THE *BOOM IN TWIN BIRTHS* DURING WORLD WAR I IN FRANCE : SELECTION BY FECUNDITY

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Rising slowly from 10.5 to 11.5 per 1,000 since 1900, the proportion of twin births suddenly incrased during First World War from 1915 to 1919 - reaching a record level of 13.6 per 1,000 in 1919, the year following the Armistice - and quickly returned to just under 11 per 1,000 after the war (fig. 1). To explain these spectacular variations, we suggest that, beside the traditional factor of changes in age at childbearing, the twinning peak of First World War was also due to a "selection effect" of most fecund couple during this period.

Changes in age at childbearing: an incomplete explanation

In general, the twinning rate is influenced mainly by age at childbearing: older women tend to have twins more often than younger women (fig. 3). The twinning peak of First World War partly results from a rise in the mean age of childbearing during war years, due to postponement or prevention of marriages by war: while the mean age of childbearing was close to 29 between 1910 and 1914, it increased sharply in 1915, remained at a level close to 30 during 1915-1919, then dropped back to pre-war levels (fig. 1).

Many marriages were postponed by the war, due to the massive departure of men to the front. Most of the women who gave birth during wartime were already married before war began, and there were few young brides among them. Further, young women who were nonetheless able to marry during war had few children, since their (young) husbands were more at risk of being on the front than older ones.

However, changes in age at childbearing are not sufficient to explain the twinning peak of World War I, which remains highly visible even after controlling for its effect using a standard maternal age distribution (fig. 2). The twinning rate furthermore peaked for each maternal age group during wartime (fig. 3).

The hypothesis of selection of the most fecund couples

We suggest that the twinning peak of World War I and 1919 is also due to a selection effect : couples who conceived during these years were among the more fecund. If these couples or women had a greater propensity than others to have twins, selection through fecundity would have increased the proportion of twin births.

The twinning peak of wartime: Many men were fighting at the front, and a high proportion of conceptions occurred during leave. Periods of leave were very short, and the couples that succeeded in conceiving in this short time were the most fecund ones. Hyper-fecund couples or women thus contributed more to births than they did in peace time.

The twinning peak of 1919: This peak results from two parallel phenomena. It coincides with the return of already married soldiers at the end of the war, in November 1918, and with the compensatory wave of marriages among young people who couldn't marry during wartime. The first couples to conceive were once again the highly fecund ones. But it is the reuniting of already married couples, rather than the wave of marriages, that mainly accounts for the 1919 peak in twin births. Fig. 4 shows the differential increases in the number of marriages and "conceptions": the number of marriages really took off in September 1919, with a record high in April 1920, while the rise in conceptions began sooner, in December 1918, immediately after Armistice, with a peak in April 1919.

Why didn't the twinning rate increase during World War II? A similar peak was not observed during World War II; on the contrary the twinning rate decreased in France after controlling for age at childbearing. Compared to World War I, mobilization did not last long and most soldiers returned home early. Malnutrition may also have *visibly* lowered the twinning rate (Bulmer, 1970), while in the First World War this effect could have been offset by the stronger effect of selection by fecundity.

A higher risk of twins for highly fecund couples

Methodology and Data:

To test the hypothesis of a link between fecundity and propensity to have twins, we examined whether, among newly married women, those who achieved pregnancy more quickly had a higher rate of twin births than those who took longer to conceive.

Data for the 20th century were analysed from the last four Family surveys conducted in France in 1975, 1982, 1990 and 1999. The total sample of these four surveys includes more than one million women representative of the French adult female population. The data collected included a history of unions and births for each woman. We excluded women born before 1920 to reduce risk of recall bias. Our sample covered around 500,000 first births occurring during first marriage.

Data for the 18th century (1670-1830) were provided by Henry's historical survey of France and gathered 23,000 first births occurring during first marriage (personal communication of H.Leridon).

In France, in both the 18th (1670-1830) and 20th centuries (1940-1970), newly married couples who conceived rapidly – delivery 8 or 9 months after marriage – more frequently had twins than those who conceived later (fig. 5). This illustrates the strong link between fertility and risk of twin pregnancies.

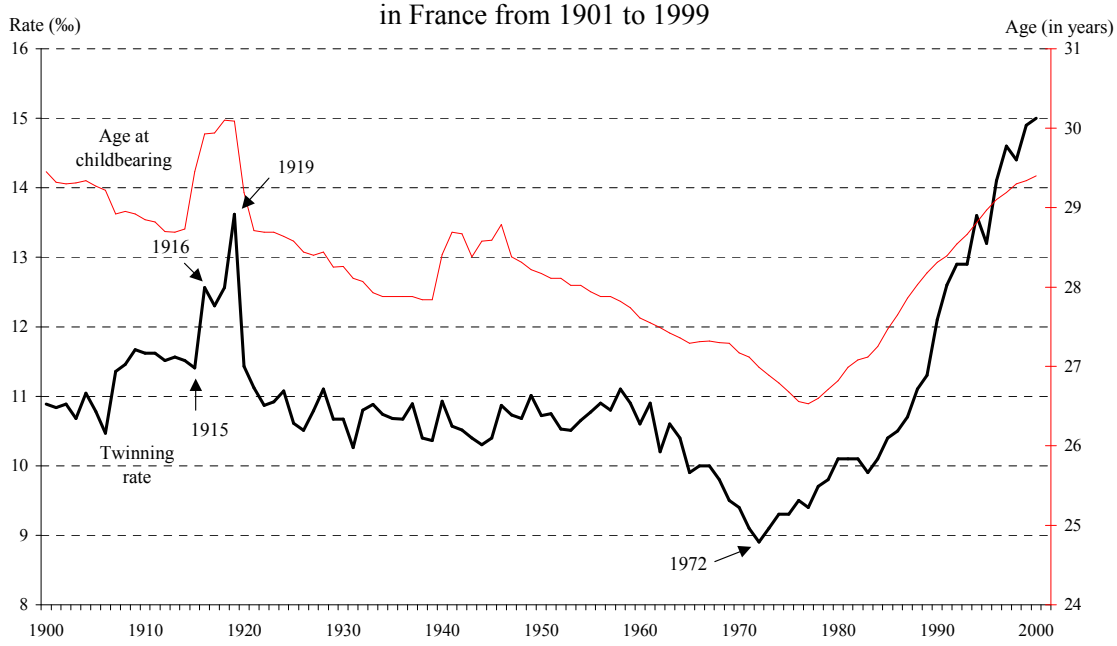
This fact remains true for women of specific age groups, but the differential risk of twin pregnancy increases with mother's age up to age 40 (fig. 6). In the 20th century (1940-1970), married women who give births for the first time at ages 30-39 more frequently have twins for this birth than women who do so at ages 20-29. Variations in twinning rate according to the interval between marriages and delivery are more pronounced for the older age group than for the younger one. Among the former, before 1970, 24 per 1,000 women giving birth between 8 and 9 months after marriages have twins, compared to 10 and 11 per 1,000 respectively, among those giving birth 10 to 11 months and 12 to 17 months after their marriage. After 1970, differences follow the same pattern[1].

The fact that the differential risk of twin pregnancy increases with mother's age up to age 40 helps to explain why we mainly observe twinning peaks among older maternal age groups during wartime (fig. 3), but it also underlines the equally important role of selection by fecundity during First World War, heightened by the simultaneous rise in age at childbearing.

[1] The novel aspect is the rise in the twinning rate for women who took a long time to conceive; it is particularly pronounced for women aged 30-39, who no doubt resort more frequently to infertility treatments.

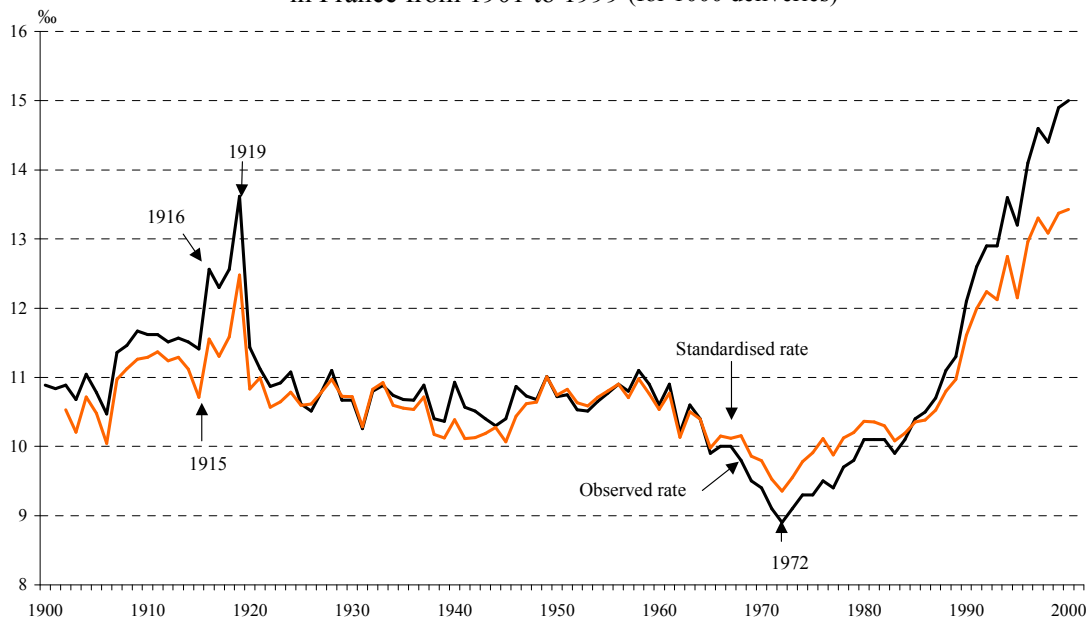
F I G U R E S

Figure 1 : Compared evolutions between twinning rate and age at childbearing in France from 1901 to 1999



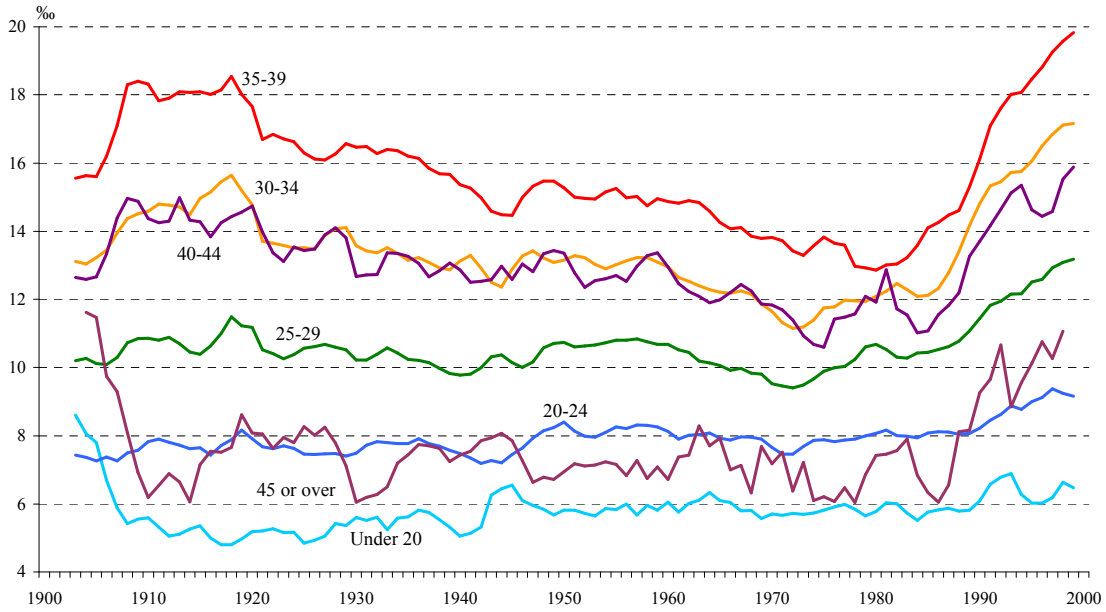
Source: Fabienne Daguet, 2002 – Civil registration data

Figure 2 : Compared evolutions of observed and standardised twinning rates in France from 1901 to 1999 (for 1000 deliveries)



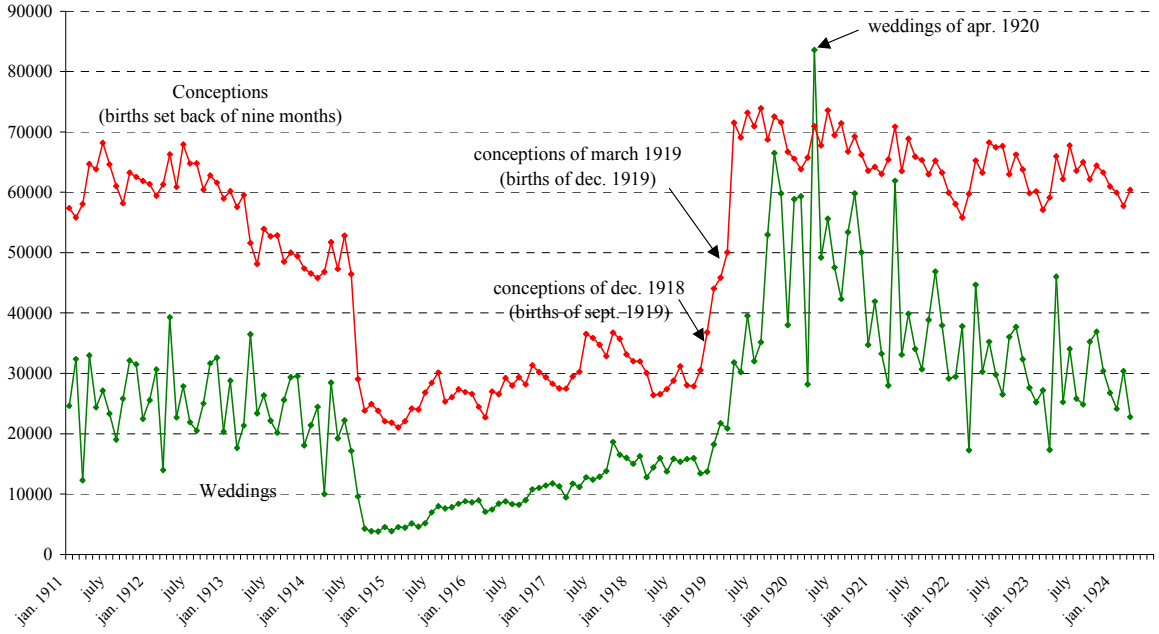
Source: Fabienne Daguet, 2002 – Civil registration data. The standardised rate was calculated on the basis of the age at childbearing structure for 1985.

Figure 3: Variation in twinning rate by mother's age in France during twentieth century



Source: Fabienne Daguet – Civil registration data. Up to age 44, three-year moving averages; age 45 and above, five-year moving averages.

Figure 4 : Compared evolutions of conceptions and weddings during the first world war



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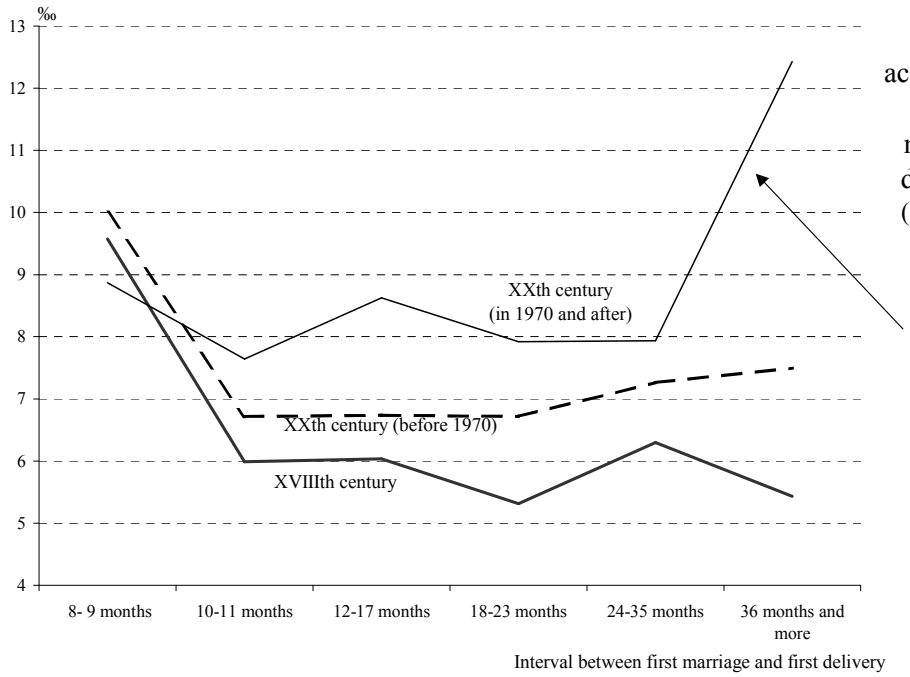

Figure 5 : Twinning rate according to the time between first marriage and first delivery in France (for 1000 deliveries)

Note : This surprising increase for higher delays between marriage and delivery results from rising use of infertility treatments since 1970's.

Sources: Family surveys (1975, 1982, 1990, 1999) for 20th century data, Henry's historical survey of France for 18th century data (personal communication of H.Leridon).

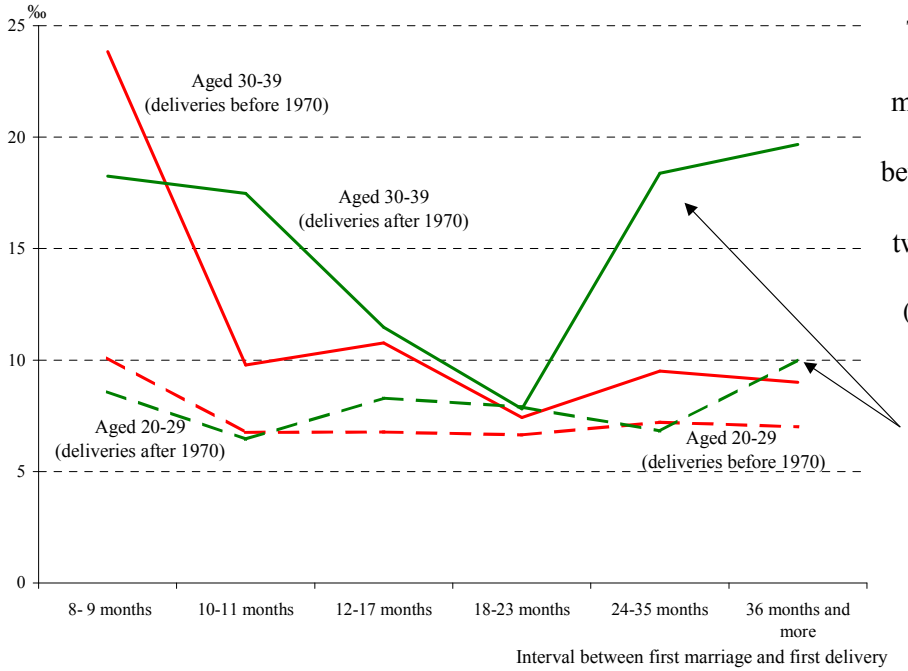

Figure 6: Twinning rate for first births by mother's age, period and time elapsed between marriage and childbirth in the twentieth century in France (for 1000 deliveries)

Note : As before, these surprising increases result from rising use of infertility treatments since 1970's, especially among older women.

Sources: Family surveys (1975, 1982, 1990, 1999).

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