DEMOGRAPHIC RESEARCH
A peer-reviewed, open-access journal of population sciences

DEMOGRAPHIC RESEARCH

VOLUME 38, ARTICLE 40, PAGES 1189- 1240
PUBLISHED 27 MARCH 2018
http://www.demographic-research.org/Volumes/Vol38/40/
DOI: 10.4054/DemRes.2018.38.40

Research Article

Measuring and explaining the baby boom in the developed world in the mid-20th century

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Contents

Demographic Research: Volume 38, Article 40
Research Article

Measuring and explaining the baby boom in the developed world in the mid-20th century

Jesús J. Sánchez-Barricarte[1]

Abstract

BACKGROUND
The early research on the baby boom tried to account for it as a logical recovery following the end of the Second World War (WWII). But it cannot be understood merely as a post-war phenomenon because its origins go back to the 1930s and early 1940s.

OBJECTIVE
I shall describe the methodology used to measure the total and marital baby boom and provide a detailed description of it. I shall attempt to explain the possible reasons that led to the sharp increase in the marital fertility rates and its subsequent decline.

METHODS
I will use various fertility indices that track the historical development of fertility (total and marital; period and cohort).

RESULTS
I show that there are major differences in the measurement of the baby boom depending on the index used. I found that the baby boom is highly heterogeneous in the 25 countries that form part of my study. It represented the logical response that families made to one period of prolonged political, economic, and military crisis (the crash of 1929 and WWII).

CONCLUSIONS
Researchers who use only the total fertility indices are really analysing only the nuptiality boom, which took place during those years, rather than changes in reproductive behaviour.

CONTRIBUTION
I measure total and marital baby boom for 25 developed countries and perform the calculations to measure the impact of marital fertility and nuptiality on the total baby boom (TBB). I present a new explanation of the origins of the baby boom.

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1. Introduction

In western countries, the demographic transition process that began in the late 19th century and early 20th century was interrupted by a period of unexpected growth in fertility in the mid-20th century. None of the demographers or social scientists of the day had been able to foresee the rise in the birth rate (Notestein et al. 1944). There had been nothing to suggest that the phenomenon known colloquially as the baby boom was going to happen. (In some countries, the number of births doubled in just a few years.) Moreover, its end was just as unexpected as its beginning. In the 1960s, many demographers thought that fertility rates would go on rising, hand in hand with economic development (Van Bavel 2010), but the figures peaked, and then a downward trend set in that was to last for 20 years.

Even though the baby boom was a phenomenon with huge, long-lasting social impact, and despite the vast number of studies on this topic (Chesnais 1992; Emeka 2006; Caldwell 2006; Macunovich 2002; Sardon 2006; Sandström 2014; Van Bavel and Reher 2013; Reher 2015; Reher and Requena 2015), its causes are still not well understood (Albanesi and Olivetti 2014). The early research on this topic tried to account for it as a logical recovery following the end of WWII. But the baby boom cannot be understood merely as a post-war phenomenon because, as we shall see below, its origins go back to the 1930s and early 1940s.

To be able to understand or conduct a comparative analysis of any demographic phenomenon, it is fundamental to be able to measure it accurately. In a recent study, Van Bavel and Reher (2013) measured the volume, magnitude, and length of the baby boom in 25 western countries on the basis of the CBR alone. The indices that are generally used in historical demography all have their advantages and shortcomings, and as we shall see, the results can vary significantly depending on which one is used. One of the aims of this study is to precisely analyse the differences that emerge when we use the different indices of total fertility.

Since during the baby boom the vast majority of births occurred within marriage, I believe that it is appropriate to factor this into my calculations, distinguishing between total fertility on the one hand and marital fertility on the other. Trends in nuptiality during the baby boom period differed from one country to another (Sánchez-Barricarte 2017b). It will be useful to neutralize the effect of nuptiality by using indices that measure only fertility among married women. I think that by measuring the boom in births within marriage, we can make a relevant contribution that might shed new light on our understanding of the baby boom in general.

This article is organised as follows. In Section 2, I shall describe the methodology used to quantify the total baby boom and the baby boom within marriage. In Section 3, I shall measure the total baby boom and provide a detailed description of it. In Section

4, I shall quantify the influence of marital fertility and the intensity of female nuptiality on overall fertility during the total baby boom period. In Section 5, I shall measure the baby boom within marriage. Lastly, in Section 6, I shall attempt to explain the possible reasons that led to the sharp increase in the marital fertility rates (baby boom) and its subsequent decline (baby bust).

2. Data and methodology

To carry out this research, I collected a large amount of information on fertility (total and marital) and nuptiality in 25 developed countries over a long period.[2] In some cases, I used databases to obtain this. In others, I had to collect the primary data and then calculate the various indices and rates. The appendix provides all the details on the sources consulted.

2.1 Fertility indicators used

I obtained information about the various fertility indices that can be used to track the historical development of fertility, which can be classified as follows:

- Total fertility indices: three period fertility measures (CBR, total fertility rate, or TFR, and Princeton overall fertility index I_f) and one cohort fertility index (completed cohort fertility rate, or CCF[3]).
- Marital fertility index: the Princeton marital fertility index (I_g).[4]

[2] I gathered information for all countries where reliable historical data could be found: Australia, Austria, Belgium, Canada, Czechoslovakia, Denmark, England and Wales, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Russian Federation, and the United States.

[3] The CCF rate is the cumulative fertility until the date when all members of the cohort have reached the end of the reproductive period. The CCF rates are lagged by 28 years. Actually, CCF should be lagged by the average age of childbearing for each cohort. Comparisons of the TFR and the CCF in the country graphs and tables would then be slightly more theoretically correct, but the differences would be minor (Frejka 2011: 953).

[4] The Princeton indices are as follows: 'I_f' is the index of the rate of childbearing by all women regardless of their marital status; it is the ratio of the actual number of births to the hypothetical number if women were subject to the married Hutterite fertility schedule. Hutterites are a Protestant sect (Anabaptists) founded in the 16th century. To escape persecution for their beliefs, they fled Western Europe to Russia in the 18th century, and then emigrated to the northern midwest United States in the 19th century. Hutterite women have very high fertility because contraception and abortion are forbidden, and mothers breastfeed for only a few months.

'I_g' is the ratio of the number of births occurring to married women to the number that would occur if married women were subject to maximum fertility (married Hutterite women).

As we shall see below, the results are quite different depending on which index is used. It is well known that the CBR is influenced by the population structure, and therefore its variability can be due not only to changes in reproductive behaviour, but also to changes in the mean age of the population. This can be a major problem when analysing long time periods over which major changes in demographic structure take place. Although the period TFR standardizes for age structure, it is sensitive to changes in the age at childbearing and is also affected by changes in the parity composition (Bongaarts and Feeney 1998). Also, the timing of marriage and first childbearing play a large role in the fluctuations of period fertility (Festy 1979; Ryder 1980; Bongaarts and Feeney 1998). Use of the Princeton indices has also been the object of some criticism. For instance, Guinnane, Okun, and Trusell (1994: 5) consider that "one important limitation of I_g is that in populations which practice parity-dependent control, the index is not invariant to differences in the age distribution of the married population and consequently to differences in age-at-marriage schedules." Since I_g is not a reliable measure of parity-dependent control, it cannot be used to reliably date the initial stages of the fertility transition.

Given the strong sensitivity of period measures to tempo shifts, many demographers have recommended analysing fertility by means of longitudinal or cohort indices. The CCF is a longitudinal measure of fertility that is not affected by the quantum or tempo effects or by population structure, but the time frame for which I have these values is much shorter and for some countries does not include the entire period of the baby boom.

2.2 Measurement of timing and volume

From now on and to avoid confusion, in this article I shall use the term 'total baby boom' (TBB) to refer to the increase in total fertility in the mid-20th century. The increase of marital fertility will be described as the 'baby boom within marriage' (BBM). I consider that it is important to distinguish between these two phenomena because, as we shall see below, there were countries in which the former was important, but the latter was scarcely perceptible (from which we can deduce that the increase in nuptiality played a major role in the increase in the total number of births). To establish the beginning of the TBB and the BBM, I used the criterion of identifying the year

'I_m' is an index of the proportion of potentially fertile women who are currently married; it is the ratio of the number of births that currently married women would experience if subject to Hutterite fertility to the number of births that all women would experience if subject to Hutterite fertility.
'I_h' is the index of fertility outside marriage, which tells us how closely the fertility rate among unmarried women approximates to the rate observed among married Hutterite women.
See Coale and Watkins (1986: 153–162) for information on how the Princeton indices are calculated.

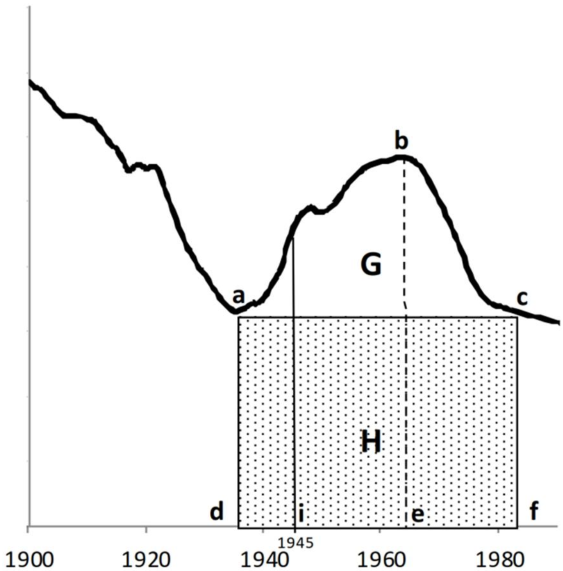
when the different indicators (total and marital fertility) started their upturn, thereby breaking with the downward trend that characterizes the transition as a whole.

The end of both booms was taken to be the year in which the values for the indicators of fertility indices returned to their levels before the upturn. Nevertheless, I established 1990 as the outside limit of the booms; that is, I assumed that none of the booms continued after 1990.[5] I took this year as the outside limit because, from the 1980s onward, the percentage of births outside marriage in the western world started to rise sharply, and access to marriage ceased to play the leading role in modulating society's reproductive capacity as had previously been the case.

Once the beginning and end of the TBB and BBM were determined, I also quantified their absolute and relative volumes. These were calculated as the sum of the differences between the values observed in each boom year and their initial value. Figure 1 helps us to understand the methodology used for calculating the different indicators of duration and intensity reported in Tables 1 and 3.[6]

[5] This occurred very rarely (particularly in the values for a few countries in the CCF index).
[6] This procedure for measuring a demographic boom has already been used in a previous article about the marriage boom (Sánchez-Barricarte 2017c).

Figure 1: Scheme for measuring a baby boom



Note: a = value at start of boom (column 1 of Tables 2 and 4); b = maximum value during boom (apex) (column 2); [(b − a) / a] × 100 = percentage of growth (column 3); c = value at end of boom; d = year of start of boom (column 4); e = year of maximum value of boom (apex) (column 5); f = year of end of boom (column 6); f – d = length of boom (column 7); G = volume of boom in absolute terms (column 8). G is the white surface below the line representing the boom. It is calculated as the sum of the differences between the values observed in each year throughout the boom and the initial value. $G = \sum_{i=d}^{i=f}(f_i - f_d)$, where f_i represents the value (for total or marital fertility) in the *i*th year; H = a × (f + 1 - d). H is the shaded surface of the rectangle situated below the line that represents the boom; (G / H) × 100 = volume of boom in relative terms (%) (column 9); i = year 1945, end of WWII. Column 10 gives the percentage of the volume G that occurs in the post-war period.

3. Descriptive analysis of the timing and volume of the TBB

Figures A-1, A-2, and A-3 in the Appendix show the historical trends in the values of the different indices used to measure total fertility. Table 1 shows in detail the different indicators on the date of onset, end, apex, and volume (absolute and relative) of the TBB. As the indices used to measure total fertility have different units, I took the value for the year when the TBB began as 100 to be able to compare how the index develops on a single scale.[7] So if we look at Figure 2, we can see at a glance that there are major differences in the measurement of the TBB depending on which index is used.

[7] Caution should be considered in interpreting Figures 2 and 3 since this approach has its limitations because, as reported on Figure 4, the starting point affects the kind of evolution that will be observed.

Figure 2: Developments in values of different total fertility indices during the TBB (value in year of onset of boom = 100)

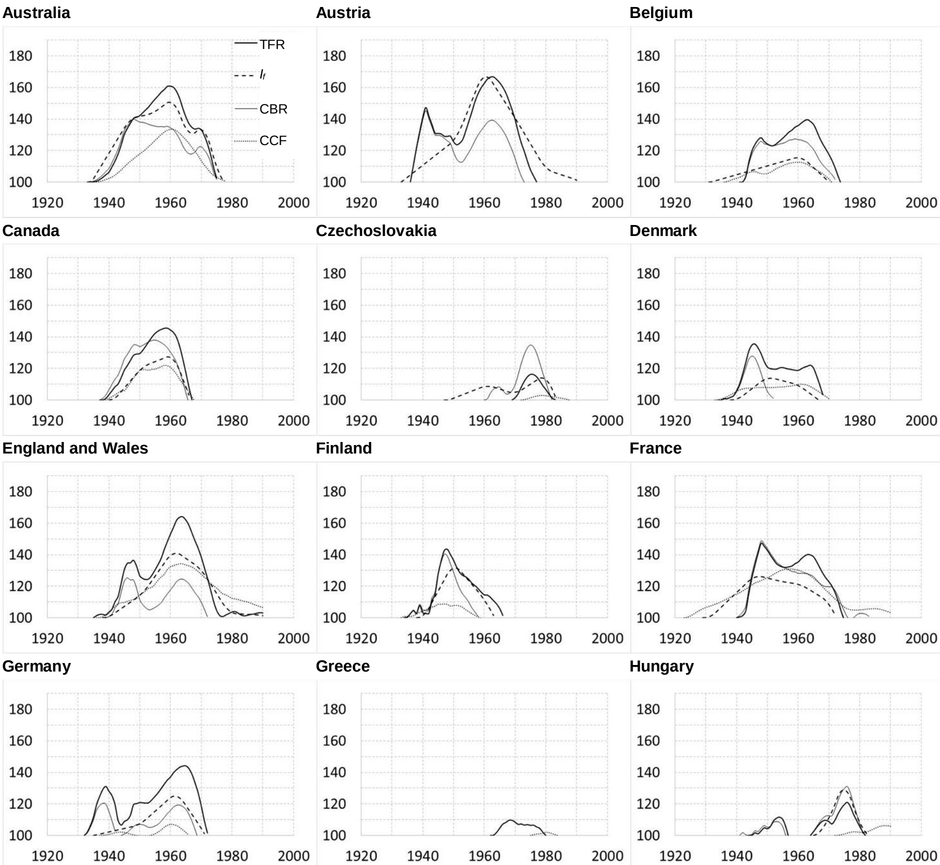
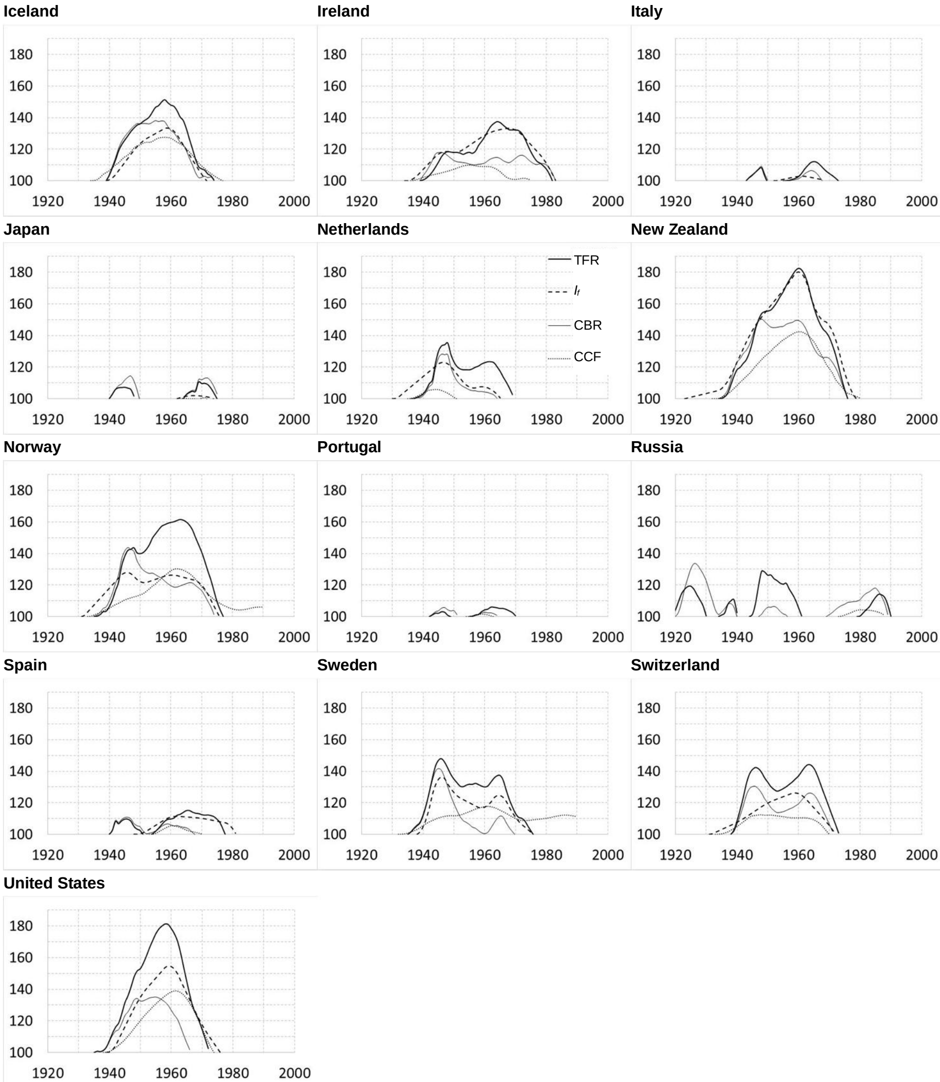


Figure 2: (Continued)



The first point of interest is that the relative TBB (column 9 in Table 1) is much bigger when we use the values of TFR (mean = 21.7) than with any of the other indices (CBR = 14.2; I_f = 16.2; CCF = 9.3). The relative volume of the boom is three times greater when we measure it with TFR than with CCF.

As would be expected, there is a strong positive correlation in the values of the relative volumes measured for each of the indices. That is, all the indices agree on the countries where the greatest and smallest TBBs took place. The indices producing the most similar results are the TFR and the CBR. (The coefficient of correlation between the two is 0.86 and R^2 is 0.75.)

If we take into account the TFR values, the countries with the highest relative volume (>30%) are New Zealand, United States, Austria, Norway, and Australia. Other countries with high volumes (20%–30%) are Switzerland, Iceland, France, Sweden, Canada, Germany, Belgium, and England and Wales. In other countries, the volume of the TBB was small or practically nonexistent (Spain, Japan, Hungary, Italy, and Portugal).

It is difficult to establish a geographical pattern, but in general, Southern European countries and Japan experienced a small TBB, while western offshoots outside Europe (United States, New Zealand, Australia) had a large TBB. The volume of the TBB for each country (measured in both absolute and relative terms) depended basically on the degree of recovery, that is, the percentage increase observed between the minimum and maximum value (Table 1, column 3), and on its duration in time (column 7). As we would expect, it was the countries with the longer and more intense recoveries that had a TBB of greater volume.

Another aspect to take into account is that the date of onset of the TBB varies greatly according to which index is used. Here, the indices with the greatest agreement concerning the date of onset are the TFR and the CBR (these differences can be identified easily in Figure 2). Although it is often stated that the TBB is a phenomenon that took place after WWII, the change in fertility trends began after the crash in 1929 and before the end of the war in all the countries we analysed. All the indices concur that in the vast majority of countries in this study this change set in during the 1930s. While the origin of the TBB predates the end of WWII, its apex was in the late 50s. The TBB was not a passing phenomenon: The mean duration of the TBB was 28–36 years, depending on whether we use the data for CBR, which gives a shorter measurement, or the index I_f, which gives a longer time (Table 1, column 7).[8]

[8] As indicated in the legend to Table 1, although the baby booms of all countries were measured, I have taken into account only those booms that occurred in the mid-20th century to calculate the mean and median.

Table 1: Dimensions of the TBB as measured from different total fertility indices

a) Total fertility rate (five years moving average)

	Lowest value	Highest value	% of growth	Year in which it starts	Year in which it is highest	Year in which it ends	TBB duration (in years)	Volume of TBB absolute	Volume of TBB relative (%)	% of volume after WWII
	(1)	(2)	(3)	(4)	(5)	(6)	(7) = (6) - (4)	(8)	(9)	(10)
Australia	2.15	3.46	60.8	1934	1960	1975	41	29.1	32.2	91.8
Austria	1.67	2.78	66.7	1936	1963	1977	41	25.7	36.7	80.9
Belgium	1.89	2.64	39.6	1941	1963	1974	33	15.0	23.4	95.4
Canada	2.69	3.91	45.4	1937	1959	1967	30	20.7	24.9	92.0
Denmark	2.13	2.89	35.4	1935	1946	1968	33	12.8	17.6	78.6
England and Wales	1.76	2.88	64.0	1935	1964	1990	55	22.6	22.9	92.8
Finland	2.35	3.37	43.4	1934	1948	1966	32	13.2	17.1	85.7
France	2.04	2.86	40.1	1940	1963	1975	35	20.1	27.4	95.2
Germany	1.74	2.50	44.1	1932	1965	1972	40	16.7	23.4	76.9
Hungary 1	2.44	2.72	11.6	1944	1954	1957	13	1.6	4.7	99.8
Iceland	2.77	4.19	51.3	1939	1958	1974	35	27.8	27.9	90.9
Ireland	2.91	4.00	37.4	1939	1964	1982	43	24.7	19.3	96.3
Italy 1	2.56	2.77	8.1	1943	1948	1950	7	0.7	3.5	79.4
Japan 1	4.22	4.52	7.2	1940	1945	1948	8	1.9	4.9	32.3
Netherlands	2.57	3.48	35.2	1936	1948	1969	33	14.9	17.0	85.3
New Zealand	2.31	4.21	82.4	1934	1960	1976	42	41.7	42.1	90.2
Norway	1.82	2.94	61.5	1935	1963	1977	42	27.9	35.6	91.3
Portugal 1	3.21	3.30	3.1	1942	1946	1949	7	0.4	1.5	55.0
Russia 3	2.43	3.13	28.7	1944	1948	1961	17	7.2	16.5	99.6
Spain	2.55	2.94	15.1	1940	1966	1978	38	7.6	7.7	88.1
Sweden	1.73	2.55	47.9	1935	1946	1976	41	18.1	24.9	80.8
Switzerland	1.80	2.60	44.1	1938	1963	1973	35	18.6	28.6	84.4
United States	2.03	3.69	81.2	1935	1958	1972	37	30.9	40.0	92.3
Median	2.31	2.94	43.4	1937	1959	1973	35	18.1	23.4	90.2
Mean	2.34	3.23	41.5	1938	1956	1970	32	17.4	21.7	85.0
Standard deviation	0.59	0.60	22.3	3.5	7.6	10.6	12.9	10.9	11.7	15.0
Coefficient of variation	0.252	0.185	0.538	0.002	0.004	0.005	0.402	0.626	0.540	0.176
Czechoslovakia	2.08	2.41	16.2	1969	1975	1983	14	2.5	8.0	100.0
Greece	2.18	2.39	9.6	1962	1969	1980	18	2.2	5.4	100.0
Hungary 2	1.83	2.21	21.0	1964	1976	1982	18	3.3	9.5	100.0
Italy 2	2.33	2.62	12.1	1955	1965	1973	18	2.2	5.0	100.0
Japan 2	1.95	2.16	10.6	1964	1969	1975	11	1.3	5.4	100.0
Portugal 2	3.01	3.16	5.1	1955	1966	1970	15	1.6	3.3	100.0
Russia 1	5.54	6.60	19.3	1918	1925	1930	12	7.4	10.3	0.0
Russia 2	4.24	4.69	10.8	1934	1939	1940	6	1.4	4.9	0.0

Table 1: (Continued)

b) CBR (five years moving average)

	Lowest value	Highest value	% of growth	Year in which it starts	is highest	ends	TBB duration (in years)	Volume of TBB absolute	relative (%)	% of volume after WWII
	(1)	(2)	(3)	(4)	(5)	(6)	(7) = (6) - (4)	(8)	(9)	(10)
Australia	16.7	23.4	39.8	1934	1948	1975	41	163.1	23.2	86.3
Austria	13.3	18.5	39.1	1936	1963	1973	37	127.0	25.1	100.0
Belgium	13.5	17.2	27.4	1942	1959	1972	30	79.5	19.0	94.5
Canada	20.4	28.2	38.0	1937	1955	1966	29	142.8	23.3	86.3
Denmark 1	17.7	22.6	27.8	1934	1945	1952	18	34.4	10.2	43.9
England and Wales	14.5	18.1	24.5	1939	1964	1972	33	66.4	13.4	87.4
Finland	19.1	26.8	40.2	1934	1947	1958	24	68.7	14.4	74.6
France	14.1	20.9	48.7	1940	1948	1983	43	129.9	21.0	93.6
Germany	16.3	19.6	20.4	1932	1938	1967	35	21.0	3.6	22.1
Greece	No baby boom									
Hungary 1	19.4	20.7	6.3	1941	1949	1956	15	11.9	3.8	95.0
Iceland	20.5	28.2	37.9	1939	1957	1974	35	163.8	22.2	87.4
Ireland	19.2	22.3	16.2	1939	1972	1983	44	100.5	11.7	87.5
Italy 1	19.4	21.2	9.1	1943	1948	1950	7	6.2	4.0	84.5
Japan 1	29.2	33.4	14.4	1940	1947	1950	10	23.6	7.4	53.1
Netherlands	20.3	26.0	28.1	1937	1946	1964	27	53.2	9.4	73.4
New Zealand	17.7	26.5	49.5	1934	1959	1976	42	237.3	31.1	83.6
Norway	14.7	21.1	43.7	1935	1946	1974	39	122.7	20.9	80.3
Portugal 1	24.2	25.6	5.7	1942	1947	1951	9	7.8	3.2	74.3
Russia 2	25.0	26.6	6.5	1947	1952	1957	10	8.5	3.1	100.0
Spain	20.1	22.3	10.8	1940	1946	1968	28	28.0	4.8	71.8
Sweden	14.0	19.8	41.7	1935	1945	1970	35	64.6	12.9	58.1
Switzerland	15.1	19.0	26.1	1938	1964	1971	33	91.4	17.8	80.0
United States	18.6	25.2	35.1	1935	1955	1966	31	122.4	20.5	85.6
Median	18.6	22.3	27.8	1938	1948	1968	31	68.7	13.4	84.5
Mean	18.4	23.2	27.7	1938	1952	1966	28	81.5	14.2	78.4
Standard deviation	4.0	4.0	14.2	3.7	8.2	10.1	11.7	62.0	8.4	18.7
Coefficient of variation	0.216	0.173	0.514	0.002	0.004	0.005	0.409	0.761	0.593	0.239
Czechoslovakia	13.8	18.6	34.8	1960	1975	1982	22	43.4	13.7	100.0
Denmark 2	16.5	17.7	7.0	1960	1965	1967	7	4.6	3.5	100.0
Hungary 2	13.2	17.2	31.0	1964	1976	1981	17	34.3	14.5	100.0
Italy 2	18.1	19.2	6.4	1955	1964	1968	13	6.0	2.4	100.0
Japan 2	16.9	19.1	13.0	1964	1972	1975	11	15.2	7.5	100.0
Portugal 2	23.5	24.2	2.7	1955	1960	1964	9	3.5	1.5	100.0
Russia 1	32.8	43.8	33.5	1920	1926	1940	20	86.5	12.4	0.0
Russia 3	14.5	17.1	18.1	1969	1985	1989	20	28.2	9.3	100.0

Table 1: (Continued)

c) I_f (five years moving average)

	Lowest value	Highest value	% of growth	Year in which it starts	is highest	ends	TBB duration (in years)	Volume of TBB absolute	relative (%)	% of volume after WWII
	(1)	(2)	(3)	(4)	(5)	(6)	(7) = (6) - (4)	(8)	(9)	(10)
Australia	0.1814	0.2731	50.6	1933	1960	1977	44	2.4	29.9	85.0
Austria	0.1279	0.2131	66.6	1933	1961	1990	57	2.0	26.5	92.3
Belgium	0.1786	0.2062	15.4	1931	1960	1970	39	0.6	7.9	82.8
Canada	0.2409	0.3067	27.3	1940	1959	1966	26	1.0	15.7	95.8
Czechoslovakia	0.1754	0.1997	13.9	1947	1979	1983	36	0.4	6.6	100.0
Denmark	0.1815	0.2066	13.8	1938	1951	1967	29	0.4	7.5	90.2
England and Wales	0.1496	0.2108	40.9	1938	1962	1990	52	1.3	16.8	97.3
Finland	0.1920	0.2523	31.4	1938	1951	1963	25	0.8	16.2	87.8
France	0.1834	0.2314	26.2	1929	1947	1972	43	1.3	16.0	73.6
Germany	0.1584	0.1976	24.8	1935	1962	1971	36	0.6	10.4	93.7
Greece	No baby boom									
Iceland	0.2476	0.3302	33.4	1939	1959	1972	33	1.5	17.9	94.6
Ireland	0.2202	0.2934	33.3	1934	1968	1983	49	2.1	19.1	91.3
Italy	0.1935	0.1991	2.8	1952	1961	1968	16	0.1	1.6	100.0
Netherlands	0.2320	0.2851	22.9	1930	1946	1965	35	0.9	10.6	57.4
New Zealand	0.1848	0.3329	80.1	1923	1960	1979	56	3.7	35.4	85.6
Norway	0.1740	0.2197	26.3	1931	1960	1976	45	1.5	18.7	76.1
Portugal	No baby boom									
Russia	No data									
Spain	0.2040	0.2274	11.5	1948	1962	1981	33	0.5	7.3	100.0
Sweden	0.1495	0.2038	36.3	1938	1946	1976	38	1.0	18.0	82.3
Switzerland	0.1623	0.2049	26.2	1931	1959	1972	41	0.9	13.7	84.2
United States	0.1822	0.2817	54.6	1939	1959	1976	37	1.9	27.7	95.8
Median	0.1818	0.2236	26.8	1937	1960	1974	38	1.0	16.1	90.7
Mean	0.1860	0.2438	31.9	1936	1959	1975	39	1.3	16.2	88.3
Standard deviation	0.031	0.046	19.1	7.0	7.7	7.8	10.4	0.9	8.6	10.6
Coefficient of variation	0.167	0.190	0.599	0.004	0.004	0.004	0.271	0.689	0.534	0.120
Hungary	0.1488	0.1917	28.8	1965	1975	1983	18	0.4	12.6	100.0
Japan	0.1693	0.1726	2.0	1962	1968	1974	12	0.0	1.2	100.0

Table 1: (Continued)

d) CCF rate, lagged by 28 years (five years moving average)

	Lowest	Highest		Year in which it			TBB	Volume of TBB		% of volume
	value	value	% of growth	starts	is highest	ends	duration (in years)	absolute	relative (%)	after WWII
	(1)	(2)	(3)	(4)	(5)	(6)	(7) = (6) - (4)	(8)	(9)	(10)
Australia	2.3	3.1	33.5	1936	1960	1978	42	15.5	15.5	94.6
Austria	No data									
Belgium	2.0	2.3	12.7	1936	1960	1971	35	4.9	6.7	87.3
Canada	2.7	3.3	21.9	1939	1958	1968	29	10.0	12.2	93.8
Denmark	2.2	2.4	10.1	1933	1961	1970	37	5.3	6.4	77.8
England and Wales	1.8	2.4	34.2	1936	1963	1990	54	17.1	17.1	94.9
Finland	2.4	2.6	8.8	1933	1947	1959	26	3.0	4.6	61.6
France	2.0	2.6	30.9	1923	1957	1990	67	20.2	14.7	77.6
Germany	2.1	2.2	7.1	1937	1960	1966	29	1.3	2.1	83.3
Iceland	2.7	3.5	27.5	1934	1958	1977	43	17.6	14.7	88.2
Ireland	3.2	3.5	9.9	1936	1955	1975	39	6.4	5.0	88.7
Italy	2.3	2.3	0.9	1955	1961	1963	8	0.1	0.4	100.0
Netherlands	2.8	3.0	5.8	1935	1944	1951	16	1.5	3.0	31.0
New Zealand	2.5	3.6	42.3	1932	1961	1980	48	24.4	20.0	90.2
Norway	2.0	2.6	30.3	1933	1962	1990	57	14.9	13.0	91.8
Portugal	2.9	2.9	1.6	1954	1959	1963	9	0.2	0.7	100.0
Spain	2.5	2.7	5.4	1953	1960	1970	17	1.2	2.6	100.0
Sweden	1.8	2.1	17.7	1932	1961	1990	58	11.3	10.5	90.1
Switzerland	2.0	2.2	12.4	1933	1948	1970	37	6.0	8.0	80.3
United States	2.3	3.2	38.9	1938	1961	1977	39	16.8	19.9	96.6
Median	2.3	2.6	12.7	1936	1960	1971	37	6.4	8.0	90.1
Mean	2.3	2.8	18.5	1937	1958	1974	36	9.3	9.3	85.7
Standard deviation	0.39	0.48	13.3	8.2	5.4	11.2	16.5	7.7	6.5	16.3
Coefficient of variation	0.168	0.174	0.720	0.004	0.003	0.006	0.456	0.821	0.695	0.190
Czechoslovakia	2.0	2.1	2.9	1972	1979	1988	16	0.5	1.5	100.0
Greece	2.0	2.0	2.0	1975	1980	1984	9	0.2	0.9	100.0
Hungary	1.9	2.0	6.3	1972	1988	1990	18	1.1	3.0	100.0
Japan	2.0	2.0	0.8	1963	1971	1972	9	0.0	0.1	100.0
Russia	1.8	1.9	4.3	1973	1980	1988	15	0.8	2.6	100.0

Source: See Appendix.
Note: Although the tables present and measure the baby booms of all countries, to calculate the mean and median with other countries, we took into account only the booms that occurred in the middle decades of the 20th century.

A considerable proportion of the TBB took place after WWII. Approximately 90% of the total increase occurred in the post-war period (Table 1, column 10). But I would like to emphasize that even though this phenomenon mainly coincides with the post-war years, its origins are undoubtedly to be found after the 1929 crash and before the end of WWII. Van Bavel and Reher (2013), who measured the baby boom using the CBR, came to the same conclusion.

In many countries, TFR and CBR peaked twice. However, these two peaks are not appreciable in the evolution of CCF. This phenomenon was probably caused by factors that made people have children earlier or later, which affected the short-term rates but had no impact on the longitudinal perspective.

4. What had the greatest impact on the TBB, the rise in marital fertility or the rise in nuptiality?

Most of the studies focusing on the baby boom use only total fertility indicators. In their recent research on this issue, Van Bavel and Reher (2013) used CBR and TFR data to measure it and investigate its causes. However, the first question that we should pose is whether these indicators are actually appropriate for this purpose.

Until the 1980s, the vast majority of births occurred within marriage in almost all western countries. During the period of the TBB, the total fertility indices might have changed because of variations in marital fertility or because of fluctuations in nuptiality. It is essential to distinguish which part of the increase in the TBB that happened in the mid-20th century was due to which factor. From the sociological point of view, it is fundamental to find out whether the rise in births happened simply because of an increase in nuptiality, or because of a change in the reproductive patterns among married couples, or as a result of a combination of these phenomena.

The years of the TBB were also characterized by a sharp rise in the female nuptiality index (I_m) (Sánchez-Barricarte 2017b), so it would be very useful to try to measure the impact that each of these two variables (marital fertility and nuptiality) had on the increase in the TBB because the causes affecting variations in marriage patterns may well be different from those that underlie reproductive decisions.

Several authors have long maintained that the [total] baby boom in western countries was caused by a rise in nuptiality: more people got married, and they did so at a younger age (Caldwell 1984), but to date, there has been no systematic examination of the extent to which marital fertility and nuptiality contributed to the boom in total fertility.

Figure 3 shows us the trends in the TBB measured by using the index I_f and the BBM measured by using the index I_g. A glance suffices to tell us that the increase in total fertility was much greater, in percentage terms, than the increase in marital fertility. This means that, since the vast majority of births at this time took place within marriage, a significant proportion of the increase in the total births must have been due to an increase in the number of people marrying.

Figure 3: Trends in the overall fertility index I_f and the marital fertility index I_g during their baby booms of the mid-20th century (value in year of onset of boom = 100)

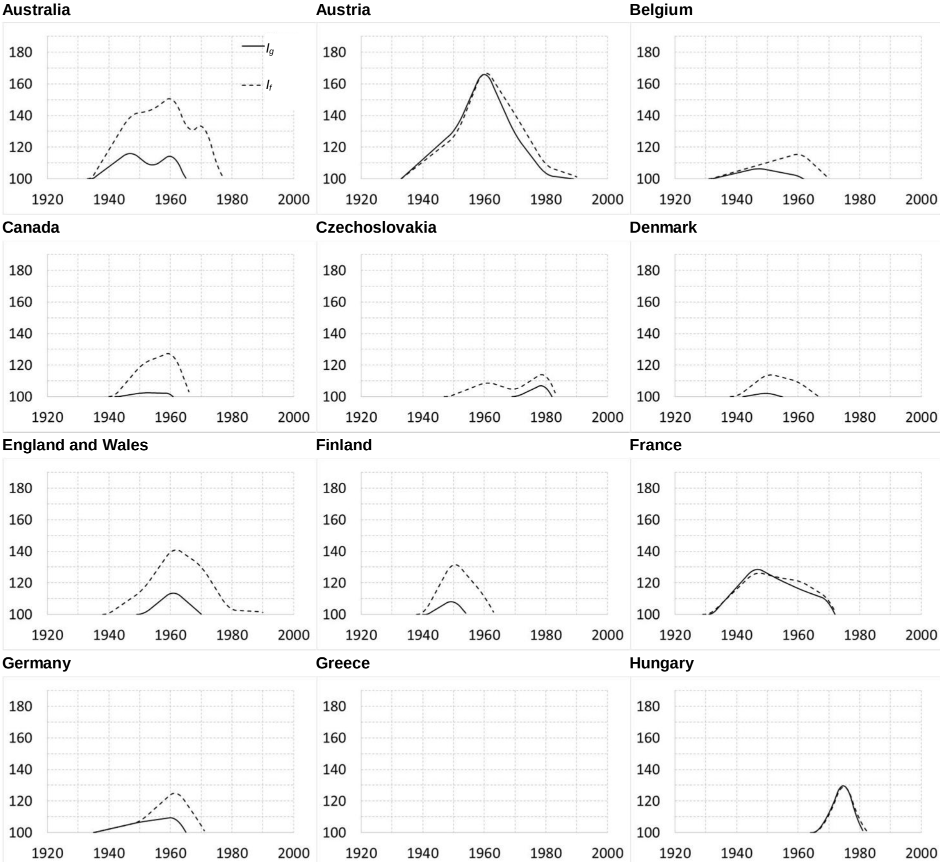
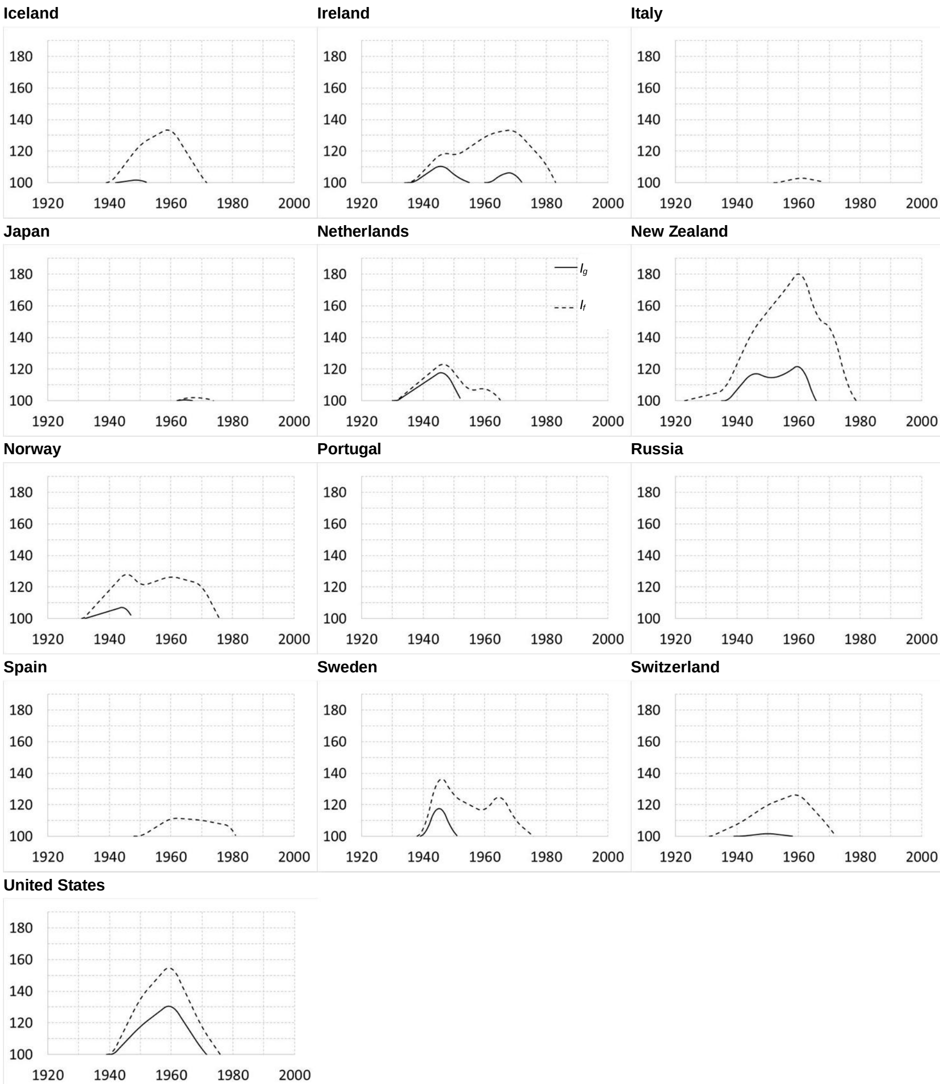


Figure 3: (Continued)



To perform the calculations to measure the impact of marital fertility and nuptiality on the TBB, we shall use the Princeton indices,[9] which relate to each other as follows (Coale and Watkins 1986):

$$I_f = [I_g \times I_m] + [I_h \times (1 - I_m)]$$

When out-of-marriage births account for only a tiny fraction of the total number, overall fertility can be represented simply as the product of marital fertility and the proportion of women who are married. I refer to overall fertility, not including out-of-marriage births using the notation I'_f:

$$I'_f = [I_g \times I_m]$$

Figure A-1 in the appendix shows the development of values of I'_f that, until very recently, were generally very similar to those for I_f. On the basis of the relationship between overall fertility (I'_f), marital fertility (I_g), and female nuptiality (I_m), and using a series of mathematical operations explained below, I was able to estimate the contribution made by marital fertility and nuptiality to the TBB.

Let I'_{f_t}, I'_{g_t} and I'_{mt} respectively be the indices at time t of overall fertility, marital fertility, and nuptiality, whose initial values at the start of the period of study are $I'_{f_{t_0}}$, $I'_{g_{t_0}}$ and I'_{mt_0}. The relative increase for 1 at a generic time t is considered as the ratio of the value of the index at time t with respect to its value at the start of the study period t_0. (Values greater than 1 indicate an increase, and values less than 1 indicate a decrease.) In this context, the equation (1) shows the relative increase in the overall fertility index (I'_f) as a function of the relative increases in marital fertility (I_g) and female nuptiality (I_m).

$$\frac{I'_{f_t}}{I'_{f_{t_0}}} = \frac{I_{g_t}}{I_{g_{t_0}}} \cdot \frac{I_{mt}}{I_{mt_0}} \tag{1}$$

If Napierian logarithms are used in equation (1), we shall obtain equation (2), which relates overall fertility (I'_f) to marital fertility (I_g) and nuptiality (I_m) in additive terms.

[9] Footnote 3 explains the meaning of each of these indices.

$$\ln\left(\frac{I'_{f_t}}{I'_{f_{t_0}}}\right)=\ln\left(\frac{I_{g_t}}{I_{g_{t_0}}}\right)+\ln\left(\frac{I_{m_t}}{I_{m_{t_0}}}\right) \tag{2}$$

If equation (2) is integrated throughout the period of the TBB, which starts at t_0 and finishes at t_f, we obtain equation (3), which gives an accumulated measure of overall fertility (I'_f) as a sum of the accumulated increments in marital fertility (I_g) and nuptiality (I_m).

$$\int_{t_0}^{t_f}\ln\left(\frac{I'_{f_t}}{I'_{f_{t_0}}}\right)dt=\int_{t_0}^{t_f}\ln\left(\frac{I_{g_t}}{I_{g_{t_0}}}\right)dt+\int_{t_0}^{t_f}\ln\left(\frac{I_{m_t}}{I_{m_{t_0}}}\right)dt \tag{3}$$

If equation (3) is divided by the measure of the accumulated increment of overall fertility (the term on the left of the equation), then we shall obtain equation (4), where the sum of the coefficients ω_f and ω_n given by equations (5) add up to 1. The fact that these coefficients add up to 1 enables us to distinguish quantitatively how much the accumulated increments in marital fertility (I_g) and female nuptiality (I_m) contribute to the accumulated increment in overall fertility (I'_f) during the TBB period.

$$\omega_f+\omega_n=1 \tag{4}$$

$$w_f=\frac{\int_{t_0}^{t_f}\ln\left(\frac{I_{g_t}}{I_{g_{t_0}}}\right)dt}{\int_{t_0}^{t_f}\ln\left(\frac{I'_{f_t}}{I'_{f_{t_0}}}\right)dt}\qquad w_n=\frac{\int_{t_0}^{t_f}\ln\left(\frac{I_{m_t}}{I_{m_{t_0}}}\right)dt}{\int_{t_0}^{t_f}\ln\left(\frac{I'_{f_t}}{I'_{f_{t_0}}}\right)dt} \tag{5}$$

Table 2 shows when the TBBs (measured by I'_f) occurred in each country and the coefficients ω_f and ω_n (the contributions of marital fertility and nuptiality to overall fertility during the TBB, respectively). These coefficients add up to 1 and are interpreted as the contribution of the accumulated increment of each variable. Positive values for these coefficients indicate an accumulated positive increment during the period of the TBB, while negative values show that a decrease occurs in the variable when considered in an accumulated sense.

The most noteworthy result is that in 15 countries (Canada, England and Wales, Ireland, Czechoslovakia, Finland, New Zealand, Switzerland, Denmark, Sweden, Norway, Iceland, Spain, Japan, Italy, and Portugal), marital fertility (I_g) had an overall negative impact on overall fertility (I'_f) during the period of the TBB. Although married women in some of these countries can be seen to have experienced a short and moderate boom in births (BBM), the global impact of marital fertility (I_g) on overall fertility (I'_f) during the years of the TBB was negative and, therefore, actually contributed to lessening the total boom.

In seven countries (France, United States, Austria, Germany, Australia, Belgium, and Netherlands) marital fertility contributed positively to the increase in overall fertility for all of the period of the TBB, but only in France and the United States were its contributions proportionally higher than those of nuptiality itself. What my data confirms is that, in general, the proximate demographic cause that had the greatest bearing on the TBB was the increase in the index of female nuptiality (I_m).

At this point, it could be argued that to separate the impact of marriage and fertility within marriage on overall fertility might make sense in a pretransitional context where the Malthusian preventive check is operating, and only marriage is subject to adjustment in the light of social and economic changes. (Fertility within marriage may, of course, still vary with the other proximate determinants, such as breastfeeding, etc.) It might also make sense in a context where childbearing and marriage have been largely decoupled, as in late-20th-century Scandinavia or some populations in the United States. Nonetheless, it may not make sense in a context where couples are able freely to decide both the timing of marriage and the number of children they have within marriage, but where getting married is a precondition for having children. For in such a situation the two decisions are not independent, and couples may reach the same fertility outcome through a combination of different decisions about age at marriage and childbearing within marriage. This is the context of the mid-20th century.

In a previous paper (Sánchez-Barricarte 2017a: 159), I found that, in the 19th and early 20th centuries, in some countries – such as France, England and Wales, Spain, the Netherlands, Germany, and to some extent in Italy – the provinces with the higher percentage of children surviving into adulthood overall were also those where access to marriage was more restricted. As the transition set in, this negative correlation changed. If reducing age at marriage and increasing fertility within marriage are simple alternatives, then we should expect a change in the age at marriage to be inversely correlated with a change in fertility within marriage. But, as we can see in Figure 5, there is sufficient variety among countries in the joint time trajectories of age at marriage and fertility within marriage to suggest that they are not ‘simple alternatives,’ and hence it is worth analysing the two phenomena separately. So even though we should acknowledge the possibility that couples might make decisions about marriage and childbearing at the same time, we shall calculate the (absolute and relative) increase of marital fertility, which will form the subject of the next section.

Table 2: Coefficients of the contribution of marital fertility (I_g) and female nuptiality (I_m) to overall fertility (measured using I'_f) during the TBB

	Total		Coefficients of contribution to overall fertility (I'_f)	
	Year in which the baby boom		ω_f Marital fertility	ω_n Nuptiality
	starts	ends	(I_g)	(I_m)
Countries	(1)	(2)	(3)	(4)
France	1929	1973	0.82	0.18
United States	1939	1972	0.56	0.44
Austria	1933	1990	0.53	0.47
Germany	1935	1972	0.15	0.85
Australia	1933	1976	0.14	0.86
Belgium	1931	1970	0.10	0.90
Netherlands	1930	1965	0.05	0.95
Canada	1940	1966	–0.11	1.11
England and Wales	1938	1978	–0.12	1.12
Ireland	1936	1982	–0.16	1.16
Czechoslovakia	1947	1984	–0.19	1.19
Finland	1938	1964	–0.28	1.28
New Zealand	1923	1975	–0.36	1.36
Switzerland	1931	1972	–0.40	1.40
Denmark	1938	1966	–0.46	1.46
Sweden	1932	1971	–0.58	1.58
Norway	1931	1975	–0.59	1.59
Iceland	1940	1969	–0.60	1.60
Spain	1948	1981	–1.01	2.01
Japan	1962	1974	–1.35	2.35
Italy	1952	1970	–1.84	2.84
Portugal	1942	1971	–3.03	4.03
Median	1937	1972	–0.23	1.23
Mean	1938	1973	–0.40	1.40

Source: See Appendix.

5. Descriptive analysis of the timing and volume of the BBM

Table 3 shows the figures about various aspects of the BBM that were measured using the index I_g. Figure 3 shows the percentage development in this index from the year in which the boom in marital fertility started, taking the value for this year as 100 (which is our baseline, as explained above). The first point that draws our attention is that the BBM was much more moderate than the TBB. If we look at the percentage recovery (column 3 in Table 3), duration in time (column 7), or volume in relative terms (column

9), we see that the values for the BBM are only half as much as those for the TBB. Austria, France, United States, and New Zealand had a moderate high volume for the BBM (between 10% and 25%; column 9 in Table 3). In the vast majority of countries, however, it was smaller than 10%, which means that rather than calling it a 'boom,' we ought to refer to what was happening as 'stagnation' of marital fertility. In Japan, Greece, Italy, Portugal, and Spain, there was no boom at all.[10] The BBM was also strikingly shorter (lasting around 24 years) than the TBB (39 years, if measured using the index I_f; Table 1C, column 7).

In all the countries that had a BBM, the boom actually began before the end of WWII. Although the bulk of the BBM took place after WWII was over (around 73%, Table 3, column 10), its onset certainly predated it.

Table 3: Dimensions of the BBM as measured from I_g (five years moving average)

	Lowest value	Highest value	% of growth	Year in which it starts	Year in which it is highest	Year in which it ends	BBM duration (in years)	Volume of BBM absolute	Volume of BBM relative (%)	% of volume after WWII
	(1)	(2)	(3)	(4)	(5)	(6)	(7) = (6) - (4)	(8)	(9)	(10)
Australia	0.3246	0.3765	16.0	1934	1947	1965	31	0.996	9.6	72.6
Austria	0.1927	0.3199	65.9	1933	1960	1989	56	2.692	24.5	90.2
Belgium	0.2846	0.3026	6.3	1932	1947	1962	30	0.308	3.5	61.8
Canada	0.4147	0.4249	2.5	1942	1953	1961	19	0.129	1.6	96.6
Denmark	0.2872	0.2932	2.1	1942	1949	1955	13	0.044	1.1	87.5
England and Wales	0.2503	0.2841	13.5	1949	1961	1970	21	0.361	6.6	100.0
Finland	0.3938	0.4257	8.1	1940	1949	1954	14	0.240	4.1	84.5
France	0.2795	0.3593	28.5	1931	1947	1972	41	1.855	15.8	70.6
Germany	0.2664	0.2915	9.4	1935	1960	1965	30	0.432	5.2	84.9
Greece	No baby boom									
Iceland	0.4444	0.4518	1.7	1942	1949	1952	10	0.045	0.9	84.1
Ireland 1	0.5763	0.6358	10.3	1935	1946	1955	20	0.577	4.8	50.3
Italy	No baby boom									
Netherlands	0.4552	0.5250	15.3	1931	1948	1952	21	0.930	9.3	38.5
New Zealand	0.3703	0.4498	21.4	1935	1960	1966	31	1.471	12.4	79.5
Norway	0.3866	0.4120	6.6	1932	1945	1947	15	0.231	3.7	12.0
Portugal	No baby boom									
Spain	No baby boom									
Sweden	0.2670	0.3139	17.6	1939	1945	1951	12	0.292	8.4	46.1
Switzerland	0.3512	0.3571	1.7	1939	1950	1958	19	0.058	0.8	86.8
United States	0.2774	0.3619	30.5	1940	1959	1972	32	1.412	15.4	96.3

[10] In some countries, such as Czechoslovakia, Ireland, Japan, and Hungary, the boom in marital fertility took place in the second half of the 20th century (1960–1982).

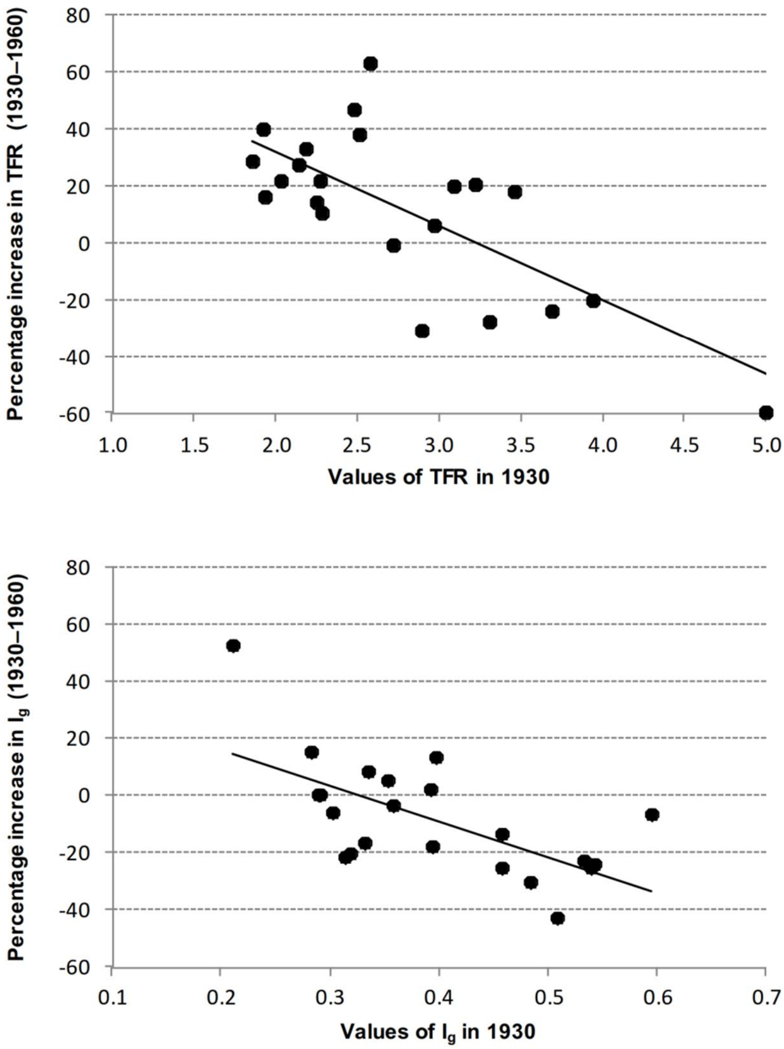
Table 3: (Continued)

	Lowest value	Highest value	% of growth	Year in which it starts	is highest	ends	BBM duration (in years)	Volume of BBM absolute	relative (%)	% of volume after WWII
	(1)	(2)	(3)	(4)	(5)	(6)	(7) = (6) - (4)	(8)	(9)	(10)
Median	0.3246	0.3619	10.3	1935	1949	1961	21	0.361	5.2	84.1
Mean	0.3425	0.3873	15.1	1937	1951	1962	24	0.710	7.5	73.1
Standard deviation	0.10	0.09	15.8	5.0	6.0	10.5	11.9	0.8	6.5	24.0
Coefficient of variation	0.279	0.242	1.044	0.003	0.003	0.005	0.488	1.061	0.863	0.329
Czechoslovakia	0.2493	0.2664	6.9	1969	1978	1982	13	0.113	3.2	100.0
Ireland 2	0.5554	0.5905	6.3	1960	1968	1972	12	0.229	3.2	100.0
Japan	0.2870	0.2881	0.4	1962	1966	1967	5	0.005	0.3	100.0
Hungary	0.1956	0.2533	29.5	1964	1975	1981	17	0.463	13.1	100.0

Source: See Appendix.
Note: To calculate the mean and median with other countries, I took into account only the booms that occurred in the middle decades of the 20th century.

Sauvy (1948) and Van Bavel and Reher (2013: 266) noted that the reactivation of (total) fertility was more intense in those countries where it had been lowest in the years immediately before the outbreak of WWII. In Figure 4, I correlate the values for the total and marital fertility indices that I calculated for the year 1930 (*x* axis) with the percentage growth of these indices observed in the period 1930–1960 (*y* axis). My aim is to compare the fertility values just before countries began to feel the terrible consequences of the stock exchange crash and WWII with those observed for 1960 (the date by which the negative effects of these two events could be understood to have been cancelled out). I also find that the countries with the lowest total and marital fertility values in 1930 were indeed those with the strongest growth in those figures over the period 1930–1960.

Figure 4: Relationship between values of different fertility indices (total and marital) observed in 1930 and their percentage growth 1930–1960



Source: See Appendix.

6. Explaining the BBM

If we set out to understand and explain the changes in reproductive behaviour observed in the mid-20th century, we must focus on analysing the variations in marital fertility. Using total fertility indices would not be appropriate to this task, since – as we have seen – in most countries these indices were heavily conditioned by changes in nuptiality. They therefore reflect changes in marriage, rather than in reproductive behaviour.

6.1 Previous explanations

One idea that was widely accepted was that the baby boom was an immediate reaction to the end of WWII (the soldiers came home) and was sustained by the major economic growth of the post-war years. According to this view, these factors encouraged both marriage itself and marital fertility (and therefore boosted total fertility). I concur with Van Bavel and Reher (2013: 269) in considering that, according to the data available, this hypothesis is hard to sustain.[11] As we have seen in previous sections of this paper, although the main bulk of the TBB and also the BBM took place after WWII, their origins indisputably lie before that date. They cannot be understood solely as post-war phenomena.

Much of the research into the causes of the baby boom has sought to provide an explanation based on economic factors, particularly in the case of the United States (Russell 2006; Emeka 2006; Murphy, Simon, and Tamura 2008; Tamura, Simon, and Murphy 2016; Jones and Schoonbroodt 2016). These studies give different justifications for this conundrum: Easterlin's hypotheses (1961, 1965, 1966, 1975, 1987), the relentless rise in real wages (Greenwood, Seshadri, and Vandenbroucke 2005), women's role in the workplace (Doepke, Hazan, and Maoz 2015; Macunovich 1996), the differences in salary between men and women (De Cooman, Ermisch, and Joshi 1987; Doepke, Hazan, and Maoz 2015), the differences in the maternal mortality (Albanesi and Olivetti 2014), and the falling price for space (Tamura and Simon 2017; Simon and Tamura 2009).

In a recent review of the research on this subject on an international level, Van Bavel and Reher (2013: 283) examined the relationships between changes in the gross domestic product (GDP) and changes in the CBR between 1921 and 1980. They concluded that "economic growth played an inconsistent and at most a marginal role in the explanation of the baby boom." They attempt to account for the boom in marital

[11] There was a brief spike in fertility in the United Kingdom in 1947 that was associated with the return of soldiers.

fertility but, in my view, their explanation is not convincing. They maintain that in the mid-20th century, young people married earlier, and in the absence of modern contraceptives, “the rising marital fertility may have been the unintended consequence of the fact that people were exposed to high risk of conception during an increased number of years” (Van Bavel and Reher 2013: 279). That is, these authors link the increase in marital fertility to the confluence of two factors: people were marrying younger, and the forms of contraception they used were ineffective. They support this hypothesis on studies by Ryder (1978 and 1979) on the United States, which link the worsening of fertility regulation during the baby boom period with a drop in the age at which people got married.

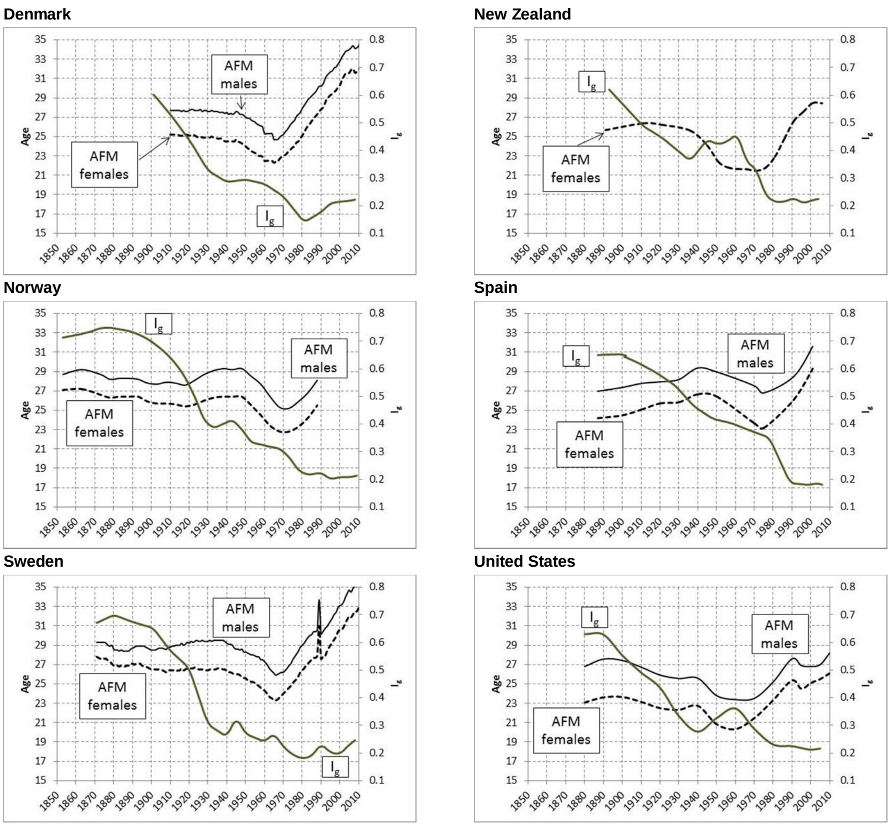
It is true that when people marry younger, they are more exposed to the risk of pregnancy since they are sexually more active, are in their peak years of fecundity, and the number of years that they are sexually active is greater (Ryder 1978), but it is not easy to believe that, if they had really wanted to have fewer children, the young couples of the mid-20th century would not have been capable of using the traditional means of demographic control that had led to a major decline in marital fertility since the late 19th century.

It is well known that in the United States, the age at first marriage fell for both sexes after the end of the 19th century (Haines 1996; Fitch and Ruggles 2000). Between 1890 and 1930, this age dropped by 2.0 years among men and 1.3 among women (Figure 5). But this drop in the age of marriage was accompanied by a major decline in marital fertility too: the index “I_g” fell from 0.628 in 1890 to 0.334 in 1930, which is a decrease of 47%. Figure 6 shows us that the drop in marital fertility affected all age groups (the young groups aged 20–24 and 25–29 saw a decline of 30 and 40% respectively between 1890 and 1930). There is no reason to think that the knowledge of birth control among couples marrying in the United States in the early 20th century was more thorough or effective than that of the couples who married a few decades later, during the years of the baby boom, which means that the explanation presented by Van Bavel and Reher would be difficult to accept.

Furthermore, if Van Bavel and Reher were right, we would expect the countries where the age at marriage dropped most to be the ones with the largest baby boom. Figure 5 shows that the drop in age at first marriage among women in the United States between 1940 and 1950 was rather modest (only 1.2 years) in comparison with other countries. (In Denmark, New Zealand, Spain, and Sweden this age fell by 2.2 to 4.1 years.) However, the rise in marital fertility (I_g) was much greater in the United States than in the other countries. In fact, in some countries, despite the major drop in the age at marriage, no increase occurred at all in marital fertility, or only a very minor one (Denmark, Spain, and Sweden). Perhaps the most striking example is that of Norway, where we can see that increases in the marital fertility happened at the same time as a rise in the age of marriage. The mean age at first marriage for women rose from 25.4 to 26.4 years between l918 and 1948.)

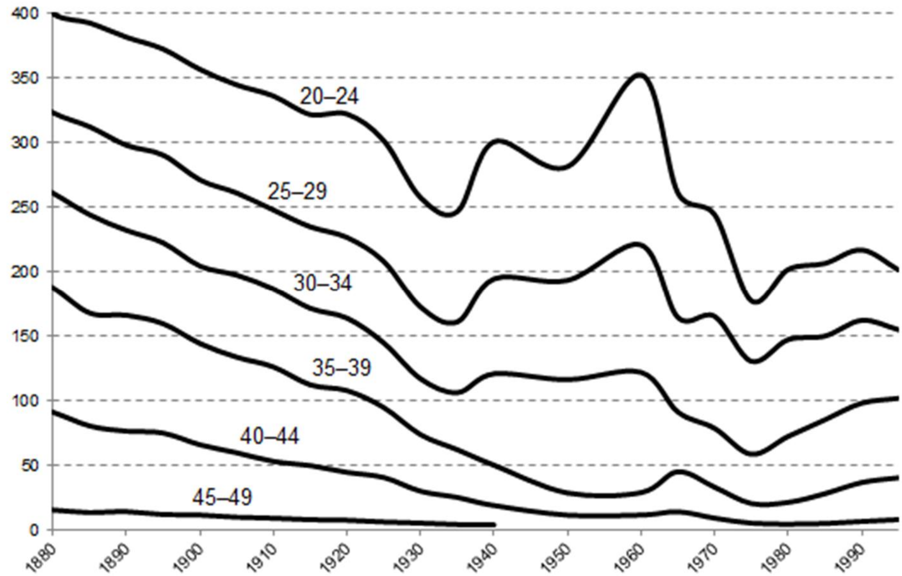
What is more, in all the countries shown in Figure 5 (including the United States), we can observe that before the BBM, there were other phases during which the age of access to marriage fell, which were accompanied by a marked decline in the marital fertility index. In short, the explanation for the baby boom in the United States offered by Van Bavel and Reher (2013), linking the lowering of the age of marriage to an increase in marital fertility, seems to offer so many exceptions that the relationship between the two should probably be regarded as coincidental, rather than causal.

Figure 5: Evolution of mean age at first marriage (AFM) (left axis) and marital fertility index (I_g) (right axis)



Sources: See Appendix.

Figure 6: Age-specific marital fertility rates in the United States



Source: See Appendix.

6.2 An alternative explanation: A new research proposal (back to the economic factors)

The baby boom and subsequent baby bust are phenomena that must be understood within the same explanatory theoretical framework as the start of the fertility transition. That is, the theoretical paradigm used to account for the start of the historical decline in fertility should be capable of predicting its later fluctuations. Recent studies analysing the historical decrease in fertility using aggregated data are consistent in pointing to the leading role played by economic variables in this decline. Herzer, Strulik, and Vollmer (2012) examined the long-run relationship between fertility (CBRs), mortality (crude death rates), and income (GDP per capita) for 20 countries, using panel cointegration techniques for the 20th century. Their analyses show that declining mortality and growth of income per capita lead to a decline in fertility. Tamura and Simon (2017), using information for 21 developed countries, identified declining young adult mortality as the cause for declining historical fertility, and the price of space as the driving variable for the baby booms. Their model is capable of capturing the secular decline in fertility and the baby booms that occurred in these countries.

In a paper entitled "The long-term determinants of marital fertility in the developed world (19th and 20th centuries): The role of welfare policies," applying panel data and time series regression models to aggregate demographic, social, and economic data for 25 countries, Sánchez-Barricarte (2017c) finds statistically significant evidence that mortality, gross domestic product per capita (GDPpc), education level, and public social spending per capita on transfer payments to older people (STpc) influenced the historic decline in marital fertility between 1880 and 1990. Controlling for mortality[12] and education level, he finds that, from 1880 to 1990, the rise in GDP per capita has been pushing down marital fertility. His results regarding the effects of GDP per capita on fertility are similar to those found by Herzer, Strulik, and Vollmer (2012). He explains that where parents traditionally regarded their children as the most reliable (or indeed, only) safety net in the face of future calamities – such as accidents, illness, and old age – the improvement in couples' purchasing power reduced their interest in having large families. When a couple's income grew, new economic alternatives (savings, investments, land, property, etc.) for preparing for future difficulties became available. Historically speaking, as the economic situation improved in different countries, the percentage of couples who no longer saw their children as the only possible means of ensuring their future also rose. This would explain why the increase in GDPpc had a statistically significant negative effect on marital fertility.

The state's implementation of social welfare policies (mainly designed to protect adults and the elderly population) also tends to discourage people from having children. When, in the late 19th century, some states established social security measures that gave priority to the needs of adults and the elderly rather than those of children and young couples of child-bearing age, the historical balance in family relationships was lost. The incentive to reproduce began to wane once states launched social policies that took over many of the tasks that had traditionally been undertaken by people's offspring (particularly those of attending to the needs and care of the adult sick or elderly who were unable to work). Using information from Lindert (1994 and 2004) about the percentage of the GDP spent on social transfers in various OECD countries from 1880 to 1930 and from 1960 to 1990 and applying panel technics, he shows that social

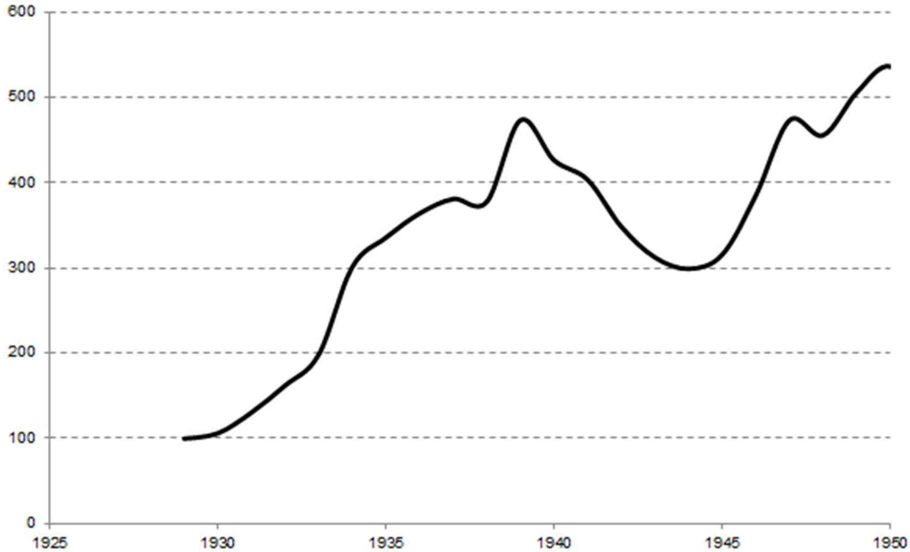
[12] As the theory of the demographic transition proposed (Notestein 1945; Davis 1945), this author shows that a decline in mortality leads, years later, to a reduction in marital fertility. Traditionally, mortality has been seen as a decisive factor affecting reproductive decisions, however, the empirical studies associated with the Princeton European Fertility Project (PEFP) raised the most serious questions concerning the idea that the decline in fertility was a response to an earlier decrease in mortality rates (van de Walle 1986). In recent years, studies using longitudinal microdata have made important contributions towards clarifying the relationship between mortality and fertility during the demographic transition (Van Poppel et al. 2012; Schellekens and van Poppel 2012; Reher et al. 2017). These studies show that those couples who had lost a child were significantly more likely to undergo the hazard of additional births.

transfers per capita designed to protect adults and the elderly population had a negative impact on marital fertility. The welfare state would have displaced the family and would have taken over the basic functions that were inherent to it by nature, supplanting its social role.

How may the BBM and the subsequent baby bust fit into this general historical account of the marital fertility? In accordance with the econometric models used by Herzer, Strulik, and Vollmer (2012) and Sánchez-Barricarte (2017c), the BBM would be the rational response on the part of families to the new economic scenario resulting from two extraordinary events: the Wall Street crash of 1929, which sparked a severe financial crisis that lasted for a decade, and WWII, which was the largest confrontation ever known. The deep economic crisis of 1929–1949 eroded the GDP per capita considerably (Table A-1 in the appendix), and the resulting reductions in public social welfare for the mature and elderly population actually encouraged married people to have more children. Since their income had fallen, the percentage of couples depending on their offspring as the best (and probably unique) insurance policy for old age actually increased. It may be that, in view of the unprecedented sense of insecurity triggered by these two events, many couples also lost confidence in the beneficent capacity of the state and came to doubt its solvency for meeting their future needs were they to have an accident, lose their job, become ill or incapacitated, or retire. The fact that the start of the Great Depression or the outbreak of WWII came immediately before the beginning of the BBM in all the countries analysed should not be regarded as an accidental phenomenon (as Table 3 shows, the BBM was not apparent in any country before the crash of 1929).

Although the United States was a country very affected by the onset of the Wall Street crash of 1929 (its GDP per capita plummeted 31% in only four years; Table A-1, column A), its marital fertility (I_g) did not start to rise until 1940 (Table 3, column 4). Probably the exceptional efforts that President Franklin Roosevelt made with the US budget to encourage interventionist polities in 1933–1939 (the so-called “New Deal”) actually delayed the onset of the BBM. As we can see in Figure 7, the public expenditures on social welfare grew exponentially from 1929 until the outbreak of WWII. Per capita expenditure soared from 99 to 473 dollars (expressed in 1990 International Geary-Khamis dollars) in only ten years. This historical expansion of public social welfare in the United States was unique in the west and could not be emulated by other countries. Nonetheless, the outbreak of WWII in 1939 meant an immediate collapse of public expenditure on social welfare (which fell by 37% during 1939–1944; Figure 7). Although this later recovered, the collapse of the GDP per capita (which fell 28% in the years 1944–1947; Table A-1, column B) probably also led many US families to have children as the best strategy for preparing themselves for the hardships that were to come. Couples’ mistrust of the social welfare measures designed by President Roosevelt and the plummeting of the GDP per capita ultimately led to a rise in marital fertility, which meant that the United States experienced one of the greatest BBM ever observed in developed countries (Table 3).

Figure 7: Dollars per capita in public expenditures on social welfare in the United States (in 1990 International Geary-Khamis dollars)



Note: Public expenditures on social welfare include social insurance, public aid, health and medical programs, veterans' programs, housing and other welfare programs. Public spending on education is not included here, since my aim is to measure the US government's expenditure specifically on the adult/elderly age group.
Source: See Appendix.

From the 1950s onwards, not only did the economy start to make a healthy recovery in western countries, with increases in GDP per capita, but spending on social transfers (mostly directed to adult and elderly population) also shot up. Social transfers relating to welfare, unemployment, pensions, health and housing subsidies doubled between 1960 and 1980 (Lindert 2004: 12–13). Public spending on pensions rose steeply during this period: in 1980 pensions accounted for 8.4% of the GDP in OECD countries (almost twice the figure for 1960).

The baby bust observed after the 1960s would be also rational and predictable in terms of Herzer, Strulik, and Vollmer (2012) and Sánchez-Barricarte's (2017c) econometric models. The rise in per capita income after the 1950s and 1960s not only increased the opportunity cost for couples, but also gave them an alternative to the traditional strategy of having children as a way of preparing for future difficulties (illness, retirement, being unfit to work, etc.), and therefore made them more economically independent from their offspring. The vast increase in public social transfers for the elderly thus discouraged people from having larger families, because the welfare states generously took on the task of meeting most of the needs of this population.[13]

To try to test the validity of these hypotheses for explaining the BBM, I shall take my previous results (Sánchez-Barricarte 2017c: 1267–1272) and I shall extend the interpretation of them in the light of my hypothesis that a reduction in Gross Domestic Product per capita (GDPpc) and in public social welfare payments affected fertility in the mid-20th century. I replicated my previous econometric model to establish how well it fits the data observed for marital fertility. This model analyses the possible effects of different variables[14] on the historic decline in marital fertility, applying a regression with fixed and time effects generalized least squares.

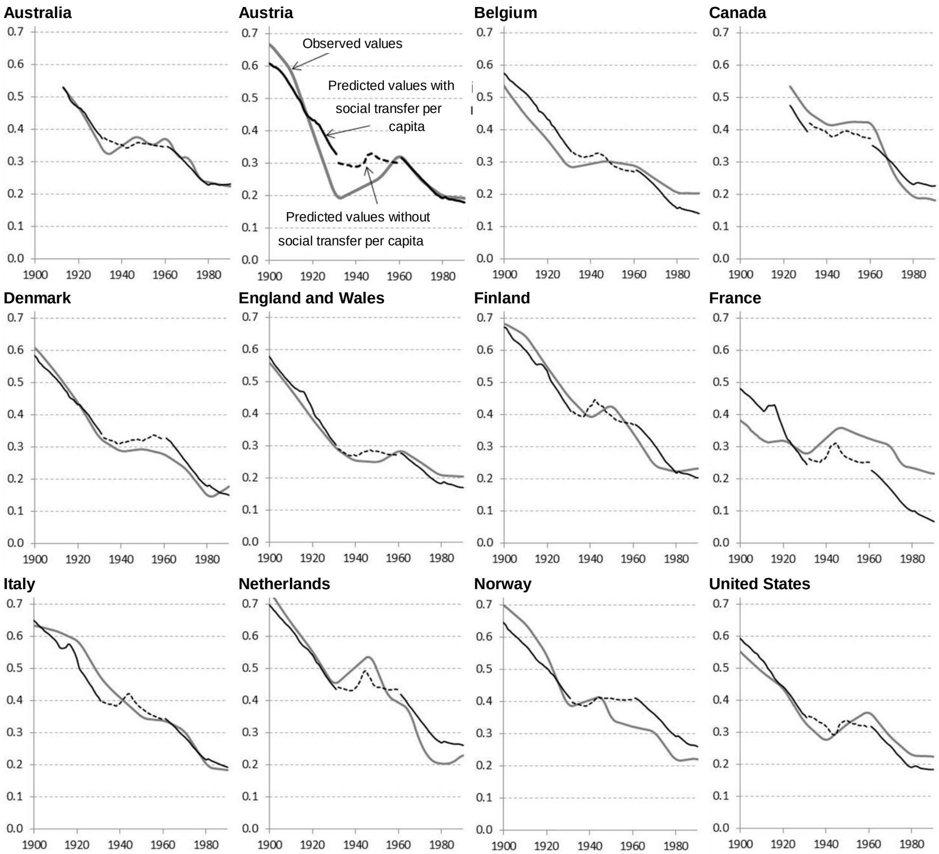
The results of this analysis (see Table 2 in Sánchez-Barricarte 2017c) were as expected: An increase in the values for the GDPpc had a negative effect on marital fertility; mortality had a statistically significant effect in the expected direction (positive); and the variable reflecting social transfers for adults and the elderly (STpc) also had a negative correlation; that is, the expected number of children declined when children became less relevant for security in old age.

Figure 8 shows the observed and predicted values for the marital fertility index (I_g) using the econometric model devised by Sánchez-Barricarte (2017c: 1257). These two values have a reasonably good fit, and in all countries the predicted values detect both the baby boom and the baby bust. From 1931 to 1959, no information is available concerning expenditure on social transfers (STpc), so the predicted values in these models were estimated without taking this variable into account. Given the negative relationship observed between the effort made by countries to provide social transfers for the elderly and the marital fertility index during the periods 1880–1930 and 1960–1990, I consider that if I had had data about such transfers for the period 1931–1959, the models would have an even better fit to the BBM and the subsequent baby bust.

[13] Sánchez-Barricarte (2017c) also shows that when social transfers designed to cover part of the costs of bringing up children (transfers to families, child allowances, and benefits) increase, the effect on marital fertility is positive.

[14] Where 'I_g' is the index of marital fertility; GDPpc is the gross domestic product per capita for each one of the 25 countries (inflation-adjusted expressed in 1990 International Geary-Khamis dollars); STpc represents the social transfers per capita; ${}_{25}q_0$ is the probability of dying before the age of 25 (both sexes); Education is the average years of total schooling for both sexes; Υ_t is a vector of yearly dummies controlling for time effects; and α_i is a set of fixed effects accounting for the heterogeneity between countries. The period for which data is available for these variables is 1880–1990. The appendix at Sánchez-Barricarte (2017c) lists the sources from which this information was obtained and gives technical details about this statistical model.

Figure 8: Observed and predicted marital fertility values (I_g). 1900–1990, selected developed countries



Source: The predicted values were obtained using econometric models 3 and 4 from Table 2, reported in Sánchez-Barricarte (2017c).

The explanatory models of the historical decline in marital fertility developed by Herzer, Strulik, and Vollmer (2012) and Sánchez-Barricarte (2017c) have been shown to be capable of predicting not only its onset, but also its subsequent fluctuations. From this point of view, contrary to the thesis put forward by Van Bavel and Reher (2013), economic factors (the decline in GDP per capita and the erosion of state support for pensioners after the crash of 1929 and WWII) were probably important factors that triggered the baby boom observed in the mid-20th century. Similarly, the baby boom, far from being an "unintended consequence," as Van Bavel and Reher suggest (2013: 278), was a logical, rational, and voluntary reaction by couples to the extraordinary new socioeconomic circumstances that they were facing (crash of 1929 and WWII).

7. Conclusions

The present research is intended to be complementary to the conclusions provided by other colleagues in earlier studies and ends by proposing a new explanation for the phenomenon of the baby boom. Van Bavel and Reher (2013) measured the baby boom by using the CBR. My contribution is to measure the TBB using four different indicators of total fertility based on different indices (CBR, TFR, I_f, and CCF). I have been able to show that there are major differences in the results obtained, depending on the index used. This is also the first time that the boom in marital fertility (BBM) for different developed countries has been measured.

I have been able to ratify some of the conclusions drawn by earlier researchers; for example, although the phenomena of the TBB and the BBM mainly occurred after WWII, their origins lie before this date, in the 1930s and early 1940s (Van Bavel and Reher 2013). I found that the TBB and the BBM are highly heterogeneous in the 25 countries that form part of my study. The phenomenon that lasted longest was the TBB. The BBM, on the other hand, was notably shorter and more moderate (in fact, in most countries it meant a relative increase in marital fertility that was lower than 10%). Surprisingly, my detailed measurements enabled us to identify some countries – Norway, Netherlands, and Sweden (Table 3, column 10) – in which a large proportion of the BBM took place before the end of WWII.

Several researchers have already noted that a major part of the TBB in western countries can be accounted for by the marriage boom (Caldwell 1984). On the basis of the Princeton indices, I propose a methodology for measuring the contributions of marital fertility and nuptiality to the TBB. I confirm that most of the TBB was due to the marriage boom. Nonetheless, thanks to the detailed measurements carried out, I show once more that the TBB was in no sense a homogeneous phenomenon. In a few countries, marital fertility made a significant contribution to the TBB (above all, in France, United States, and Austria, and to a lesser extent in Germany, Australia, and Belgium). In most, however, it contributed significantly to its reduction (Denmark, Japan, Italy, Finland, and Iceland). Given the major influence of the marriage boom on the TBB, I suggest that researchers who use only the total fertility indices are mainly analysing the nuptiality boom that took place during those years, rather than analysing changes in reproductive behaviour as such. As I have shown, the bulk of the increase in total fertility indices was accounted for by the fact that more people married, and that they did so at a younger age than before. If our aim is to find out the reasons why married people decided to have larger families, we need to confine the scope of our analysis to the BBM.

I maintain that both the BBM and the subsequent baby bust are phenomena that have to be understood within the same explanatory theoretical framework as the start of the historical decline in fertility (Herzer, Strulik, and Vollmer 2012; Sánchez-Barricarte 2017c). I think that the BBM and the baby bust were rational, conscious, and predictable events. The BBM represented the logical response that families made to one period of prolonged political, economic, and military crisis (the crash of 1929 and WWII), which slashed family income and undermined the incipient welfare policies that some countries had initiated a few decades previously. Faced with these extraordinary circumstances, families reverted to the traditional strategy that had been used throughout the pretransitional period as the safest way of preparing for life's challenges: having a large family. Similarly, the baby bust is couples' logical and rational reaction to the major increase in state aid (mainly in the form of pensions and health care) from the 1950s onwards. The fact that the state took on functions that had traditionally been provided by people's offspring (particularly care for the elderly) actually dissuaded couples from having large families. Further research is certainly needed to achieve a deeper understanding of the theoretical issues broached in this paper, and to validate (or refute) the conclusions that I have reached.

8. Acknowledgments

This research was supported by the Spanish Ministry of Economy and Competitiveness (CSO2017-83290-P) and the Autonomous Community of Madrid (S2015/HUM-3321). I would like to express my gratitude for the helpful feedback provided by Alberto Elices-Vallejo and David Reher on a previous version of this paper. Professor Leandro Prados de la Escosura advised me on the search for information.

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Appendix

Table A-1: Percentage drop in per capita GDP (1990 international Geary–Khamis dollars) in the periods shown

	Circa Great Depression		Circa WWII		Sum of percentage decreases
	Period	% of variation	Period	% of variation	
	A	B	C	D	B + D
Australia	1929–1931	–17.3	1943–1946	–14.4	–31.7
Austria	1929–1934	–22.9	1939–1945	–57.9	–80.8
Belgium	1929–1932	–8.8	1939–1943	–24.1	–33.0
Canada	1929–1933	–33.5	1944–1946	–6.9	–40.3
Czechoslovakia	1929–1935	–20.8			
Denmark	1931–1932	–3.5	1939–1941	–23.7	–27.2
Finland	1929–1932	–6.1	1939–1940	–5.5	–11.6
Former USSR	1931–1932	–1.5	1939–1946	–14.5	–16.0
France	1929–1932	–15.9	1939–1944	–49.5	–65.4
Germany	1929–1932	–17.0	1944–1946	–63.6	–80.6
Greece	1929–1931	–8.9	1939–1945	–64.5	–73.3
Hungary	1929–1932	–11.4	1939–1946	–39.4	–50.8
Italy	1929–1934	–6.4	1939–1945	–45.4	–51.9
Japan	1929–1931	–9.3	1940–1945	–53.2	–62.5
Netherlands	1928–1934	–15.5	1939–1944	–52.2	–67.8
New Zealand	1929–1932	–17.8	1943–1944	–0.9	–18.6
Norway	1930–1931	–8.4	1939–1944	–19.2	–27.6
Portugal	1929–1930	–2.4	1939–1940	–7.7	–10.1
Spain	1929–1933	–9.2	1940–1941	–2.4	–11.7
Sweden	1930–1932	–4.8	1939–1941	–11.6	–16.3
Switzerland	1929–1932	–9.8	1940–1943	–6.2	–16.0
United Kingdom	1929–1931	–6.6	1943–1947	–14.7	–21.3
United States	1929–1933	–30.8	1944–1947	–28.0	–58.7
Mean		–12.6		–27.5	

Source: Maddison (2009)

Figure A-1: Development of indices I_f, I_g, I_m, and I'_f, developed countries, 1900–2010

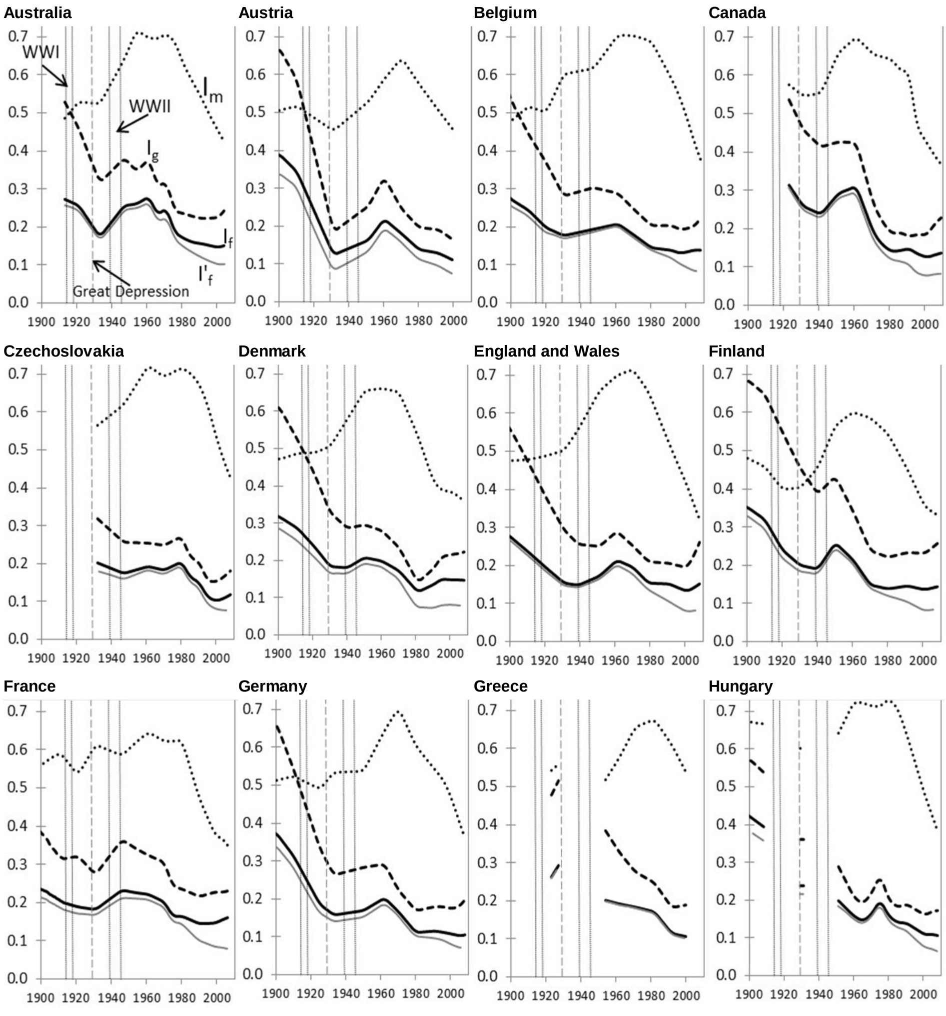


Figure A-1: (Continued)

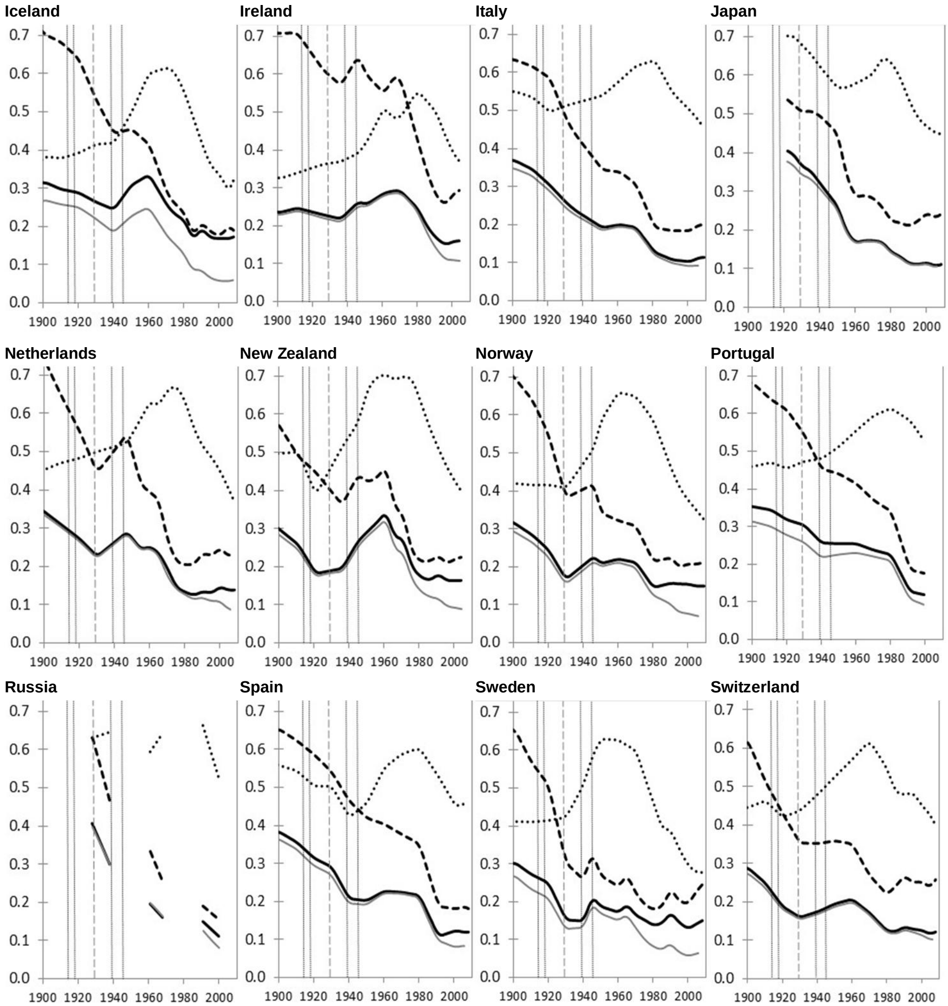
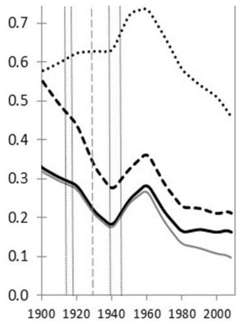


Figure A-1: (Continued)

United States



Source: See Appendix.

Figure A-2: Development of TFR and CCF, developed countries, 1900–2010

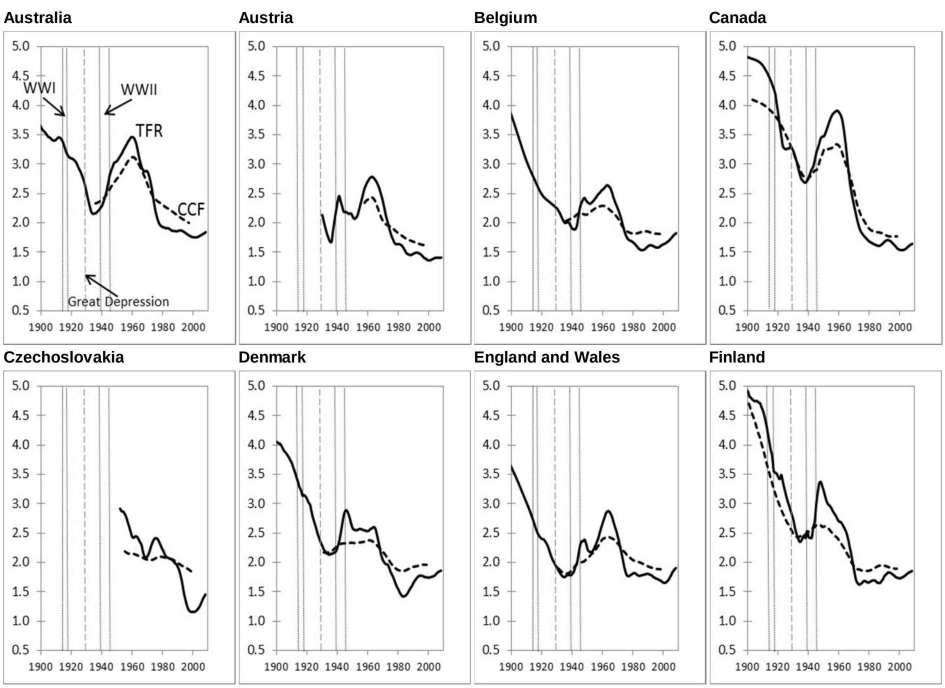


Figure A-2: (Continued)

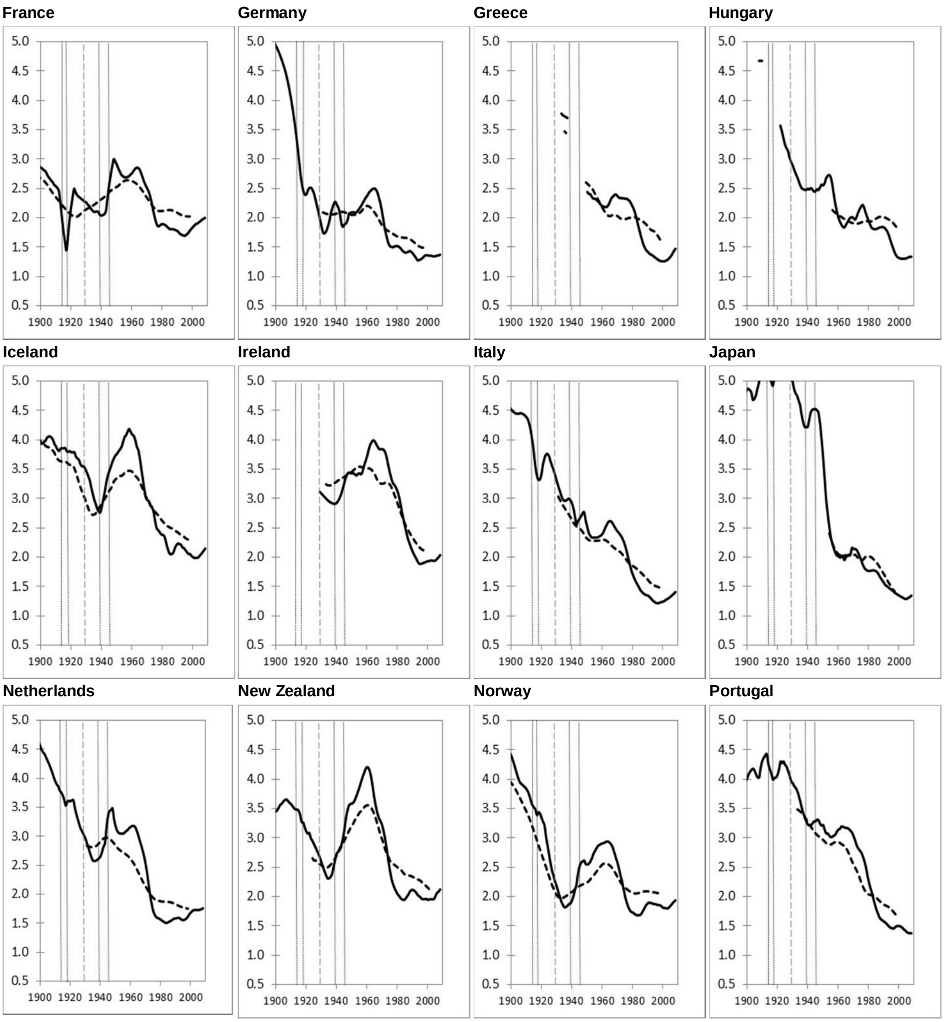
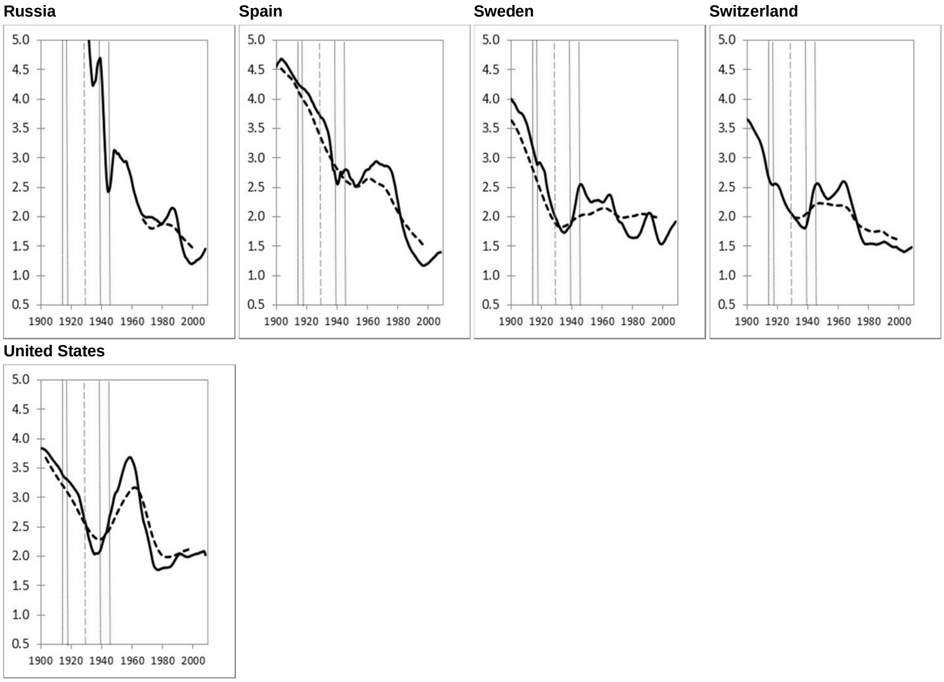


Figure A-2: (Continued)



Note: The index CCF is a longitudinal measure of fertility. To calculate the date of birth of each cohort, 28 years must be subtracted from the year on the graph.
Source: See Appendix.

Figure A-3: Development of the CBR, developed countries, 1900–2010

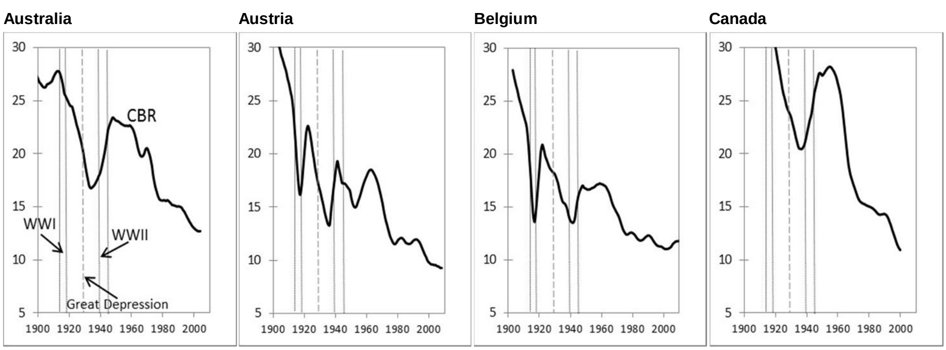


Figure A-3: (Continued)

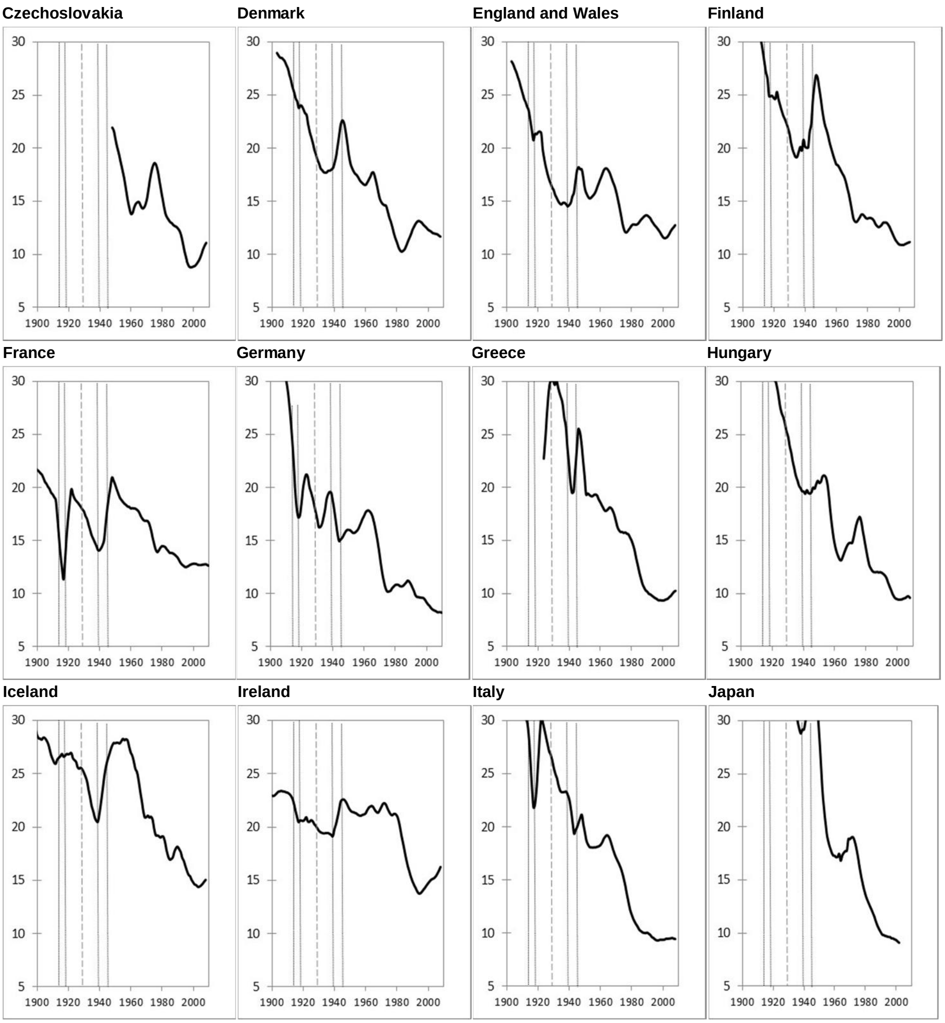
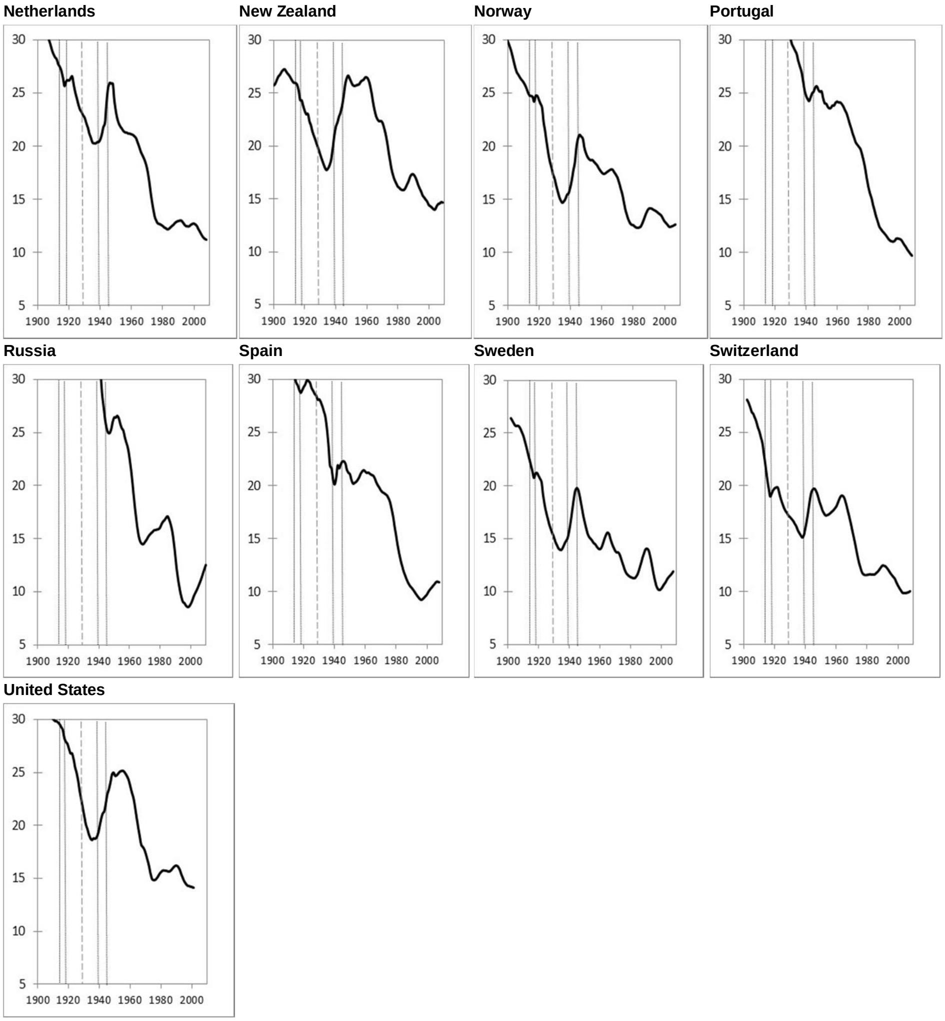


Figure A-3: (Continued)



Source: See Appendix.

Data sources

Mean age at first marriage (Figure 5)

Denmark: Statistics Denmark (http://www.statbank.dk/)
New Zealand: Calculated by the author from census data (singulate mean age at marriage)
Norway: Statistics Norway (https://www.ssb.no/)
Spain: Cachinero Sánchez (1982)
Sweden: Statistics Sweden (www.ssd.scb.se)
United States: U.S. Bureau of the Census (www.census.gov)

Age-specific marital fertility rates in the United States, 1905–1940 (Figure 6)

From 1880 to 1940, data provided by professor David Hacker (2016), University of Minnesota. From 1950 to 1995, Centre for Disease Control and Prevention (https://www.cdc.gov/nchs/fastats/births.htm).

Dollars per capita in public expenditures on social welfare – public aid in the United States (Figure 7)

My own calculation based on data provided by Carter (2006: 734).

Princeton indices (I_f, I_g, I_m)

The national values for the various Princeton indices were obtained from Coale and Watkins (1986). Data available from the following University of Princeton website: http://opr.princeton.edu/archive/pefp/. The author of the present paper calculated the indices for Table A-2.

Table A-2: Years for which the Princeton index was calculated (except where specified)

Australia	1911, 1921, 1933, 1947, 1954, 1966, 1971, 1976, 1981, 1986, 1991, 1996, 2001, 2006
Austria	1951, 1991, 2001
Belgium	1992, 1996, 2000, 2005, 2010
Canada	From 1900 to 1911 the data is from Quebec, obtained from Pouyez and Lavoie (1983); 1921, 1931, 1941, 1951, 1961, 1971, 1976, 1981, 1986, 1991, 1995, 2001, 2006, 2011
Czechoslovakia	1947, 1985, 1990, 1995, 2000, 2005, 2010
Denmark	1950, 1981, 1940, 1990, 1995, 2000, 2005, 2010
England and Wales	1939, 1951, 1991, 1995, 2001, 2010
Finland	1991, 2001, 2011
France	From 1900 to 1911, Weir (1994); 1946, 1954, 1975, 1990, 1999, 2004, 2008
Germany	1946, 1950, 1991, 1996, 2001, 2006, 2010
Greece	1920, 1981, 1991, 2001
Hungary	1949, 1965, 1975, 1985, 1990, 2001, 2005, 2010
Iceland	1971, 1975, 1980, 1985, 1990, 1995, 2000, 2006, 2010
Ireland	1946, 1951, 1966, 1986, 1991, 1996, 2002, 2006
Italy	1981, 1991, 2001, 2006, 2010
Japan	1920, 1925, 1930, 1935, 1940, 1950, 1955, 1960, 1965, 1970, 1975, 1980, 1985, 1990, 1995, 2000, 2005, 2010
Netherlands	1947, 1955, 1965, 1975, 1985, 1990, 1995, 2000, 2005, 2010
New Zealand	1911, 1921, 1936, 1945, 1951, 1956, 1961, 1966, 1971, 1976, 1981, 1986, 1991, 1996, 2001, 2006
Norway	1911, 1946, 1950, 1990, 1995, 2000, 2005, 2011
Portugal	1991, 2001, 2011
Russia	1989, 2002, 2010
Spain	1950, 1991, 2001, 2006, 2011
Sweden	1910, 1920, 1940, 1945, 1965, 1970, 1975, 1980, 1985, 1990, 1995, 2000, 2005, 2010
Switzerland	1980, 1985, 1990, 1995, 2000, 2005, 2010
United States	1900, 1910, 1920, 1930, 1940, 1950, 1960, 1970, 1980, 1990, 2000, 2006, 2010

Table A-3: Sources of information concerning the total fertility rate (five years moving average)

Australia	From 1900 to 1905, estimated from the CBR obtained from the Australian Bureau of Statistics (www.abs.gov.au) using a conversion rate of 0.134 (Bogue 1993); from 1908 to 1918, Chesnais (1992); from 1921 to 2010, Australian Bureau of Statistics.
Austria	From 1903 to 1908 and from 1937 to 1959, Sardon (1991); from 1960 to 2010, Eurostat (ec.europa.eu/eurostat).
Belgium	1900, from Chesnais (1992); from 1910 to 1920, estimated from the If calculated by Coale and Watkins, eds. (1986), applying a conversion rate of 12.44 as Sardon (1996) suggests; from 1930 to 1959, Sardon (1991); from 1960 to 2010, Eurostat.
Canada	1902, from Needleman (1986); from 1906 to 1920, Chesnais (1992); from 1921 to 1990, Wadhera and Strachan (1993); from 2000 to 2010, Statistics Canada CASIM (http://www5.statcan.gc.ca/cansim/a26).
Czechoslovakia	From 1900 to 1919, estimated from the CBR obtained from the Czech Statistical Office (www.czso.cz), using a conversion rate of 0.134 (Bogue 1993); from 1920 to 2010, Czech Statistical Office and Statistical Office of the Slovak Republic (slovak.statistics.sk).
Denmark	From 1901 to 2010, Statistics Denmark (www.statbank.dk).
England and Wales	From 1900 to 1959 (England and Wales) and from 1960 to 2010 (United Kingdom), UK National Statistics (www.statistics.gov.uk).
Finland	From 1900 to 2010, Statistics Finland (tilastokeskus.fi).
France	From 1901 to 2010, National Institute of Statistics and Economic Studies of France (www.insee.fr).
Germany	From 1900 to 1930 Chesnais (1992); from 1931 to 1955 (only West Germany), Chesnais (1992); from 1956 to 2010, Human Fertility Database (www.humanfertility.org) (HFD).
Greece	From 1931 to 1936, Sardon (1991); from 1950 to 1959, Chesnais (1992); from 1960 to 2010, Eurostat.
Hungary	From 1900 to 1920, Kollega (1996); from 1921 to 1959, Chesnais (1992); from 1960 to 2010, Eurostat.
Iceland	From 1900 to 2009, Statistics Iceland.
Ireland	From 1900 to 1925, estimated from the CBR provided by Chesnais (1992), applying a conversion rate of 0.134 (Bogue 1993); from 1926 to 1959, Sardon (1991); from 1960 to 2010, Eurostat.
Italy	From 1903 to 1959, Sardon (1991); from 1960 to 2010, Eurostat.
Japan	From 1900 to 1919, estimated from the CBR from Statistics Bureau of Japan (www.stat.go.jp), applying a conversion rate of 0.1478 (Bogue 1993); from 1920 to 1943, Taeuber (1958); from 1947 to 2010, Statistics Bureau of Japan.
Netherlands	From 1900 to 2010, Centraal Buerau voor de Statistiek (statline.cbs.nl).
New Zealand	From 1900 to 1920 (only non-Maori population), estimated from the CBR from Statistics New Zealand (www.stats.govt.nz), applying a conversion rate of 0.134 (Bogue 1993); from 1921 to 2010, Statistics New Zealand.
Norway	From 1900 to 1960, Chesnais (1992); from 1961 to 1973, Eurostat; 1974 to 2010, Statistics Norway (www.ssb.no).
Portugal	From 1900 to 1932, estimated from the CBR from Chesnais (1992), applying a conversion rate of 0.13 (Bogue 1993); from 1933 to 1959, Sardon (1991); from 1960 to 2010, Eurostat.
Russia	From 1900 to 1918, Vishnevsky (2006); from 1920 to 1958, Andreev, Darskij, and Kharkova (1992); from 1959 to 2010, HFD.
Spain	From 1901 to 1974, Sardon (1991); from 1975 to 2010, Instituto Nacional de Estadística (www.ine.es).
Sweden	From 1900 to 1969, HFD; from 1970 to 2010, Statistics Sweden (www.ssd.scb.se).
Switzerland	From 1900 to 1930, Calot (1998); from 1932 to 1959, Sardon (1991); from 1960 to 2009, Eurostat.
United States	From 1903 to 1932, Chesnais (1992); from 1933 to 2010, HFD.

Table A-4: Sources of information concerning the completed CCF

Australia	From 1934 to 1992, Kippen (2003); from 1993, data provided by J.-P. Sardon, Observatoire Démographique Européen.
Austria	From 1956 to 1957, Sardon (1991); from 1958 to 1977, Council of Europe (2003); from 1978 to 1992, data provided by J.-P. Sardon, Observatoire Démographique Européen; from 1993, www.populationeurope.org.
Belgium	From 1929 to 1957, Sardon (1991); from 1958 to 1977, Council of Europe (2003); from 1978 data provided by J.-P. Sardon, Observatoire Démographique Européen.
Canada	From 1901 to 1931, Needleman (1986); from 1934 to 2000, Statistic Canada, Health Statistics Division and Demography Division http://www.statcan.gc.ca/
Czechoslovakia	From 1954 to 1957, Frejka and Sardon (2004); from 1958 to 1977, Council of Europe (2003); from 1978, data provided by J.-P. Sardon, Observatoire Démographique Européen
Denmark	From 1929 to 1957, Sardon (1991); from 1958 to 1977, Council of Europe (2003); from 1978, data provided by J.-P. Sardon, Observatoire Démographique Européen.
England and Wales	From 1928 to 1957, Sardon (1991); from 1958 to 1977, Council of Europe (2003); from 1978, data provided by J.-P. Sardon, Observatoire Démographique Européen.
Finland	Turpeinen (1979).
France	From 1900 to 1928, National Institute of Statistics and Economic studies (http://www.insee.fr/en/themes/detail.asp?ref_id=ir-sd2005&page=irweb/sd2005/dd/sd2005_fecgen.htm); from 1929 to 1957, Sardon (1991); from 1958 to 1977, Council of Europe (2003); from 1978, data provided by J.-P. Sardon, Observatoire Démographique Européen.
Germany	From 1928 to 1957, Sardon (1991); from 1958 to 1977, Council of Europe (2003); from 1978, data provided by J.-P. Sardon, Observatoire Démographique Européen.
Greece	From 1929 to 1957, Sardon (1991); from 1958 to 1977, Council of Europe (2003); from 1978, data provided by J.-P. Sardon, Observatoire Démographique Européen.
Hungary	From 1954 to 1957, Frejka and Sardon (2004); from 1958 to 1977, Council of Europe (2003); from 1978, data provided by J.-P. Sardon, Observatoire Démographique Européen.
Iceland	From 1900 to 1977, Statistic Iceland http://www.statice.is/Statistics/Population/Births-and-deaths; from 1978, data provided by J.-P. Sardon, Observatoire Démographique Européen.
Ireland	From 1929 to 1957 Sardon (1991); from 1958 to 1977, Council of Europe (2003); from 1978, data provided by J.-P. Sardon, Observatoire Démographique Européen.
Italy	From 1929 to 1957, Sardon (1991); from 1958 to 1977, Council of Europe (2003); from 1978, data provided by J.-P. Sardon, Observatoire Démographique Européen.
Japan	From 1952 to 1977, Frejka and Sardon (2004); from 1978, data provided by J.-P. Sardon, Observatoire Démographique Européen.
Netherlands	From 1928 to 1957, Sardon (1991); from 1958 to 1977, Council of Europe (2003); from 1978, data provided by J.-P. Sardon, Observatoire Démographique Européen.
New Zealand	Statistics New Zealand, www.stats.govt.nz.
Norway	From 1900 to 1929, Brundorg, (1988); from 1958 to 1977, Council of Europe (2003); from 1928 to 1959, Sardon (1991); from 1978, data provided by J.-P. Sardon, Observatoire Démographique Européen.
Portugal	From 1929 to 1957, Sardon (1991); from 1958 to 1977, Council of Europe (2003); from 1978, data provided by J.-P. Sardon, Observatoire Démographique Européen.
Russia	From 1965 to 1999, Council of Europe (2003).
Spain	From 1901 to 1957, Nicolau (2005); from 1958 to 1977, Council of Europe (2003); from 1978, data provided by J.-P. Sardon, Observatoire Démographique Européen.
Sweden	From 1900 to 1903, Statistiska Centralbyrå (1969); from 1904 to 1928, HFD.
Switzerland	From 1929 to 1957, Sardon (1991); from 1958 to 1977, Council of Europe (2003); from 1978, data provided by J.-P. Sardon, Observatoire Démographique Européen.
United States	From 1901 to 1936, Heuser (1976); from 1939 to 1986, National Center for Health Statistics (http://www.cdc.gov/nchs/nvss/cohort_fertility_tables.htm); from 1987, data provided by J.-P. Sardon, Observatoire Démographique Européen.