Using Census Returns and the Own-Children Method to Measure Marital Fertility in Rawtenstall, 1851–1901

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Abstract

The incompleteness of Victorian census returns of marriage and birth records for England and Wales, and the high costs of using civil and church records, have greatly restricted research into the timing and character of the decline in marital fertility in the second half of the 19th century. This article argues that, in spite of these limitations, the census returns provide enough data to allow the well-known the 'Own-children method of fertility estimation', when used within Bongaarts' framework for analysing the proximate determinants of fertility, to derive estimates of total and age-specific marital fertility for women 15 to 49 years of age. It uses data from the census returns for the town of Rawtenstall, a small cotton textile manufacturing town in north-east Lancashire, to generate these estimates and to test their credibility against other well respected measures of marital fertility for England and Wales.

Introduction

The onset of sustained decline in marital fertility in Victorian England, and its timing and causes, are among the most intractable problems in the demographic and economic history of the period. Several reasons account for this: the census returns do not record the date or the age of the mother at her marriage, or the dates of birth of her children and other aspects of her birth record. The parish records, which provided some of these data, decline in coverage once civil registration begins in 1837, and access to the civil records of birth, marriage, and death remains very restricted and is likely to remain so. This means that essential age-specific marital fertility records cannot be calculated directly and demographers have had to rely on total fertility rates and gross reproduction rates as proxies for completed family size. These measures are restricted to national and large scale regional populations and leave local variations in behaviour invisible.[1] At the local level scholars have supplemented the census enumerators' books with data from parish registers to reveal important insights into marital fertility, though the time and effort involved, even for very small communities, continues to limit their use.[2]

1 M.S. Teitelbaum, *British Fertility Decline: Demographic Transition in the Crucible of the Industrial Revolution* (Princeton, 1984), pp. 218–26; R. Woods, *The Demography of Victorian England and Wales,* (Cambridge, 2000), pp. 110–12.

2 R. Woods, and C.W. Smith, 'The decline of marital fertility in the late nineteenth century: the case of England and Wales', *Population Studies*, 37 (1983), pp. 207–25; E. Garrett, 'The trials of labour: motherhood

Given the lack of better data, most of the debate on marital fertility in Victorian England and Wales has been led by Simon Szreter's use of the 1911 census data to derive national indices of completed marital fertility among 195 male occupational groupings in the marriage cohort of the 1870s and 1880s.[3] In spite of their enormous value these data have limitations: they provide cumulative rather than time-associated measures of fertility and are restricted to national rates. They also relate heavily to male occupational differences. Together, these limitations inhibit exploration of the longer-term decline of English fertility after 1837, particularly for women at the local level, where scholars have identified considerable differences in fertility behaviour within larger regional populations such as Registration Districts and counties.[4]

Until more useful evidence is available, researchers need a method of deriving credible, time-based estimates of female experience in marital fertility using only the census enumerators' returns at the level of the parish, village, or town, and by extension, registration districts and large cities. This article explores this possibility. It uses a combination of the own-children method of fertility estimation and Bongaarts' framework for analysing the fertility-inhibiting effects of intermediate fertility variables to provide the basis of such a method. It identifies problems associated with putting the approach into practice and of identifying the likely degree of accuracy of the results it produces. The approach uses the equation

$$\text{TM} = \frac{\text{TFR}}{C_m}$$

where TM is the total marital fertility, TFR is the total fertility rate, and C_m is an index of the proportions married.[5] Age-specific and total fertility estimates are derived using the own-children method, and the proportions of women 15–49 years of age married are

versus employment in a nineteenth-century textile centre', *Continuity and Change*, 5 (1990), pp. 133–6; B. Reay, 'Before the transition: fertility in English villages, 1800–1880', *Continuity and Change*, 9 (1994), pp. 99–101; B. Eckstein and A. Hinde, 'Measuring fertility within marriage between 1841 and 1901 using parish registers and the census enumerators' books', *Local Population Studies*, 65 (2000), pp. 38–52.

3 S. Szreter, *Fertility, Class and Gender in Britain, 1860–1940* (Cambridge, 1996), pp. 310–66.

4 E. Garrett, A. Reid, K. Sch rer, and S. Szreter, *Changing Family Size in England and Wales: Place, Class and Demography 1891–1911* (Cambridge, 2001).

5 J. Bongaarts and R.G. Potter, *Fertility, Biology, and Behaviour: an Analysis of the Proximate Determinants* (London, 1983); J. Bongaarts, 'The fertility-inhibiting effects of the intermediate fertility variables', *Studies in Family Planning*, 13 (1982), pp. 179–89; J. Bongaarts, 'A framework for analysing the proximate determinants of fertility', *Population and Development Review*, 4 (1978), pp. 105–32. The index of marriage, Cm, measures the extent to which late and non-universal marriage reduces fertility by exposing women to the risk of conception. If $g(a)$ and $m(a)$ are, respectively, schedules of age-specific marital fertility rates and the proportions of women currently married at age a, then

$$C_m = \frac{\sum_a g(a)m(a)}{\sum_a g(a)}$$

derived from the returns. We use only data from the census returns from 1851 to 1901 for Rawtenstall, a small cotton textile manufacturing community in north-east Lancashire.

The article is set out in five parts. The next section provides a brief outline of the geographic and economic context within which women aged 15 to 49 years of age who lived in Rawtenstall in the second half of the nineteenth century made their marriage and fertility choices. Following that, the article outlines the main problems associated with using the own-children method and sets out the steps taken to derive age-specific marital fertility rates (ASMFRs) and total marital fertility rates (TMFRs). The next section tests the credibility of the results derived for all married women in Rawtenstall against several widely-accepted schedules for periods of natural fertility and for identifying the onset of parity-specific fertility control. A fourth section examines the results for each of the main occupational groups to build a more detailed picture of the timing and emerging characteristics of fertility change between 1851 and 1901. Finally, I summarise the main conclusions, and comment on the contribution of the Rawtenstall experience to our knowledge of the timing, character, and possible causes of the onset of sustained fertility decline in Victorian England.

To avoid the problem of frequent boundary changes in the census returns, I used the 1893 Rawtenstall urban district boundaries to define the population of Rawtenstall at all censuses. Households located within these boundaries were readily identifiable at all six censuses 1851–1901 using very large scale Ordnance Survey maps held in Rawtenstall public library and the John Rylands Library, University of Manchester.

Rawtenstall: geography, population, and economy

At the census of 1851 Rawtenstall was a small, secluded, Lancashire market town of four to five thousand people located in the Rossendale Valley at the junction of the River Irwell and a stream known as Limy Water. The town serviced upstream communities in three river valleys, as far as Love Clough on the Limy Water, Waterfoot on the Irwell, and the Whitewell Brooke valley, which joins the Irwell at Waterfoot. Together the three river valleys formed a U-shaped, closely-knit, community of towns, villages, and farms containing 17,033 people. Over the next 30 years the community grew rapidly to 29,254 in 1881; thereafter, growth slowed sharply reaching only 31,053 by 1901. Underlying this growth and subsequent slowdown was the changing demand for workers in the town's cotton textile manufacturing industry.[6] The district had long been a small coal mining and handloom weaving centre and, by 1851, contained several textile factories, most of which were cotton mills specializing in the manufacture of calicoes and other simple cotton textiles. Four decades of burgeoning growth in the cotton industry boosted employment and prosperity. Employment in cotton factories rose from 4,544 in 1851 (50 per cent female), to 8,110 in 1891 (61 per cent female).

6 This passage and the following paragraph draw heavily on H.M. Boot and J.H. Maindonald, 'New estimates of age- and sex-specific earnings and the male-female earnings gap in the British cotton industry, 1833–1906', *Economic History Review*, 61 (2008), pp. 397–404.

The 20 years from 1881 onwards changed all this. Competition from newly-developing textile industries in Europe, America, and India cut deeply into Britain's foreign markets, especially for cheaper cotton goods, causing Rawtenstall, with its focus on the simpler textile types, to feel the depression more keenly than in high value textile manufacturing towns. By 1901 employment in the town's cotton mills had fallen by 16 per cent to 6,801, the lowest level since 1851, two thirds of the loss being males.

During the 50 years up to 1901, the benefits of prosperity in the cotton industry, and losses of depression, were distributed unevenly between men and women in the industry in the age group 20–49 years. Developments in the technology of spinning increased the demand for women's labour much faster than for men and increased women's earnings significantly faster than for men of the same age, especially among women between their mid-twenties and mid-thirties. Throughout the industry, the gains to women created strong incentives for women who were still working in their early twenties to continue working into their mid-thirties. In 1851, 52 per cent of female cotton workers in Rawtenstall continued working into their early thirties, with 24 per cent continuing into their early forties. The proportions working into their early thirties fell in the 1860s but recovered to 41 per cent into the 1870s where they remained to the end of the century.

The onset of depression in the late 1870s continued to favour the employment and earnings of women over men. Waning demand for the simpler cotton goods reduced the demand for adult males, while technical improvements continued to reduce the amount of skill required to maintain a given quality of the final product in the adult male sectors of the industry, whilst increasing the demand for women, and their wages, compared with those for men. The demand for adult female labour and good wages continued to attract women to the mills in Rawtenstall up to the 1890s. For men the outcome was different; employment became scarcer and average earnings declined relative to those for women. Employment for men fell by 26 per cent between 1871 and 1901 while women's earnings increased up to the 1890s when they declined by 5 per cent while wages were maintained.

We now turn to consider the process of estimating age specific and total female marital fertility and of assessing the credibility of those estimates in terms of their consistency with other well-accepted estimates of marital fertility in England and their interpretability in the light of Rawtenstall's economic experience between 1851 and 1901.

Using the own-children method

As we have seen the direct measurement of TMFRs and ASMFRs from the census returns is not possible because they require the dates of live births and the ages of the mothers at each birth, neither of which are provided in the census returns. The census returns do, however, provide enough data to allow the well-known *own-children method* of fertility to derive estimates of total fertility rates and schedules of age-specific fertility rates. These rates, when divided by corresponding schedules of the proportions of women married derived from the census data, yield indirect measures that we provisionally describe as ‘quasi-ASMFRs’ and ‘quasi-TMFRs’, which are then tested for their credibility.

The own-children method infers information on recent births from the presence of children aged 0–14 years in the household, and links these children to the female who is most likely to be their mother.[7] It assumes that the vast majority of young children live with their mothers up to the age of 14 years and corrects the estimates taking account of infant mortality and children who cannot be matched to a mother in the population. The method then uses reverse estimation to derive estimated mortality-adjusted age-specific rates and total fertility rates (ASFRs and TFRs) from the census (or household survey) records of children up to 14 years of age and their mothers, at the census date and for each of the 14 years before the census date.

The method can be applied using various computer programs written for the purpose.[8] Important requirements of the program are that the operator has to allocate numeric codes to each household and the following attributes of each person in the household: relationship to the head of household, sex, marital status, and age. Other attributes, such as the number of identified own-children living in the household, place of birth, education, religion, ethnicity, occupation, are optional. Caution is required if an attribute selected, such as occupation, can change over the person’s lifetime, as we show below. The coded items are then concatenated into string form and entered into the program to generate ASFRs and TFRs for all women, and women in each category selected by the user, in the age range 15–49 years at each census date and for each of the preceding 14 years.[9] Another feature of the program is that it allows the operator to select whether he or she wishes to include all women, ever-married women, or currently-married women.

The own-children method has considerable advantages. It provides time-associated measures of age-specific and total fertility rates required to establish a basis from which we can derive estimates of marital fertility. Other than the census data, the method requires a set of life tables and estimates of sex ratios at birth at each census date to estimate age-specific and total fertility. The program I used contained a full set of Coale-Demeny model life tables from which the operator may select the appropriate regional model, which the

7 L-J. Cho, R.D. Retherford and M.K. Choe, *The ‘Own-Children’ Method of Fertility Estimation* (Honolulu, 1986).

8 One such program is EASWESPOP Fertility Estimate Programs version 2.0, see http://www.eastwestcenter.org/fileadmin/resources/research/PDFs/manual_fertility_estimate.pdf (accessed 20 April 2017). Excellent guides for first users of the programs can be found in M.D. Smith, ‘Preparation of fertility estimates using the “own-children” method from the Labour Force Survey through the East-West Fertility Program, with Excel output’, Background Paper No. 3, Oxford Centre for Population Research (Oxford, 2003); and G. Childs, ‘Demographic analysis of small populations using the own children method’, *Field Methods*, 16 (2004), pp. 379–95.

9 In our case the specified category was ‘occupation’. It is important to remember that the accuracy of the results depends on the number of married women in each five-year age group between 15 and 49 years. In our case ‘domestic servants’ was the second largest occupation for women in Rawtenstall but accounted for only five per cent of the female labour force between 15 and 49. Very few of these women were married and even fewer were in paid work. Numbers were too small to yield reliable measures of their fertility.

program then operates automatically. Operators can select to enter their own tables if available. We selected model 'West' tables along with decade average sex ratios at birth calculated from Mitchell for this project.[10]

The method has limitations, two of which are serious enough to threaten the credibility of the final results. Estimates can be distorted by age misreporting among children. Age heaping is clearly present among people aged above 65 years in the Rawtenstall censuses and there is some evidence among the age-group 0–5 years. This is a normal feature of historical populations, and there is no reason to believe that it was unusually high in Rawtenstall. In addition, any effect among children is greatly lessened by averaging over five-year age groups. Migration is also a potential source of bias and was especially high in Rawtenstall in the 1850s. Errors mainly occur when fertility is higher among migrants from rural areas than in the town's population, especially when the data are available for a single year. Fortunately, our data covers six successive censuses yielding five sets of overlapping estimates that allow us to identify systematic biases caused by age misreporting and migration. We deal with these problems as they arise in the text of the article.

A third limitation arises from errors of matching mothers to their children. Any study of Victorian urban industrial populations with substantial migrant intake is susceptible to mismatching between children to their mothers. Large migrant inflows create overcrowding causing the proportion of complex households in the community to increase. These combine to increase the likelihood of children being separated from their parents and/or being allocated to married women in other families.[11] The own-children method deals with this problem by randomly allocating 'non-own' (unlinked) children to eligible mothers by age. The pioneers of the method admit that misallocation of these children and other matching errors may still introduce bias, but argue that the effect is usually small compared with biases from age misreporting.[12] Nevertheless, the difficulty of identifying and allocating separated children in complex households to their mothers remains. Experience with the Rawtenstall data indicates that the best way of limiting these errors is to pay particular attention to the coding process.

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10 A.J. Coale, P. Demeny, and B. Vaughan, *Regional Model Life Tables and Stable Populations* (New York, 1983). E. A. Wrigley and R.S. Schofield, *The Population History of England 1541–1871: a Reconstruction* (Cambridge, 1989), pp. 708–14, are critical of the poor correspondence between the Coale-Demeny models 'West' and 'North' and the third English Life Table. They find model 'North' superior but consider neither was accurate enough for their purposes. We selected model 'West' after comparing levels 10–14 of the Coale-Demeny female and male estimates in both models with the corresponding English Life Tables (ELTs) 3 to 7. Those comparisons confirmed Wrigley and Schofield's concerns in regard to ELT 3 (1838–44) but we found the 'West' series for females consistently outperformed series 'North' in all comparisons with ELTs 4–7. For the sex ratios of births, see B.R. Mitchell, *British Historical Statistics* (Cambridge 1988), pp. 42–43.

11 We define simple households as any household containing members of one nuclear family. Households containing other members in addition to a nuclear family are classed as complex. Just over 40 per cent of the population of Rawtenstall in 1851 and 1861 lived in complex households, a proportion which declined to 33 per cent in 1871 after which it fluctuated slightly to the end of the century.

12 Cho et al., *'Own Children' Method*, p. 7.

The proportions of 'non-own' children identified in Rawtenstall are below 10 per cent for most years and ages of children, but they rise to 15 or even 20 per cent among older children between 1851 and 1861. These were years when strong demand for labour in the town's cotton mills and coal mine were attracting young families to the town increasing overcrowding and the proportion of complex households. In these circumstances high levels of 'non-own' children numbers are to be expected, reflecting the fact that many children were separated from their mothers, particularly older children who were able to find work of their own and could be who could be sent ahead to relations and friends in the town. Once the initial surge of migration eased, overcrowding and the need for some children to live away from the mother reduced, causing the number of 'non-own' children to decline to more reasonable levels. The numbers still appear large enough to bias the final results towards higher levels of fertility. However, as we shall see, the fertility estimates generated tend to emphasise that fertility among women in Rawtenstall was noticeably lower than the average for England and Wales. Any inherent bias upward would, therefore, mean that the estimates are higher than the true rate, and that fertility in Rawtenstall was even lower than the results suggest.

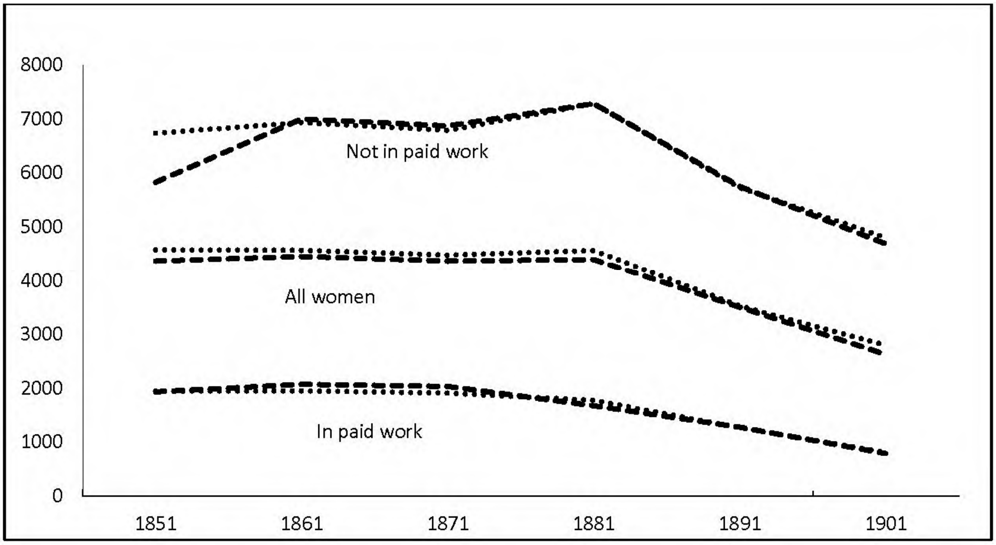
An important feature of the own-children method is its ability to tabulate fertility by social and economic characteristics such as place of birth, social class and occupation. Normally this is a straight forward operation; other problems of estimation arise, however, if the selected characteristic can change during the woman's fertile life, for example employment status or occupation. This is because the method assumes that all characteristics remain unchanged from the census date at which they were recorded for the purpose of calculating its back projections. Thus a woman listed as 'not in paid work' at the date of the census is treated as though she had never been in paid work, even though she may have worked for most of those years. A woman listed as 'in paid work' is treated as always have been in paid work, even though her work continuity was interrupted by the birth of one or more children.

Cho and his colleagues argue that, although the resulting estimates become increasingly biased over the period of reverse projections, the results still yield credible estimates of trends and comparisons if the tabulations cover more than one census, and that attention is confined to the year immediately preceding the census.[13] Figure 1 compares Cho et al.'s recommended single year estimate at the year preceding the census date with the five year average that includes the census date estimate over the six censuses for 'all women', 'women in paid work', and 'women not in paid work'. Both sets show mean differences of less than 6 per cent with the exception of women 'not in paid work' (13 per cent) in 1851 which, given the high migration rates in 1851, raises confidence in Cho's approach and allows us, with caution, to use the five-year average TFR values to compare trends in all occupation groups between 1851 and 1901.

One problem remains: in order to generate marital fertility rates from the ASFRs generated by the 'own-children' method the Bongaarts approach requires that illegitimate

13 Ibid., pp. 58–59.

Figure 1 **Single-year and five-year average total fertility rate estimates (births per thousand women) for women aged 15–49 years by work status: Rawtenstall 1851–1901**



Notes: Dashed lines are single-year rates; dotted lines are five-year averages.

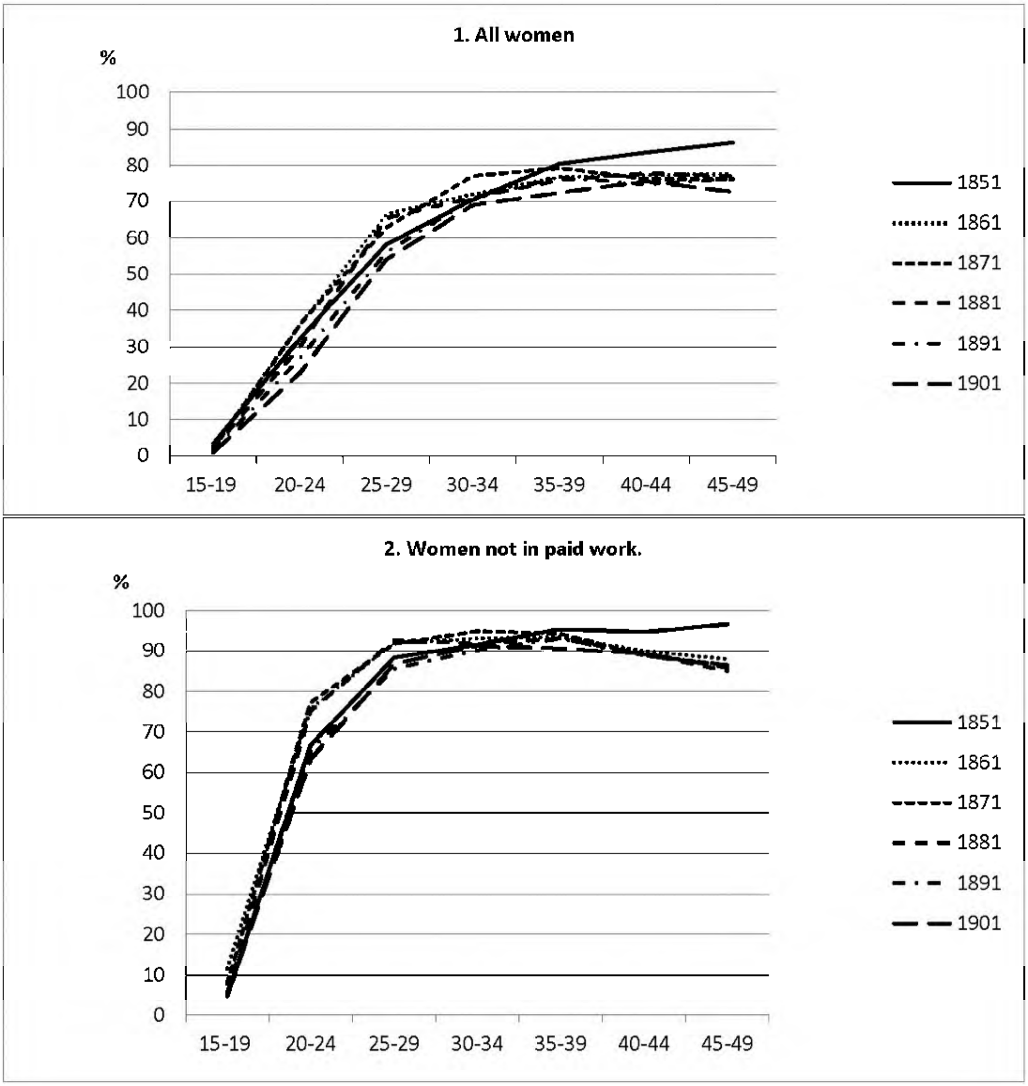
Source: Census enumerators' books, Rawtenstall 1851–1901 (see Appendix for details).

children be excluded. The census data do not identify illegitimate children, but the problem has a simple solution; the method allows the operator to select between all women, ever married women, and currently married women. When asked, the operator simply selects currently married women. Although this will not identify children that may have been technically illegitimate but are not so identified by their parents, this does not appear to affect the final results and permits consistency with the Bongaarts approach when we come to calculate the age-specific marital fertility rates (ASMFRs).

Calculating age-specific proportions of women married

The final piece of data required to calculate marital fertility rates are the five year average profiles of the proportions of women 15–49 years who were married, both overall and by their occupation status. These profiles are readily derived from the census returns and are shown for Rawtenstall in Figure 2. The profiles themselves are important indicators of differences in marital behaviour between the different occupation groups. They show how women who were not in paid work married earlier in every age group than women on average (panels 1 and 2), and much earlier than women in paid work (panel 3). Cotton workers (panel 4) formed the largest paid occupation group accounting for 71 per cent of all those married women in the 'in paid work' group. Domestic servants accounted for about 10 per cent of women in paid work and the second largest occupation group. Their proportions married fluctuated widely from census to census but were always low. The

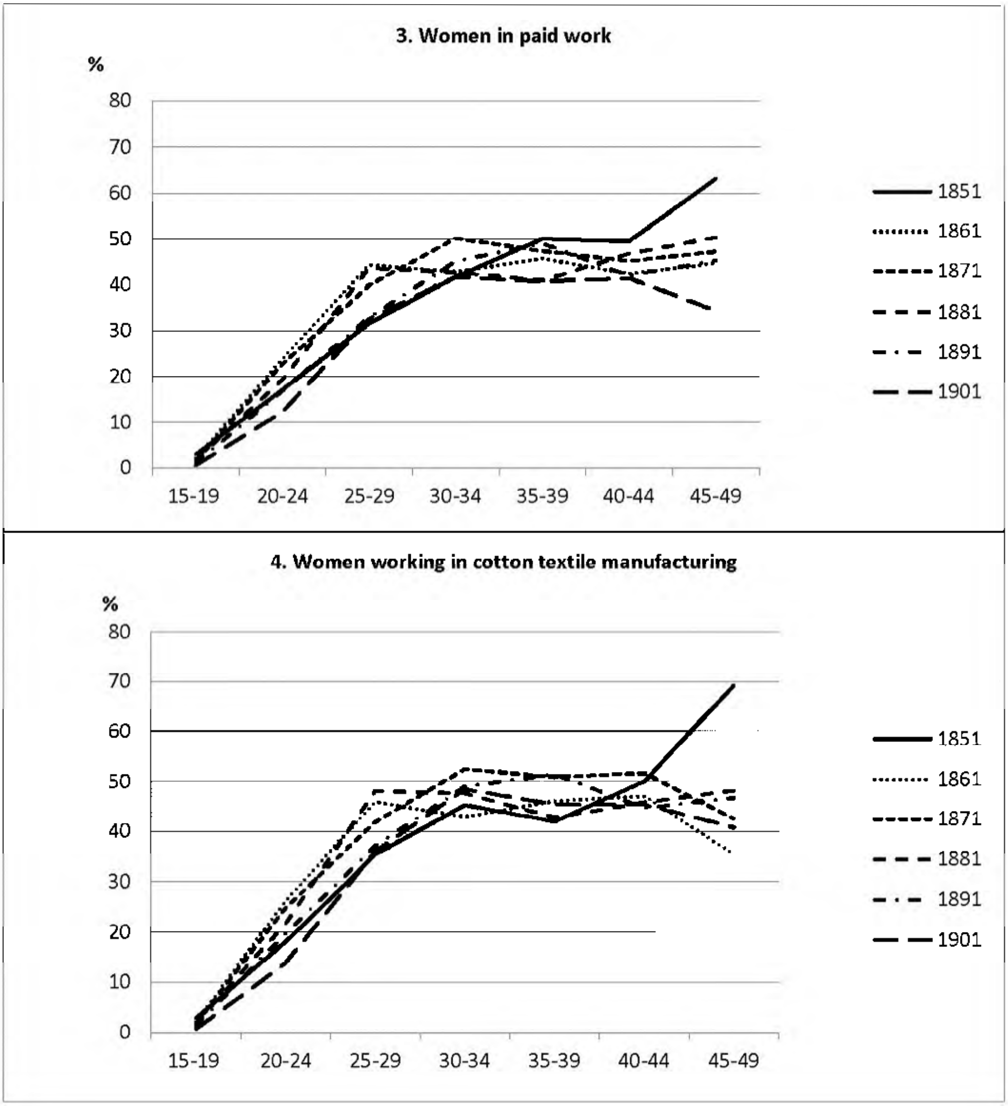
Figure 2 **Percentages of women married in each five-year age group from 15–19 years to 45–49 years, by occupation: Rawtenstall 1851–1901**



remaining 53 occupation groups identified rarely had more than 50 per cent married except among the oldest age groups. As we shall see, these patterns appear were closely linked to changes in the fertility of married women.

Calculating age-specific and total marital fertility rates

We now have all the data required to calculate estimates of age-specific and total marital fertility rates for all married women 15–49 years of age and those in each of our occupation status groups. An example of the calculation is set out in Table 1 listing the schedules of



Source: Census enumerators' books, Rawtenstall 1851–1901 (see Appendix for details).

ASFRs, *f(a)*, the proportions of women married, *m(a)*, and *g(a)* the calculated estimated schedule of ASMFRs, *g*(*a*). The total fertility rate is the sum of the seven ASFRs multiplied by five and divided by 1,000. The table lists two options for calculating the estimated TMFR. Option 1 includes all married women 15–49 years of age; option 2 includes only those women 20–49 years. Since few women were married in the age-group 15–19 years, then following Bongaarts we prefer option 2 to avoid the distorting effect of the very low proportions of women married in the 15–19 age group.[14] Similar calculations were

14 Bongaarts, 'Fertility-inhibiting effects', p. 187.

Table 1 Calculation of age-specific marital fertility rates for women aged 15–49 years: Rawtenstall 1851

Age group	Age-specific fertility rate, *f*(*a*)	Proportion married, *m*(*a*)	Age-specific marital fertility rate, *g*(*a*)
15–19	17.2	0.034	505.9
20–24	129.5	0.322	402.2
25–29	210.0	0.583	360.2
30–34	216.3	0.704	307.2
35–39	199.1	0.805	247.3
40–44	113.2	0.836	135.4
45–49	29.6	0.863	34.3
Total fertility rate	4.57		
Total marital fertility rate			9.96
Total marital fertility rate excluding age-group 15–19 years			7.43

Notes: Age-specific fertility rates are expressed per thousand women. Total fertility rates and total marital fertility rates are expressed per per women. In this table, *g*(*a*) has been calculated as *f*(*a*)/*m*(*a*).

Source: Census enumerators' books, Rawtenstall 1851–1901 (see Appendix for details).

performed for all married women, women in paid work, women in the cotton industry and women not in paid work. These results are discussed later. Estimates were also generated for domestic servants, the second largest paid occupation group but the estimates were based on very small frequencies and the results were considered too unreliable for further analysis.

Comparison with previous fertility estimates

A particular value of ASMFRs is that they provide profiles of fertility that can be tested for their credibility. The rest of this section uses this characteristic to test the credibility of the estimates that we have now generated.

It is well known that populations that practice no parity-specific fertility control in marriage (i.e. natural fertility) share a characteristically convex profile of decline in fertility by age that differs little between populations and over time, while populations that practice parity-specific control take on concave shapes that are not consistent with natural fertility.[15] The more concave the profile the greater the degree of fertility control. For our estimates to be credible they should conform closely to these features. Since it is generally accepted that natural fertility was universal in England in 1851 and transitioned to a distinctively parity-specific regime by 1901, for any new set of estimates to be credible it is necessary that they provide evidence of natural fertility in 1851. Data for subsequent censuses up to 1901 should also provide evidence of a transition to parity-specific fertility control as, by

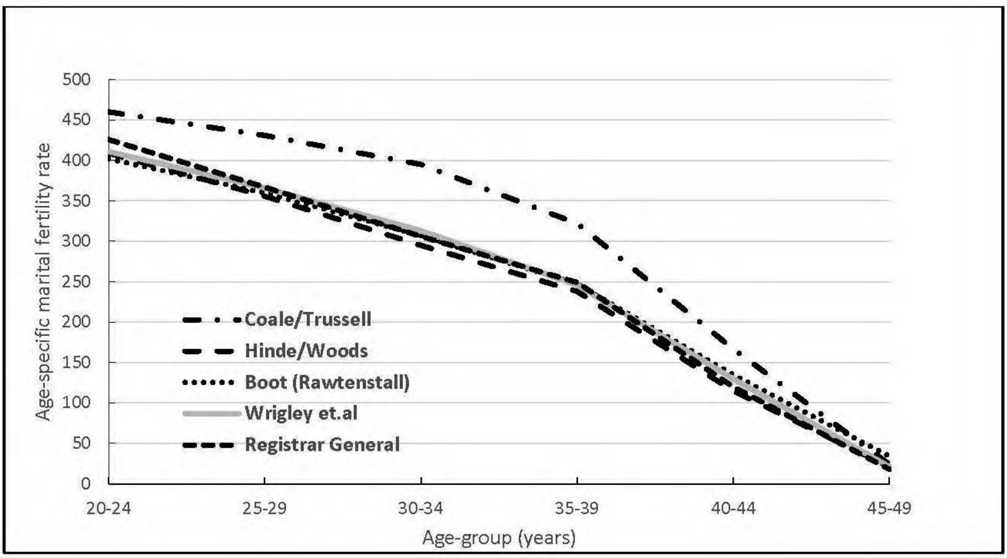
15 See, for example, J. Knodel, 'Fertility limitation and fertility transition: evidence from the age patterns of fertility in Europe and Asia', *Population Studies*, 31 (1977), pp. 220–27.

1901, it is generally accepted that marital fertility control was generally practised throughout England and Wales.

To make these tests for the Rawtenstall data we compare our estimated ASMFR profiles for 'all married women' in 1851, against Wrigley's mean average for England between 1600 and 1824 and three other widely accepted measures of natural fertility in England. For evidence of the timing of transition to parity-specific fertility control after 1851 we compare our estimates for all married women against the Registrar General's estimates for England at each census from 1851 to 1901. The results of the tests are shown visually in Figures 3 and 4.

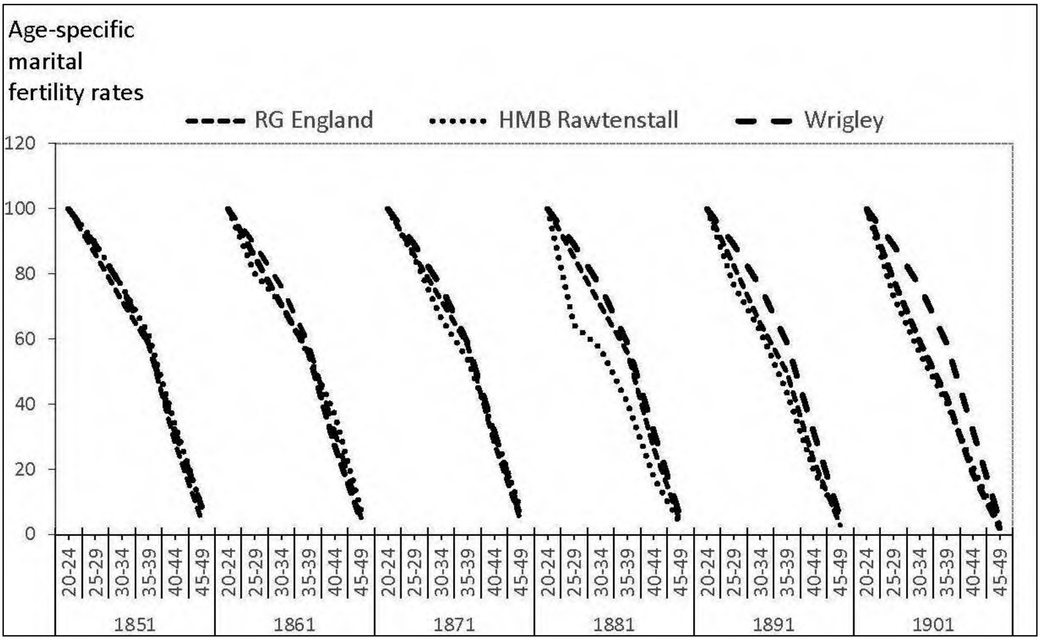
Figure 3 compares the four optional profiles with Wrigley's mean average for England between 1600 and 1824. All profiles except that of Coale/Trussell conform very closely to Wrigley et al.'s profile, the standard errors being 0.2 for the Registrar General's estimates, 0.3 for Rawtenstall, 0.9 for Hinde/Woods, and 5.0 for Coale/Trussell, leaving it the only profile significantly different from the Wrigley profile. Figure 5 compares changes in the Registrar General's marital fertility profiles for England and the profiles for Rawtenstall at

Figure 3 Comparison of estimates of the age-specific marital fertility profile in Rawtenstall, 1851, with estimates for England in periods of natural fertility



Sources: Census enumerators' books, Rawtenstall 1851. Other natural fertility schedules taken from E. A. Wrigley, R.S. Davies, J.E. Oeppen and R.S. Schofield, *English Population History from Family Reconstitution 1580–1837* (Cambridge, 1997), p. 355; P.R.A. Hinde and R. Woods, 'Variations in historical natural fertility patterns and the measurement of fertility control', *Journal of Biosocial Science*, 16 (1984), pp. 315–6; A.J. Coale and T.J. Trussell, 'Finding two parameters that specify a model schedule of marital fertility', *Population Index*, 44 (1978), p. 205; Registrar General, *Statistical Review for 1938 and 1939* (London, 1947) pp. 237 and 285.

Figure 4 The transition from natural to controlled marital fertility in Rawtenstall and England by census year, 1851–1901



Note: The age-specific marital fertility rates in this figure are all expressed as a percentage of the rates in the corresponding year for women aged 20–24 years.

Sources: Census enumerators' books, Rawtenstall 1851-1901 (see Appendix for details); E.A. Wrigley, R.S. Davies, J.E. Oeppen and R.S. Schofield, *English Population History from Family Reconstitution 1580–1837* (Cambridge, 1997), p. 355; Registrar General, *Statistical Review for 1938 and 1939* (London, 1947) pp. 237 and 285.

each census up to 1901; the Wrigley et al. profile provides a standard against which to judge these movements.

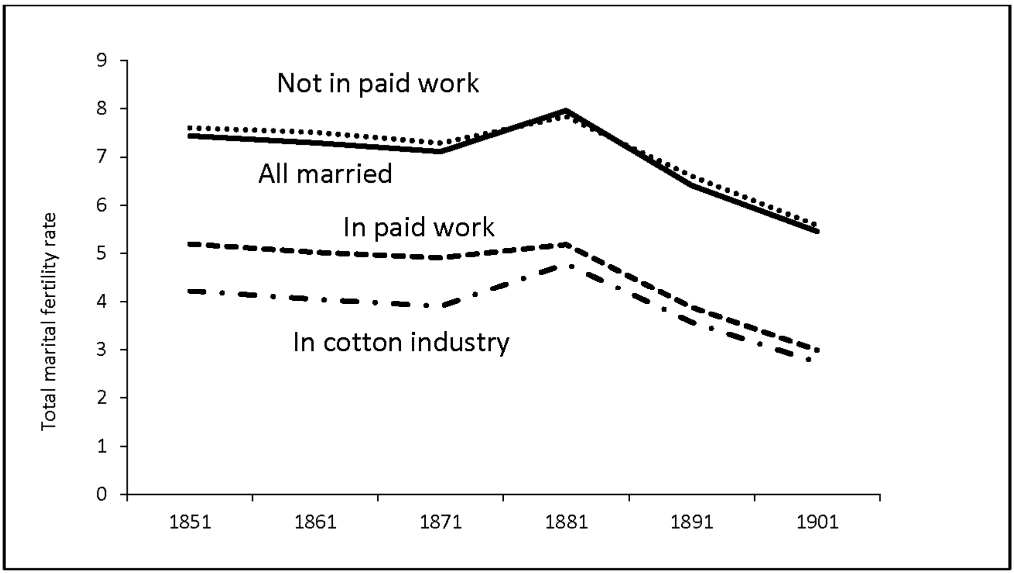
As expected, the Registrar General's profiles conform to the conventional view of fertility change in England in the second half of the nineteenth century. They show no clear evidence of deviation towards concavity before 1881. By 1891 however, the profile had taken on the distinctive concave features that indicate the onset of parity specific fertility control which becomes stronger by 1901. The Rawtenstall profiles tell a somewhat different story. Here, there is evidence that fertility was falling among women in the 25–29 year age-group as early as 1861, and this fall expands to include women the 25–39 year age-groups in 1871. The 1891 and 1901 censuses reveal another story showing that a strong shift towards parity specific control of marital fertility had occurred in the 1880s that pushed the process of marital fertility control in Rawtenstall significantly ahead of that for England as a whole. Rawtenstall was to increase its lead by 1901. Considered in this way, the small variations of the 1860s and 1870s hinting at fertility control, and the evidence of the early leadership of Rawtenstall in the transition to controlled fertility all reflect the value of estimates generated by the own-children method in highlighting events in small communities that are obscured in data drawn at the national level.

Resulting TMFRs and ASMFRs by occupation status, Rawtenstall, 1851–1901

To build a more detailed picture of the timing and emerging changes in women's marital fertility in Rawtenstall we extend the analysis to the four main groups of married females: all married women, those not in paid work, those in paid work, and those working in cotton mills. The TMFRs at each census in Figure 5 require no comment except to note the large difference between those in paid work and those who were not at every census between 1851 and 1901.

Figure 6 shows two sets of schedules; those on the left are the original estimates; on the right are indexed values of those rates. Indexing is a form of standardisation for compositional differences and expresses the rates for each age as a percentage of the rate at age 20–24 years. Its value is that it clarifies the contrasting curvatures of the profiles in populations where the compositional structure of sub-groups differs from that of the

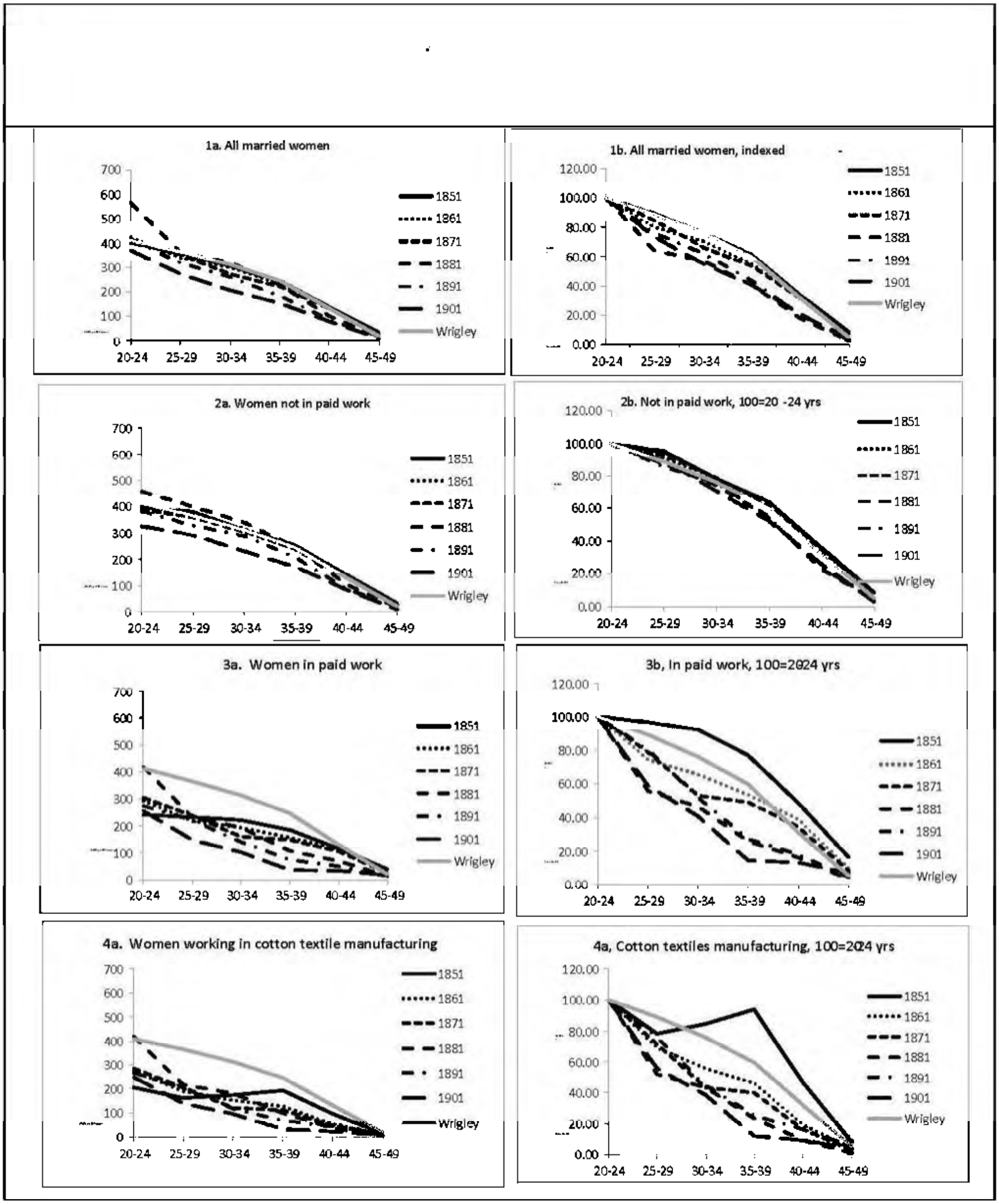
Figure 5 **Estimated total marital fertility rates, married women aged 20–49 years, by occupational status: Rawtenstall, 1851–1901**



Note: The total marital fertility rate, as presented here, is the number of children a woman would have if she married at exact age 20 years, remained married until her 50th birthday, and bore children at each intervening age according to the estimated age-specific marital fertility rates of women in Rawtenstall in the given census year.

Sources: Census enumerators' books, Rawtenstall, 1851–1901 (see Appendix for details).

Figure 6 **Age-specific marital fertility rates and their values indexed to the age-group 20–24 years: married women aged 20-49 years by occupational status: Rawtenstall 1851–1901**



Source: Census enumerators' books, Rawtenstall 1851–1901 (see Appendix for details).

control population. Each panel includes the Wrigley et al. English mean profile (in grey scale) as a standard against which those movements can be compared.

Two features stand out. First, there is a clear overall shift among all married women from a convex, natural fertility profile in 1851 to a distinctly concave parity-specific profile by 1901. All groups except women not in paid work consistently reduce their fertility up to 1900: women not in paid work increase their fertility up to 1881 before reducing it steadily in the 1880s and 1890s. The profiles for women in the cotton industry and in paid work begin to show evidence of concavity as early as 1861, which continues in both thereafter.[16] After 1881 all profiles take on distinctly concave shapes in all age groups.

Another feature, evident in the profiles on the left hand panels, is the large differences in the size and changes of the ASMFRs between those women who were not in paid work and those who were in paid work that can be seen in panels 2a to 4b. The fertility of women not in paid work is always much higher and more reluctant to decline, even in the 1880s and 1890s when they were beginning to control their fertility. The profiles for women in paid work, by contrast, show very distinctive shifts towards deliberate parity-specific control of fertility by the 1870s. Thereafter they indicate a distinctive emphasis on controlling fertility among the 25–35 year age groups. It is the vigour of the shift towards parity-specific fertility control and its persistence among women in paid work that accounts for the major changes in the ASMFRs between 1851 and 1901.

Discussion and conclusions

The purpose of this article was to draw attention to a largely neglected but readily available method that enables researchers to derive credible estimates of marital fertility from the census returns for England and Wales from 1851 onwards. By way of demonstration we used data from the census returns for a small cotton textile manufacturing town in Lancashire between 1851 and 1901. The tests we made were rigorous and yielded results for 1851 that were consistent with a pre-transition natural fertility regime in 1851 and with existing and well respected estimates of marital fertility rates during the transition to 1901. Together these results suggest that the method can yield credible results. Further refinement of the approach would, no doubt, improve the accuracy of the fertility estimates. A remaining problem is the size of the community suitable for analysis. The Rawtenstall population grew from about 17,000 to about 31,000 people over a 50-year period and, although we could obtain credible estimates of marital fertility in the large occupation groups, we were unable to generate age-specific rates for occupations where the number of married women in individual five-year age groups fell below 20. This meant that the practical minimum number of women needed for generating reliable age-specific

16 The erratic ASMFRs for married women in the cotton industry in 1851 are the product of unusually low ASFR estimates in the 20–24 and 25–29 year age-groups in one of the years used to calculate the five year average TFR for 1851 from which the ASMFRs calculations are derived. This is further justification of our decision to use five year average TFRs.

estimates for any group of married women between ages 15 and 49 years was about 240 persons in any census year. This limit should be borne in mind when selecting the population to be analysed.

While demonstrating the value of a neglected tool and its limitations, this article tells the story of how and when married women living in a cotton textile manufacturing town in Lancashire began deliberately controlling their fertility to determine the number of children they had. Our analysis focusses on two of Bongaarts' intermediate variables, the proportion of women married and the age at marriage. Their most striking feature is the large differences in both variables between women who were in paid work and those who were not, showing that over the whole period studied women in paid work typically delayed marriage and reduced the proportion married significantly further than those who were not in paid work. Whether or not a woman was in paid work also dominates the timing of the onset of deliberate fertility control. The 1881 census marks the onset of deliberate reductions in the proportions married and increases in age at marriage among all women in Rawtenstall regardless of occupation status, and the emergence of the concave age-specific (controlled) fertility profiles found in Figure 6.

Although there is a large literature on the part played by three remaining intermediate variables in British fertility history, almost nothing can be said about their contribution to fertility control in Rawtenstall. It is generally accepted that postpartum amenorrhea (the temporary protection from conception due to breast feeding) declined in nineteenth-century English manufacturing towns, particularly after 1870 when the spread of new artificial feeding methods offered a viable alternative to breastfeeding for women to return to work early after confinement.[17] Such a decline represents a decline in protection against conception and is thus movement in the wrong direction to explain decreased fertility. Hours of work for women in cotton factories fell from 70 per week in the 1830s to 56.5 in 1875, which might have affected frequency of coition, though again that would be an effect working in the wrong direction.[18] An abundant literature on induced abortion shows that working class women in cotton mills were well aware of abortion and, by the 1880s, contraceptives as means of controlling fertility. There is, however, no clear way of determining how extensively and frequently abortion was used to control marital fertility. Given the risks involved, however, it is unlikely to have played any significant part in reducing fertility in Rawtenstall. Similarly, the high cost (for working class women) of contraceptives would have limited their use very significantly at least until low cost latex sheaths appeared in the English market in the late 1920s.[19]

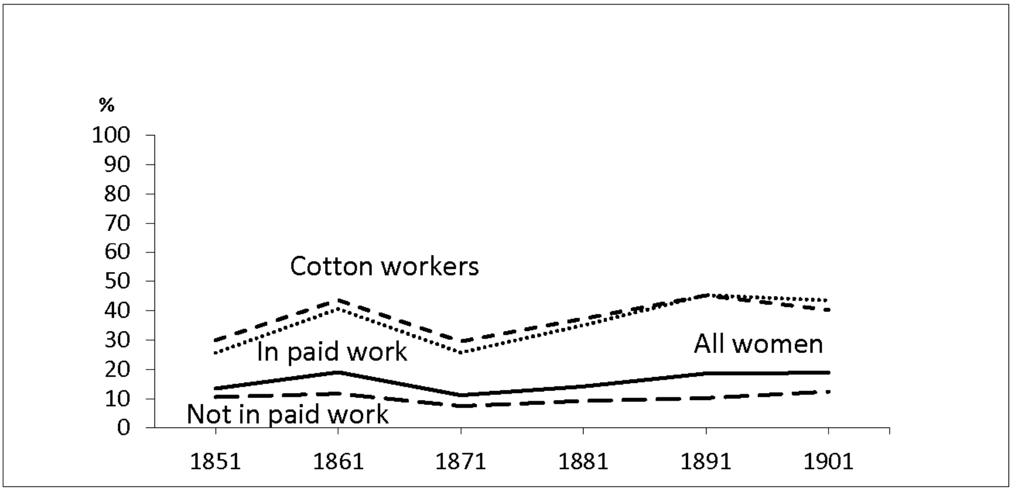
Eilidh Garrett has argued that married women who stayed on at the factories into their

17 V. Fildes, 'Breast feeding practices during industrialisation, 1800–1919', in F. Faulkner (ed.), *Infant and Child Nutrition Worldwide: Issues and Perspectives* (Florida, 1991), pp. 1–20.

18 Boot and Maindonald, 'New estimates', p. 381.

19 A. McClaren, 'Women's work and the regulation of family size: the question of abortion in nineteenth century', *History Workshop*, 4 (1977), pp. 70–81; J. Peel, 'The manufacture and retailing of contraceptives in England', *Population Studies*, 17 (1963), pp. 113–125.

Figure 7 Percentage of married women aged 35–39 years with no co-resident children by work status, Rawtenstall 1851–1901



Source: Census enumerators' books, Rawtenstall 1851–1901 (see Appendix for details).

thirties and forties did so because they had low levels of natural fertility and were married to low status male textile workers who needed the supporting income of a wife to keep in their jobs because they could not find better paying jobs.[20] It is certainly possible that the opportunities for long term employment offered by the textile industries made it possible for sterile and sub-fertile married women to concentrate in the workforce in older age groups and yield the results demonstrated by Garrett. We could not provide a full test this hypothesis for Rawtenstall, however Figure 7 shows that between 30 and 45 per cent of married cotton workers in the 35–39 year age group were living with no co-resident children, compared with around 10 per cent of women who were not in paid work.

Such large numbers, at first glance, might lead us to conclude that this difference confirms Garrett's hypothesis. Nevertheless, factors such as higher infant mortality rates among women cotton workers, long delays in first marriage among female cotton workers after the 1860s, and high earning available to older cotton workers were all strong incentives to return to work once children left home and may have contributed to the high number of older women living without co-resident children. It is also important to remember that, while high levels of sterility would have contributed to the large differences in fertility between women who worked and those who did not, like other variables we have noted, sterility is relatively stable over time and would have made little contribution to the direction and timing of fertility change.[21]

Responsibility for fertility differentials between working and non-working women

20 Garrett, 'Trials of labour', pp. 137–45.
21 Bongaarts and Potter, *Fertility, Biology and Behaviour*, pp. 46–47.

continued to depend on changes in age-specific proportions of women married and age at marriage and choices of individual women, made in response to the changing economic and social incentives, that affected their ideas about when they would marry, how they should rear their children, and increasingly by the 1880s, how many children they should have to secure their standard of living.

None of these features contradicts E.A. Wrigley's view that, up to the end of the 1870s, changes in marital fertility in England were principally due to changes in the age at which women married and the proportions ever married.[22] How do they fit with the twenty years that followed? During those years all married women in Rawtenstall exhibit similar longer delays before marriage, and reduced fertility regardless of their occupation status. Szreter has argued that, at the national level, the downturn in fertility 'does not necessarily signal the emergence of novel ideas and attitudes toward family planning or even widespread uptake of new methods of birth control... traditional methods of abstinence and withdrawal, with some recourse to abortion where these failed were probably the main techniques of birth control within marriage before World War One with strong emphasis on age at marriage and proportions married'.[23]

How then, at a time when real wages were rising, do we account for the sudden onset of declining proportions married, increasing delays in the age at marriage, and declining fertility among women not in paid work, (who accounted for up to 85 per cent of married women in the fertile age group)?[24] For Rawtenstall, the only event of significance between 1881 and 1901 that could have prompted such a change was the decline in overseas demand for the products of its cotton industry. We have seen how that decline, along with technological changes, triggered mill closures and falling male and female employment and earnings, all of which had their own knock on consequences for the economy of the town that lasted into the twentieth century. Following a 25-year period of burgeoning growth and rising prosperity, the advent of a prolonged period of poor employment and stagnating earnings in the town's major industry must have been a severe shock to most families. The Nobel Prize winning economist, Daniel Kahneman, has shown how such shocks cause people to react disproportionately to loss compared with gain.[25] For young unmarried men in Rawtenstall it meant adopting delaying marriage, for young unmarried women it meant postponing marriage, and for those in marriage it meant having fewer mouths to feed. For the 30 years from 1881, cotton workers and other women in paid work in Rawtenstall demonstrated the benefits of controlling fertility by delaying marriage making it easier for their neighbours to respond to the new threats quickly and in positive ways that reduced

22 E.A. Wrigley, 'Population growth, 1680–1820', *REFRESH, Recent Findings of Research and Economic and Social History*, 1 (1985), p. 3.

23 Szreter, *Fertility, Class and Gender in Britain*, pp. 335–50.

24 The issue of what happened to real wages in the last 20 years of the nineteenth century is very complex. For a careful summary see C. Feinstein, 'What really happened to real wages?: trends in wages, prices, and productivity in the United Kingdom, 1880–1913', *Economic History Review*, 43 (1990), pp. 328–55. For the cotton industry see Boot and Maindonald, 'New estimates', p. 404.

25 D. Kahneman, *Thinking, Fast and Slow* (London, 2012), pp. 283–309.

overall marital fertility in the town from 7.96 children in 1881 to 5.46 by 1901. Whilst economists accept Kahneman's hypothesis the more sceptical demographers require empirical evidence.[26] Rawtenstall is but one small case study, but it illustrates the value of one approach by which historical census data could be used to resolve a problem that continues to elude historians of Victorian fertility change.

26 Z. Fu, H.M. Boot, P. Christen and J. Zhou, 'Automatic record linkage of individuals and households in historical census data', *International Journal of Humanities and Arts Computing*, 8 (2014), pp. 204–25.