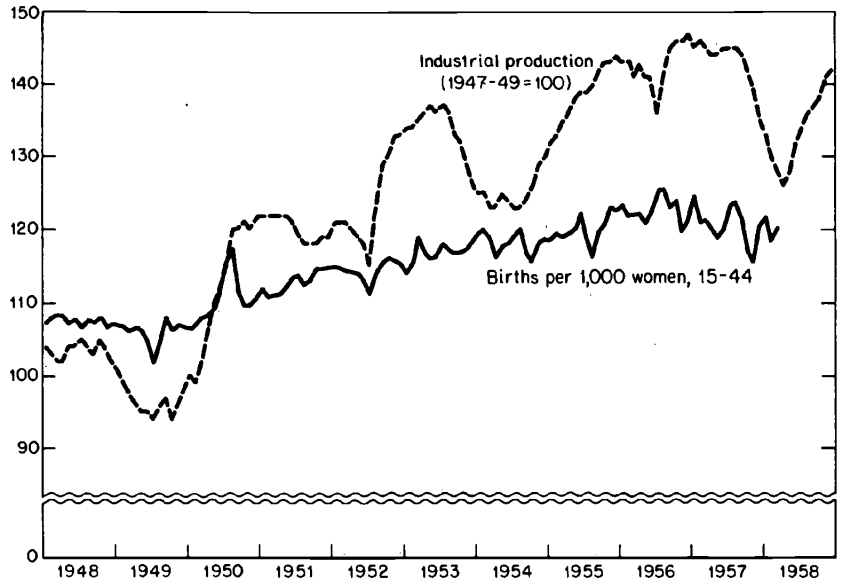
The possible influence of economic fluctuations on marriages and births may be considered at two levels: (1) The degree of covariation in annual and other short-range deviations from trends; (2) The relation between the trends themselves.

[6] The general fertility rates by parity were computed from data kindly supplied by the Scripps Foundation for Research on Population Problems. The level of marriages in a given year of course affects fertility not only in the following year but in subsequent years, and the number of women available to have second births is a function of the number who have already had their first child. These secondary effects are too diffuse to show in the aggregate data used here, but undoubtedly contribute to the stability of fertility trends. It should be noted that P. K. Whelpton, Director of the Scripps Foundation, who has pioneered in the analysis of fertility by age and parity, is now engaged in an extensive study of the relation of economic fluctuations to age-parity specific birth rates.

[7] The monthly fertility series adjusted for seasonal variation, was supplied to the author through the courtesy of Mr. Joseph Schachter from unpublished computations made under his direction in the National Office of Vital Statistics.

CHART 5

Index of Industrial Production and General Fertility Rates (Nine Months Lag), Both Series Adjusted for Seasonal Variation, by Month, 1948–1958



I. DEGREE OF COVARIATION IN DEVIATIONS FROM TRENDS

The results confirm the generally held view that marriages and births respond sensitively to changes in economic conditions. The correlation coefficients of trend deviations for fertility with economic indexes are generally high. They suggest that economic conditions control about one-half of the annual variance of fertility from its trend, the degree of control differing relatively little with the economic index, the choice of trend, and the period covered. A possible exception is the relatively low correlation of employment and unemployment with fertility in the postwar period.

Correlations of nuptiality with fertility are relatively low. When economic indexes are held constant, there is no correlation between the two, suggesting that nuptiality is not an independent factor affecting trend deviations in fertility but is a channel through which economic conditions influence annual variations in fertility. The results indicate that in the interwar period about half of the control exercised by economic conditions operates through nuptiality and the other half is exercised

directly on fertility. For the postwar period the findings are too inconclusive to make such an apportionment.

It must be pointed out that the high correlation coefficients merely indicate that deviations from the respective trends are generally in the same direction, not that changes in economic conditions are accompanied by changes in fertility of comparable magnitude. Thus on the average over the whole period studied a trend deviation of 4 per cent in personal income produced a trend deviation of only 1 per cent in fertility.

2. RELATION OF MAJOR BUSINESS CYCLES TO FERTILITY TRENDS

The data of this study do not confirm the view that *major* changes in fertility are a function of business cycles. In other words, while the deviations from trend of fertility rates seem to move in the same direction as the trend deviations of economic indicators, the former series exhibits a distinctive character of its own, describing a trend in many respects quite independent of economic conditions. The surface waves are indeed much influenced by economic fluctuations, but the underlying tide appears to be an independent and surprisingly stable force.

This conclusion passes over the possibility that prolonged depression or prosperity may influence basic attitudes and behavior with reference to marriage and fertility and thereby exercise a cumulative effect on fertility over and above year-to-year fluctuations. Conversely, it may be that fertility would be much more responsive than previously to the onset of a major depression, especially in view of its present relatively high level and the present widespread knowledge of methods of family limitation. Such considerations argue for great caution in attempting to predict the future influence of business cycles on births.

Finally, the above analysis strengthens the view of the author that economic fluctuations in themselves should not be regarded as primary *causes* of fertility trends, but as important conditioning influences. It is highly questionable that many people in a modern industrial society produce children for their economic or market value, though they certainly do limit family size because of concern about the economic costs of an additional child. Economic costs associated with parenthood presumably bear less heavily in times of prosperity and more heavily in times of depression, but in both cases as a check on motivations and behavior of non-economic origin. Changes in the social and psychological forces affecting the latter may be quite independent of economic cycles.

Appendix A

TABLE A-1

Economic Data

Year	*Index of Industrial Production* (1947–49 = 100)	*Real Per Capita Personal Income* (1947–49 dollars)	*Per Cent Unemployed of Civilian Labor Force*	*Number of Employees in Non-agricultural Establishments* (millions)
1920	41	779	4.0	27.1
21	31	691	11.9	24.1
22	39	782	7.6	25.6
23	47	872	3.2	28.1
24	44	863	5.5	27.8
25	49	875	4.0	28.5
26	51	888	1.9	29.5
27	51	898	4.1	29.7
28	53	918	4.4	29.7
29	59	960	3.2	31.0
1930	49	874	8.7	29.1
31	40	814	15.9	26.4
32	31	687	23.6	23.4
33	37	678	24.9	23.5
34	40	740	21.7	25.7
35	47	804	20.1	26.8
36	56	901	16.9	28.8
37	61	933	14.3	30.7
38	48	874	19.0	28.9
39	58	936	17.2	30.3
1940	67	995	14.6	32.0
41	87	1,148	9.9	36.2
42	106	1,314	4.7	39.8
43	127	1,518	1.9	42.1
44	125	1,644	1.2	41.5
45	107	1,668	1.9	40.0
46	90	1,529	3.9	41.3
47	100	1,396	3.5	43.5
48	104	1,401	3.3	44.4
49	97	1,376	5.4	43.3
1950	112	1,470	4.9	44.7
51	120	1,507	3.0	47.3
52	124	1,544	2.6	48.3
53	134	1,592	2.5	49.7
54	125	1,566	5.0	48.4
55	139	1,649	4.0	50.0
56	143	1,700	3.8	51.9
57	143	1,712	4.3	52.2

TABLE A-2
Demographic Data

Year	U.S. Live Births (Millions)	Birth Rates Per 1,000 Women 15–44 Years of Age		Marriages Per 1,000 Unmarried Women 15–44 Years of Age
		Total	Second and Higher Order	
1920	3.0	119	81	130
21	3.0	121	82	117
22	2.9	112	78	112
23	2.9	111	78	120
24	3.0	112	78	114
25	2.9	108	74	112
26	2.8	103	71	112
27	2.8	100	68	110
28	2.7	94	64	107
29	2.6	90	61	110
1930	2.6	90	60	99
31	2.5	85	57	92
32	2.4	82	55	84
33	2.3	77	52	94
34	2.4	79	52	110
35	2.4	78	49	111
36	2.4	76	47	113
37	2.4	77	47	119
38	2.5	79	48	108
39	2.5	78	47	113
1940	2.6	80	51	127
41	2.7	83	51	136
42	3.0	92	54	146
43	3.1	94	60	132
44	2.9	89	59	123
45	2.8	86	57	138
46	3.4	102	63	202
47	3.8	113	67	183
48	3.6	107	68	177
49	3.6	107	71	159
1950	3.6	106	73	166
51	3.8	111	77	165
52	3.9	114	80	160
53	4.0	115	81	163
54	4.1	118	84	154
55	4.1	118	85	161
56	4.2	121	88	165
57	4.3	123	—	157
58	4.2 est.	120 est.	—	—

Appendix B

SOURCES OF DATA

I—*Economic Data*

(1) Federal Reserve Board Index of Industrial Production from U.S. Department of Commerce, *Survey of Current Business*, December 1953 and July 1958.

(2) U.S. Per Capita Personal Income in 1947–1949 Dollars: obtained by dividing U.S. Per Capita Personal Income by corresponding Consumer Price Index. Income data are from U.S. Department of Commerce, *Survey of Current Business* for the period 1929–1957; from National Bureau of Economic Research, *Personal Income During Business Cycles*, Business Cycles Studies no. 6, 1956, for the period 1920–1929, with adjustment to link with the Department of Commerce series. Consumer Price Index data are from U.S. Department of Labor, Bureau of Labor Statistics.

(3) Unemployment data: U.S. Department of Commerce, Bureau of the Census, for period 1929–1957; National Bureau of Economic Research, *Special Conference Series No. 8*, "Annual Estimates of Unemployment in U.S., 1900–1954," for period 1920–1928.

(4) Number of employees in non-agricultural establishments: U.S. Department of Labor, Bureau of Labor Statistics.

II—*Demographic Data*

Compiled and adapted from the several series of *Special Reports* published by the National Office of Vital Statistics. Births and birth rates corrected for underregistration. Data on second and higher order births for years prior to 1940 estimated from data published for native-white women.

COMMENT

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Dudley Kirk's paper on "The Influence of Business Cycles on Marriage and Birth Rates" throws new light on an old problem and makes ingenious use of improved basic data for analysis of interrelationships in recent years in the United States.

The close positive relationship between fluctuations in economic well-being and fluctuations in the marriage rate has been observed for long periods of time in almost all countries for which even rudimentary historical statistics exist; first, the concomitance of upswings and downswings in various indexes of the adequacy of the harvest with marriage frequencies; later, the concomitance of various measures of business cycles and crude or refined marriage rates. The correspondence was, and has continued to be, so close that Farr suggested in 1885 that "it is a fair deduction from the facts that the marriage returns in England point out periods of prosperity little less distinctly than the funds measure the hopes and fears of the money market. If the one is the barometer of credit, the

other is the barometer of prosperity, present in part, but future, expected, anticipated in still greater part."[1] Beveridge, in 1912, in his classic treatise on unemployment included a time series on marriage rates, along with various other cyclical series as a measure of "the pulse of the nation";[2] and Joseph S. Davis in a memorandum in the spring of 1958 proposes using "marriages as a current economic indicator" of consumer confidence or caution with respect to major commitments for the future in the United States.[3] With cycles as well-defined as they are in marriage series; with the longer term trends in the basic population "exposed to the risk of marrying," and in the age-specific propensities to marry so slow-moving and regular, in general no great refinement of technique is needed to demonstrate the direction and strength of correlations with economic cycles. When, as has become customary, secular trends are removed by moving averages or some other smoothing process and years of major war disturbances eliminated, the correlation coefficients rarely fall below 0.70 and often approach 0.90. The persistence of correlations of this magnitude, over time, and among different areas is, perhaps, one of the most firmly based empirical findings in any of the social sciences.

The situation with regard to the birth rate is not so simple. The relationships with economic fluctuations noted in England, in Sweden, and elsewhere during early industrializing or pre-industrial periods undoubtedly reflect in large part, the operation of the Malthusian positive check, as suggested by Sundbärg's observation that "when the harvest failed, marriage and birth rates declined and death devastated the land, bearing witness to need and privation and at times even to starvation."[4] Each famine was accompanied by an immediate rise in the death rate, and a fall, without lag (on an annual basis) in the birth rate, whether the latter was measured on a crude basis or in terms of legitimate and illegitimate fertility rates; each period of abundance by an equally quick response in falling death rates and rising birth and fertility rates. With a more rapid pace of industrialization, improved transportation and communication, and urbanization, the sharp secular decline that occurred in birth or fertility rates reflects primarily the operation of the neo-Malthusian preventive check. There is, moreover, evidence that the spread of the small-family system, through effective use of contraception or other means of birth control, proceeded until very recent years from

[1] William Farr, *Vital Statistics*, London, 1885, p. 68.
[2] William H. Beveridge, *Unemployment: A Problem of Industry*, London, 1912, p. 44.
[3] Mimeographed, Council of Economic Advisers, Washington, 1958.
[4] Translated and cited by Dorothy S. Thomas, in *Social and Economic Aspects of Swedish Population Movements, 1750–1933*, New York, 1941, p. 82.

the more favored economic and social classes through the middle classes and penetrated much more slowly into the lower economic and social ranges of the population. Thus, both secularly and structurally there has been a negative relationship between married fertility (or size of family) and income or level of living. At the same time, however, in most highly industrialized areas, positive relationships between business cycles and birth or general fertility rates have been observed, with a lag of a year or more. Compared with the correlations found for marriage rates, over long periods, birth-or-fertility rate correlations with various indexes of business cycles have been rather unstable, with the coefficients showing a pronounced upward trend; from little more than 0.30 to 0.40 during the late 19th and early decades of the 20th century to values clustering around 0.70 to 0.80, and therefore approximating those found for marriage rates during the interwar and postwar years, at least for the United States.

Intervening between the positive relationship of business cycles and fluctuations in birth or fertility measures is the demonstrated positive relationship of business cycles and marriage rates for, in general, if the marriage rate rises or falls there will, with an appropriate lag, be a secondary rise or fall in the birth rate. And, as Kirk points out, "the influence of marriage on fertility is of course most observable in connection with first births." With the spread of the small-family system, first births have, over a long period, had increasingly heavy weights in series representing aggregate births; and from the long-term view this may account for the strengthening of the correlation between business cycles and fluctuations in birth-fertility series. Kirk's slightly higher correlations for the last ten years, in spite of a short-term decrease in the weight of first births, is interesting, inasmuch as the correlation for this period between nuptiality and general fertility rates was only of the order of 0.50, a value much lower than that observed for the interwar period and suggesting that the impact of business cycles may be increasingly felt in the higher orders of births.

Kirk's findings and interpretations raise a number of questions about the most profitable procedures for future research in this important field:

(1) He questions the use of unemployment-employment indexes as measures of business cycles on the ground that "the direct effects of unemployment" would except in periods of "massive unemployment" be felt "by a relatively small part of the total population." I am in complete agreement with this point, as with his further statement that "it seems reasonable to suppose that persons are susceptible in the mass to the influence of economic factors that may not necessarily bear very heavily

or directly on all, but may shade, both consciously or unconsciously, decisions and behavior affecting the birth rate." Rather than taking, as he does "several economic series" that "might theoretically be expected to influence the level of marriages and births," however, I suggest the use of highly generalized "reference cycles," prepared by the National Bureau of Economic Research.

(2) He computes various complicated trends, from geometric growth curves to the second degree parabolas to straight lines. My own experience with historical series suggests that all of these are open to question, on theoretical grounds, and that the "cutting" of the cycles is often very ineffectively done by these procedures. Some of the observed interperiod variations are unquestionably to be attributed to the vagaries of trend fitting rather than or in addition to substantive changes in the behavior under observation.

(3) Questions may also be raised about the propriety of computing correlation coefficients for periods covering only ten years, and as to the suitability of the correlation technique for demonstrating the nature and extent of cyclical covariation. If the cycle, rather than the year, the quarter, or the month, is the valid time unit for measurement, fruitful use can, again, be made of the National Bureau techniques of defining turning points and phases of cycles for both specific and reference series. In this connection I suggest that the long historical series that have been perhaps inappropriately analyzed by many investigators (including myself) for many areas be reexamined with new techniques.

(4) Kirk's final section on the relation of major business cycles to fertility trends is limited to very recent experience and does not take account of the fact that "the underlying tide" may not only be an independent force but also, as indicated above, has been negatively rather than positively correlated with trends in the general well-being of the population.