Fertility and its Measurement: Age Specific Measures

Demography Camp

Summer 2013

1 Age Specific Fertility Rates (ASFR)

$$ASFR_i = \frac{annual\ births\ to\ women\ at\ age\ i}{mid-year\ population\ of\ women\ age\ i}$$

- The annual fraction of women giving birth at each age
- Requires data on births distributed by age of mother and an age distribution for the female population

Table 1: US Age Specific Fertility Rates

Age	1940	1985	2003
10-14	0.7	1.2	0.6
15-19	54.1	51.3	41.6
20-24	135.6	108.9	102.6
25-29	122.8	110.5	115.6
30-34	83.4	68.5	95.1
35-39	46.3	23.9	43.8
40-44	15.6	4	8.7
45-49	1.9	0.2	0.5

- Fertility rises to peak age and then declines
- Peak occurs later in 1985 and 2003 than 1940
- Fertility is generally lower in 1985 than 1940

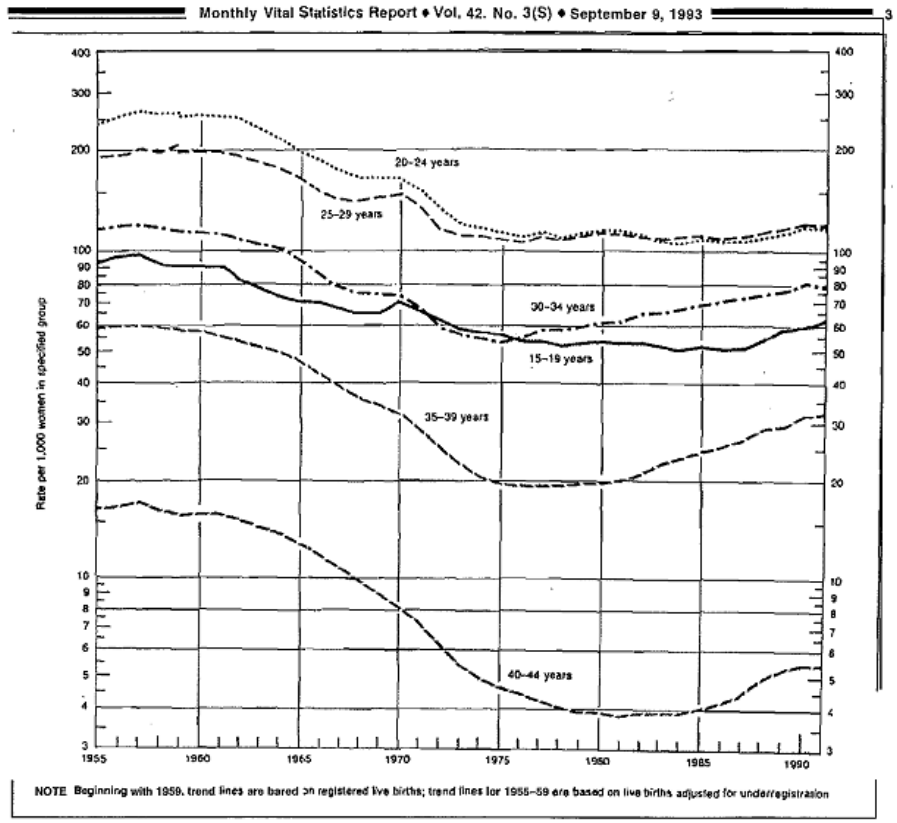

Figure 2. Birth rates by age of mother: United States. 1955–91

Figure 1: Age Specific Birth Rates

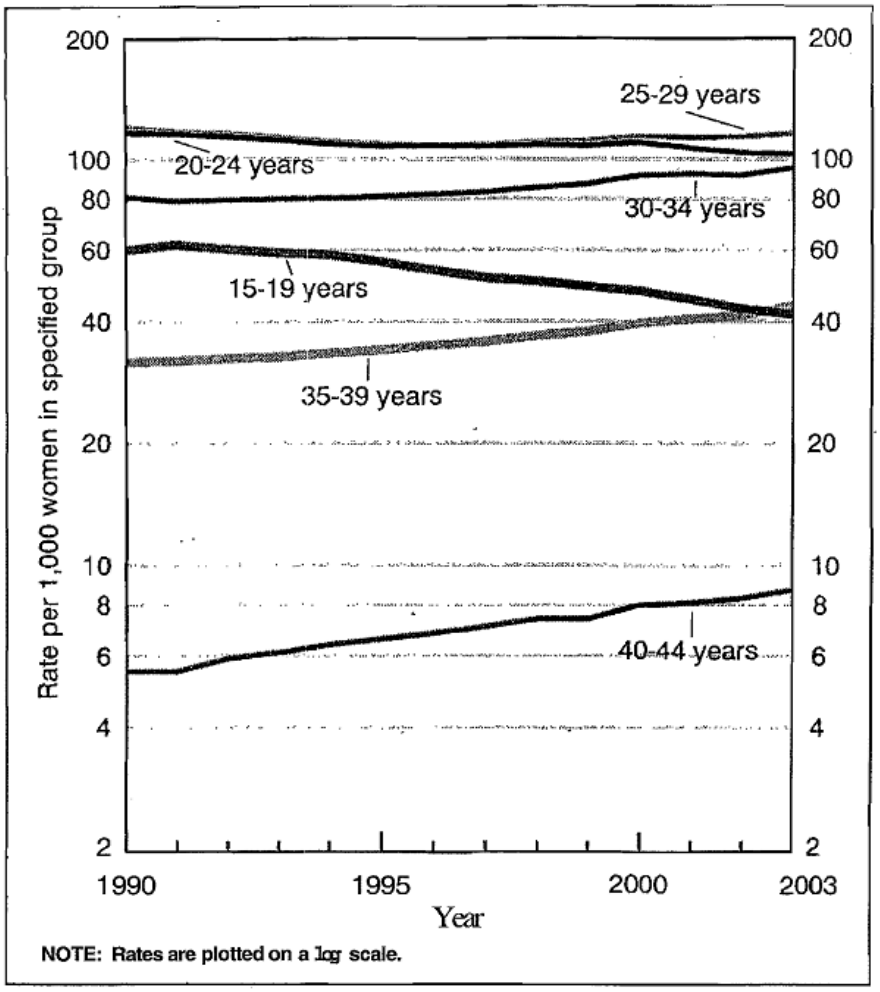

Figure 1. Birth rates by age of mother: United States, 1990–2003

Figure 2: Age Specific Birth Rates

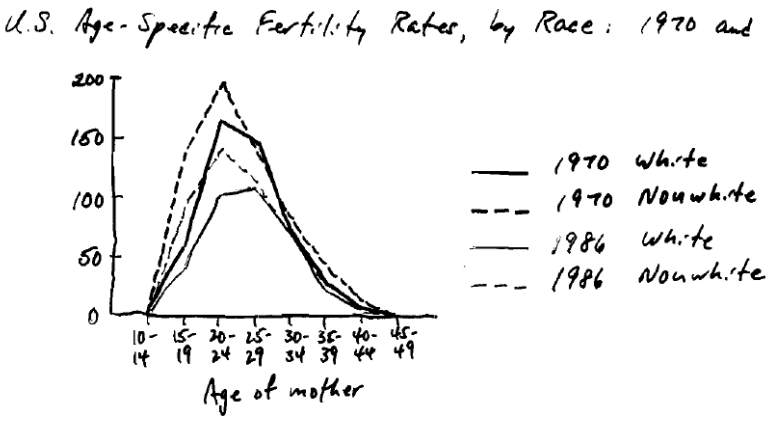

Figure 3: Age Specific Birth Rates

1.1 Fertility Schedule

- Set of $ASFR_i$
  - Is concave from above at older ages in the presence of extensive practice of birth control
  - Would like to have single index to summarize the fertility schedule, similar to $\mathring{e}_0$
  - Can use area under the curve

2 Total Fertility Rate (TFR)

$$TFR = \sum_{10}^{49} ASFR_i \; for \; 1 - year \; age \; groups$$

$$TFR = 5 \cdot \sum_{10-14}^{45-49} ASFR_i \; for \; 5 - year \; age \; groups$$

Interpretation: the average number of children born per woman for women reaching the end of childbearing ages and who are subject at each age to the fertility rates observed in a give year

Table 2: US TFR

1940	2.301
1985	1.843
2003	2.043

Table 3: Range in CBR and TFR in Contemporary World (2005)

	CBR	TFR
World	21	2.7
MDCs	11	1.6
LDCs	24	3
Africa	38	5.1
Asia	20	2.5
(Asia) Excl. China	24	3
(Asia) Western	27	3.6
(Asia) East	12	1.6
North America	14	2
Latin America	22	2.6
Europe	10	1.4
Oceania	17	2.1

3 Age Patterns of Fertility

ASFR's and TFR are "are distribution free" measures of fertility. **However**, there are influenced by age patterns of nuptiality (i.e. marriage, divorce, widowhood, remarriage)

$$ASFR_i = \begin{array}{c}\text{fertility rate of cohabiting women at age i} \times \\ \text{proportion of women at age i who are cohabiting}\end{array}$$

TFR will be high in populations having high fertility rates among cohabiting women and large proportions cohabiting

Measurement Problems

- Definition: what is marriage? Cohabitation?
- Variation across space and time
- Different partnerships definitions have different fertility rates in the same populations
- When do you measure relationship status? At conception? At birth? Does it matter?

4 Periods and Cohorts

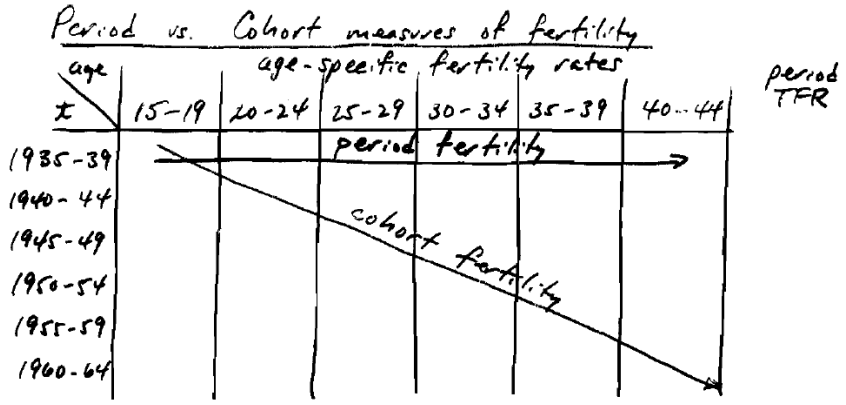

Figure 4: Period and Cohort Direction

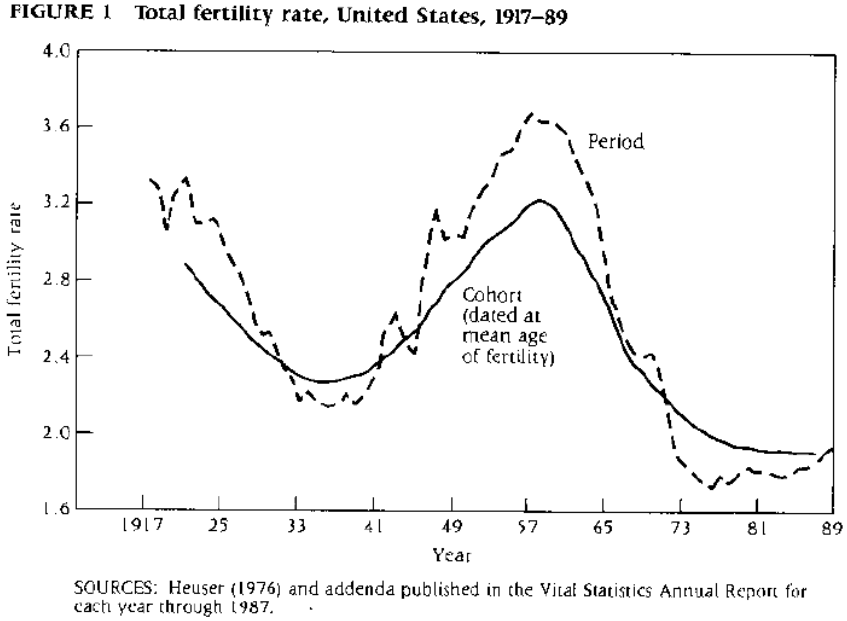

Figure 5: From Ryder 1990

Reasons for studying cohort fertility:

- People's behaviors re: fertility depend on preceeding behavior when they are controlling the number of children
- Growing availability of micro-level longitudinal data

Note: Cohort changes in the timing of births may affect period rates. In particular, if the cohort mean age of childbearing rises, the period TFR declines, and vice versa.

Ex. Cohort TFR=2.1, but mean age of childbearing falls from 29 to 28. Suppose all childbearing occurs at once- like litters. Change occurs in 1975.

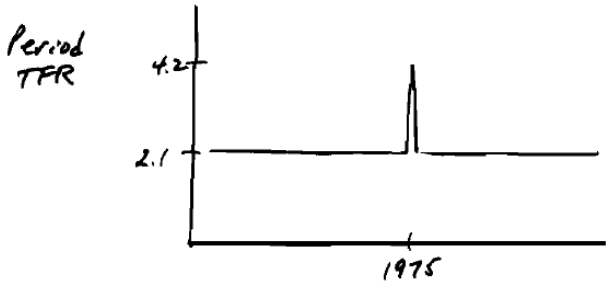

Figure 6: From Ryder 1990

In 1975, two cohorts (29 year olds and 28 year olds) are having their children

Figure 7: Blimps in Fertility

Cohort TFR unchanged

FIGURE 2 Mean age of fertility, United States, 1917–87

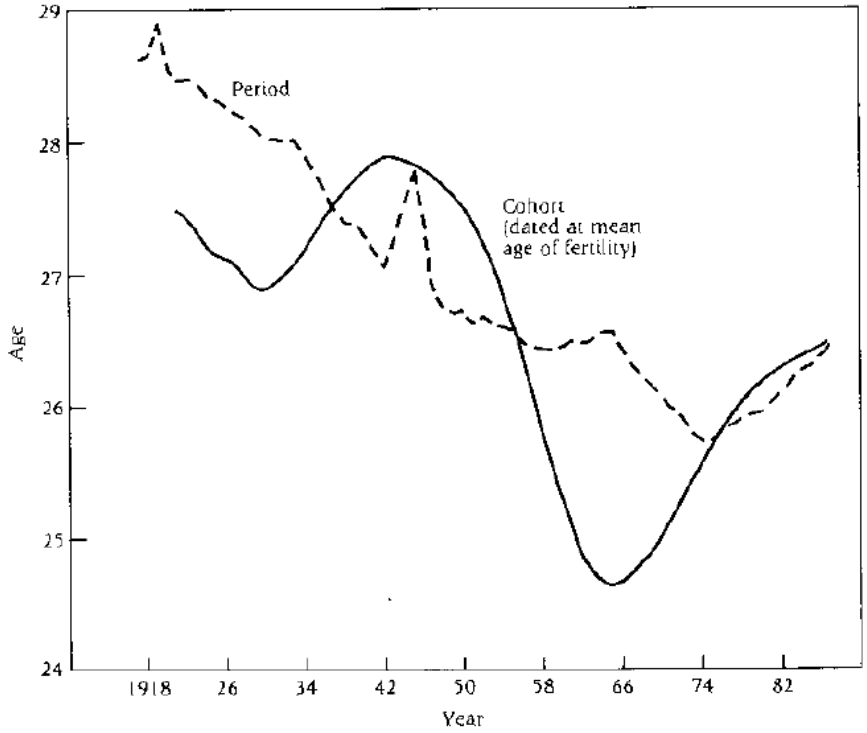

Figure 8: From Ryder 1990