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A Comment

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Fertility and Economic Change in Eighteenth and Nineteenth Century Europe: A Comment

Nancy Birdsall

In a recent article in *Population and Development Review*, Richard M. Smith attributes English fertility trends in the period 1541 to 1871 to a "highly distinctive process of household formation." He suggests: "Superficially this process would seem susceptible to an economic interpretation." The purpose of this note is to propose that in fact there is a sensible economic interpretation for the sustained rise in fertility in England throughout the eighteenth century and for the subsequent long-term decline throughout the nineteenth century. The interpretation should not be set against the point Smith so appropriately emphasizes, of a particular household formation rule in Europe; it relies on that point. But it goes beyond Smith's discussion in two ways: (1) it explains the continued rise in English fertility through the end of the eighteenth century, despite the fall in the marriage rate and in the real wage, as shown in his Figures 3 and 4 (combined here and reproduced as Figure 1); and (2) it explains the long-run trend of the decline in the nineteenth century (admittedly with fluctuations), despite the sustained increase in real wages throughout that century (see Figure 1).

By an "economic interpretation" is meant simply that the long-run increase and then decline in fertility can be systematically related to changes in the economic environment that induced changes in behavior regarding marriage and fertility. The economic interpretation is set firmly in the framework Smith demonstrates is important—namely, rules of household formation that appear to be impervious (except perhaps in the very long run) to changes in economic conditions. For the period in Europe under consideration, the first rule was that newly married couples set up their own households; the corollary was that marriage did not occur until the couple had a sufficient measure of financial independence to do so. The economic interpretation also relies on the fact that throughout the period the structure of the labor market was changing. Smith shows this factor to be important in rural areas in the pretransitional period, but
FIGURE 1 Gross reproduction rates compared with a real wage index (both 25-year moving averages): England, 1541–1871

SOURCE: Smith, cited in note 1, Figures 3 and 4, p. 601.

does not relate it to industrialization, in retrospect the central economic force in eighteenth and nineteenth century England.

The suggested interpretation also resolves the seeming contradiction Smith alludes to between John Caldwell’s theory of fertility decline and the Marxist view, adapted by Charles Tilly. Caldwell theorizes that “Westernization,” the accompanying emphasis on economic individualism, and the reversal of “wealth flows” to favor children rather than parents bring on fertility decline. Tilly suggests that “proletarianization” of the work force (with Westernization) brings on fertility increases (or at least assures continued high fertility) as the working masses attempt to accumulate the one factor of production they control—labor power. By extending Smith’s analysis into the nineteenth century to take into account the effect of industrialization, and by considering more carefully how the labor market changed within the period of “proletarianization,” the two theories can be shown to fit easily into a simple economic interpretation of marriage and fertility behavior and to explain very well both the eighteenth century increase and the nineteenth century decline in fertility.
**The eighteenth century increase in English population growth**

The positive association between population growth and the stirrings of industrialization in eighteenth-century England is a long-honored one. Kuznets has even defined modern economic growth in the nonindustrialized countries as a sustained increase not only in per capita product but also in population. The rate of growth in the eighteenth century was probably not much higher than parts of Europe had experienced in earlier periods when nature was generous: the twelfth and thirteenth centuries, for example, as well as the sixteenth and early seventeenth centuries. It is exceptional only in retrospect, because we know it was followed not by a subsequent drop in population, but by continuous growth.

Smith’s discussion assumes that the eighteenth century increase in the population growth rate—due, as is now widely believed, not merely to mortality declines but also to an increase in marriage rates and thus in fertility—was part of the pattern of long swings in fertility that occurred for the several preceding “pretransitional” centuries. His contribution lies in showing how the close relation between changes in real wages and subsequent (lagged) changes in marriage rates was a logical consequence of the European household formation rule, the institutional arrangement of agrarian service, and what Lesthaeghe calls “communal risk devolution”—that is, that in England the parish rather than kin took care of the poor.

The question, however, is whether Smith’s emphasis on rural and agricultural labor markets can explain the seeming anomaly that emerges in the latter half of the eighteenth century, of continued increases in the gross reproduction rate at the same time that the real wage declined. This is illustrated in Figure 1, which reproduces the gross reproduction rate as shown in his Figure 3 and the real wage as shown in his Figure 4, for the period 1541 to 1871.

A demographic interpretation of the continuing rise in fertility in the latter half of the eighteenth century despite the fall in real wages is that it was a continuation of the same earlier trend, with the lag between the peak in wages (1741) and the peak in fertility (1816) lengthened by measurement factors associated with changing marriage rates. Wrigley and Schofield, for example, suggest that throughout the entire period, in the absence of conscious fertility control, fertility response to changing economic circumstances could take place only through the timing and incidence of marriage (rather than through immediate response of already-married couples), which would necessitate the lag between the wage and fertility series shown in the figure. The lag in the later period is longer, they propose, because when age at marriage is falling fast, a telescoping effect will increase marriage rates more than the lower marriage age itself would have implied, and similarly increase fertility rates more. They also suggest that rising rates of pregnancy at marriage and of illegitimacy in the late nineteenth century help explain the long period of rising fertility in the face of falling wages.
However, the departure from the previous pattern in the form of persistent high fertility over a long period of falling wages can also be explained by taking into account the economic changes occurring with industrialization—changes that altered permanently the previous long-run swings of population growth. Moreover, the new economic reality helps explain the second reversal, that is, rising wages coincident with falling fertility, that had taken hold by the end of the nineteenth century, signaling the onset of the demographic transition. But first we examine the situation in the late eighteenth century.

**Early industrialization and fertility increase**

**Earlier marriage**

How can the continued rise in fertility in the latter half of the eighteenth century, in the face of declining real wages, be explained? A now-conventional explanation is the rise of rural industry. The opportunity to work in cottage or “putting-out” industries destroyed the tie between marriage and access to a living through work exclusively in agriculture and contributed to lower age at marriage and higher rates of nuptiality (i.e., higher proportions eventually married). It may even have led to higher marital fertility rates, though on this there is much less evidence. This explanation is actually a simple extension of Smith’s own approach, taking more explicitly into account new opportunities for wage work outside of agriculture, in that much of the increase in fertility is attributed to the increased rate of new household formation. In Flanders, where many families supplemented agricultural income by cottage manufacture of linen, the marriage rate responded positively to an increase in the linen/rye price ratio. Chambers argues that labor force growth in England and the rise in fertility (1780 to 1851) were due to the growth of alternative industrial opportunities leading to marriage where impartible inheritance had once restricted marriage. For Nottinghamshire in the first half of the nineteenth century, he finds the highest rates of fertility in the industrial textile areas. Levine uses a time series to show the effects of rural industrialization on increasing rates of marriage throughout the eighteenth century in Shepshed, England, where the stocking industry provided ever-expanding opportunities. Moreover, there is some evidence that in nonindustrial areas where a relatively prosperous smallholder agricultural system maintained its grip on the family (outside of England, where wage labor in agriculture had been prevalent since the sixteenth century), fertility (and presumably marriage rates) did not rise—in these areas Smith’s pretransitional explanation still applied. For example, fertility in the nineteenth century eastern United States remained relatively low (compared with high fertility in the west, where limited access to land was not a factor). Compared with the overall population, the agricultural population of eighteenth century Netherlands increased less rapidly, and had persistently high rates of celibacy. Where alternative employment was limited, the "desire
to acquire, to hold on to, and to accumulate land” is cited as a cause of the preindustrial fertility decline in nineteenth century Austria-Hungary.\textsuperscript{14}

The rise of rural industry explains why a fall in real wages was accompanied, for the first time in eighteenth century England, by a persistent rise in marriage rates and fertility rather than, with some lag, a fall. The effect of changes in agricultural wages and prices on the demand for agrarian service brought out by Smith, though undoubtedly still a factor in agricultural areas, was countered in the aggregate once there were alternative wage opportunities outside of agriculture. Rural industry may not have increased the average income of any one family, but it increased the number of families by affording to more young people the opportunity to set up a household. This effect was presumably even more important where impartible inheritance of land was the rule. In studies relating family structure to economic change in the nineteenth century, several scholars conclude that the single-heir arrangement, with large families but many celibates (thus few families), in aggregate produced lower population growth than the equal division of land, with smaller individual families but more marriages.\textsuperscript{15} The lowest population growth in the Netherlands is recorded for that province (Overijssel) where until 1795 the law dictated impartible inheritance.\textsuperscript{16}

Impartible inheritance over the longer run, however, may have had the effect of easing the transition to a permanent industrial labor force working in factories, since the nonheir siblings in a family would have responded more easily to nonagricultural employment opportunities in cities. Urban factories were less likely to compete successfully with rural industry where division of land was the norm, as in France.\textsuperscript{17} In England, in contrast, the greater prevalence of a single-heir system, the lower proportion of the rural population that owned their own land, and the occurrence of enclosure, reducing even further that proportion, produced low fertility in rural areas but high rates of emigration to industrial regions, where fertility was high. This may provide a partial explanation for the more rapid growth of population in England than in France during the nineteenth century.

The increasing availability of industrial earnings opportunities had two complementary effects: it increased the rate of marriage by opening up income-earning opportunities to more people; and it lowered the age of marriage since industrial workers reach their maximum earnings at an earlier age than agricultural workers. In places such as Flanders and textile regions of England, it encouraged more rapid growth within rural areas. Where an agricultural living was restricted to a small part of the population, industrial regions became areas of immigration and of high fertility.\textsuperscript{18}

The investment value of children

Industrialization in rural areas and later in urban areas introduced another factor that may have contributed to higher fertility rates: higher marital fertility. In cottage industries, children became an asset to the household. There is virtually no evidence of purposeful increases in marital fertility among couples in rural
industrial areas; but couples married earlier were bound to have more children by reason of a longer period of risk. Mendels reports that in Flanders average births within marriage were 4.8 in linen-producing areas, compared with 3.8 in adjacent areas where the soil was more fertile and families were less dependent on domestic industry. Among counties in England in 1851 there was a positive correlation between gross reproduction rates and percentages of children 10–14 years who were employed. Rising rates of illegitimate births and of pregnancy at marriage noted by Wrigley and Schofield also suggest that children were becoming less of an economic burden. Moreover, there is some evidence that when employment opportunities in rural areas eventually declined, as in Shepshed after 1815, there was conscious fertility control to reduce the new burden children posed once they could not work. In a similar vein, Tilly suggests that proletarians always had higher fertility than nonproletarians and that the late eighteenth century rise in natural increase was due both to the increase in the proportion of the population that was proletarian and to their higher rates of natural increase. Although the higher rates of increase (due to fertility, not lower mortality) could be due entirely to lower marriage age, Tilly points out that there are well-documented preindustrial cases of groups whose fertility patterns do not conform to a "natural" fertility regime, but meet the "stringent test of parity-dependence." In short, although we cannot find evidence that couples increased the tempo of reproduction within marriage to provide more labor power in the face of falling wages (this would be what Smith calls the Marxisant view), there is some evidence in pretransitional societies of divergence from a natural fertility regime, and some evidence immediately after the period of rural industrialization that couples limited their fertility within marriage as employment opportunities for children dwindled.

Although children must have worked in agriculture as well, and particularly on family farms, the marginal return to their labor was necessarily restricted by the size of the holding; this was less true in home industry and certainly less true when children began to work in factories. In a quite literal sense, children were thus an investment good during the early industrial period. This was particularly the case in England, where child labor laws (discussed below) restricted the employment of children at a much later stage in industrialization than they did elsewhere.

Furthermore, where parents no longer owned land, children were the most accessible form of investment for the future, when old age would make working impossible. In Preston, a Lancashire cotton town, data pieced together on household structure in the mid-nineteenth century indicate that 80 percent of grandparents lived with their children, suggesting limited alternatives.

In short, the costs of children in this period were undoubtedly comparatively low. Since few attended schools and housing standards were poor, the marginal cost of an additional child would be primarily in food. Yet children could contribute to household income in rural industrial areas, and parents could hope for children's support in their old age.
Female employment

When employable women must give up income to take care of children, children have an opportunity cost. This opportunity cost is measured by potential rather than actual earnings, so that the cost of children to better educated women, whose time is consequently worth more, is higher regardless of whether they actually work. The cost of children rises for a particular mother if the demand for female labor pushes up female wages, again regardless of whether she actually works. In fact, studies of fertility determinants indicate that the husband's income in a family is a good indicator of the positive "income effect" on fertility, and the wife's earnings opportunities a good indicator of the "substitution effect."25

On the other hand, where female employment and child care are compatible, as was true in rural industrial areas where work took place within the home, female employment is unlikely to depress fertility. In fact, under such circumstances, the additional income may permit working mothers to enlarge their families, and large families may draw women into the labor force because of the need to increase family income. In a study of cottage industries in Japan, fertility of women working in cottage industries was significantly higher than that of women who worked away from home, and only slightly lower than that of housewives.26

The situation of many working women in early industrial Europe was undoubtedly similar to that of these Japanese cottage industry workers. Unfortunately it is unlikely that there are household data from the period with information on both occupational status of women and fertility. Aggregate data do indicate that there was a high correlation, by county in England, between the proportion of women in industrial employment and marriage rates.27 Furthermore, among counties with high female employment in 1870, those where domestic industry was still predominant had higher marriage and fertility rates than those where factory industry dominated.28

Migration opportunities

Where industrialization per se did not stimulate fertility, the opportunity to migrate toward industrializing regions may have.29 Rural areas close to the industrializing regions of Lancashire and Warwickshire experienced both high fertility and high rates of outmigration.30 The growth of populations throughout the European continent in the eighteenth and nineteenth centuries, before industrialization, may also have been due to higher fertility among persons aware that their children would not be restricted to employment opportunities in the immediate area. This would be particularly true of regions where land was already fragmentated or where peasants had only a tenuous right to the fruits of their agricultural labor, as in Prussia. It would be less true where land was more equitably distributed and where families had a more reasonable hope of passing a substantial piece of property on to their offspring, as in France. To my knowledge, there is as yet no analysis for different agricultural regions of the relationship between outmigration and fertility.
Later industrialization and fertility decline

The conventional interpretation of "proletarianization" is the shift from self-employment with control over the means of production to wage work for others. In England, much of the agricultural labor force was proletarian by the beginning of the eighteenth century. In late eighteenth century England, and throughout the nineteenth century in much of Europe, however, industrialization led to further proletarianization of the work force. New opportunities for wage work led to lower age at marriage and higher rates of marriage. Better employment opportunities, not only for young men but also for married women and children, may have encouraged higher marital fertility; at the least, they provided no stimulus to lower fertility.

Proletarianization proceeded apace throughout the nineteenth century; but fertility by no means remained high. In England the gross reproduction rate, after peaking in 1816, declined throughout the century, except for the period between the mid-1840s and the 1870s (see Figure 1). How, then, is the long-run decline in fertility in England and later elsewhere in Europe to be explained, and does the decline contradict Tilly's view that wage work causes increased fertility?

An answer lies in consideration of Caldwell's view that a shift in "wealth flows" within families toward children leads to lower fertility. Caldwell asserts that Westernization is the spur to such a shift. In an early statement he defined Westernization as the introduction in non-Western societies of Western ideas, via modern means of communication—for example, the radio—but especially via imported education. More recently he has stated that what is significant for fertility is "whether production is based on the familial organization of labor or whether there is a free and monetized labor market (i.e., capitalist production)." Education remains the centerpiece of his approach, however: "Invariably educated children cost more and give less."3

In the modern world, a wage labor force and an educated one tend to coincide (this is particularly so in Africa, the setting that probably inspired many of Caldwell's ideas on fertility). But in the early stages of industrialization in its first setting, eighteenth century England, this was by no means the case. Unskilled wage work (Tilly's "proletarianization") and the implied change in the relations of production may, other things equal, have induced higher fertility, as Marx expected. As suggested above, in the early stages of industrialization, after all, children were cheap. The cost of children was no higher, and possibly was even lower, than it had been in an agrarian society—lower because future family welfare was no longer tied to the land that might have to be divided, and because children could work, in home industries and later in factories.

The cost of children

Thus, initially the severing of the link between family and income-producing property and the proletarianization of the work force were unaccompanied by
any change in the cost of children (except perhaps a lowering of their cost) and reduced the constraints on marriage and fertility. But by 1820, the costs of children probably were increasing. In England, the Factory Act of 1819, for example, prohibited for the first time the employment of children under nine in textile mills and limited those aged 10–16 to a 12-hour day. Although the Act was probably not well enforced and only applied to about 13 percent of the factory labor force, it engendered considerable public discussion of the child labor issue, and in fact by 1835 less than 0.5 percent of textile employees were children under ten. By 1840 lack of vigorous enforcement may have meant the initial impact of the 1819 legislation had been spent. However, new and much more effective legislation was passed in 1867; the Factory Acts Extension Act and the Workshops Regulation Act extended coverage to workers in all factories, and provided for much more extensive enforcement. Not too much should be made of the fact that the 1819 and the 1867 legislation coincided very closely with renewed declines in fertility; surely the responses of individual parents to such changes in the costs of children would be neither so calculated nor so rapid. The larger point, however, is important: despite rising income, fertility fell throughout much of the nineteenth century, at a time when the costs of children were increasing.

Education

By the latter part of the nineteenth century, moreover, the importance of passing on a new type of “wealth” further raised the cost of children. The new wealth was in human capital; families could best ensure the prosperity of each new generation by providing it with an education adequate for “white-collar work”: government, the military, the professions, or business (with the last category becoming increasingly complicated technologically and organizationally).

In England, the drop in fertility began among the professional middle classes, which felt most keenly the necessity of educating their children (and not in the wealthier landholding class). Banks provides a compelling account of the rising costs of a public school and university education for the Victorian middle-class family, whether the objective was a career in law, medicine, or the military. After 1871, military commissions could no longer be purchased, so that education made passage into the military accessible to more families. In the same period, patronage in the civil service was also abolished. The development of the Public Boarding School system itself could be taken as an indication of how far the middle and upper classes were willing to go in educating their children.

There was also a clear drive during this period for education among the lower middle classes. Although the actual costs of training for clerkships were not large, parents did have to face the prospect of continuing to house, clothe, and feed adolescent sons who in an earlier generation would have been helping to support themselves. Finally, in the period between 1840 and 1870 the number of persons assessed in the middle-income range expanded more rapidly
than the population as a whole. And the Elementary Education Act of 1870, followed by legislation in 1876 prohibiting employment of young children during school hours, and legislation in 1891 making school compulsory, all indirectly increased the cost of children to working-class parents. As education became a more universal requirement for income generation in the twentieth century, the fertility decline spread to other classes.

Much more data will be required on the actual costs of children before the association suggested here can be seriously appraised. It is probably not a coincidence, however, that fertility declined and remained relatively low as the costs of children rose and as the economic benefits of children to parents fell, first with the abolition of child labor and later with the spread of education.

**Type of employment**

The type of industry undoubtedly influenced fertility through its effect on family structure. Evidence cited above regarding the apparent increases in marriage rates and marital fertility in rural industrial areas applied particularly in those areas where entire families could work at home. The rise of factory-based industry changed the structure of the industrial labor force and tended to push fertility downward. A striking indication of this turnaround is Lancashire, where a fertility ratio 'very much above the average in 1821 fell much more than the average in the period 1821-51 at a time when cotton textiles was becoming increasingly a factory industry.'

The removal of industrial work from the home to the factory increased the price parents had to pay for children, since either the mother had to drop out of the labor force or a parent-surrogate, such as a grandparent, had to be supported at home. The negative association between labor force participation of women outside the home and fertility is well established for contemporary societies (although the direction of causality is not); to establish such a relationship for parts of nineteenth century Europe would require analysis of data that include information on occupation of all members of households.

**Urbanization**

Scattered evidence suggests that urbanization, as distinct from industrialization, acted as a fertility depressant, or at least failed to stimulate fertility at a time when the development of industry per se may well have exerted such stimulus. The areas of highest fertility in England were those with more dispersed populations. In the great commercial centers of Europe, such as Paris and London, fertility never rose appreciably from preindustrial levels, in contrast to trends in industrial regions such as the Ruhr. In Flanders fertility was lower in the city of Ghent than in the rural surrounding areas. We can tentatively note that as the later stages of industrialization increased concentrations of people, fertility fell relative to its higher levels in rural industrial areas.
Conclusion

It is true, as Smith shows, that the household formation rule and the peculiar institution of agrarian service in pretransitional England help explain the lagged pattern of fertility as it related to changing wages over several centuries. But by the late eighteenth century an economic explanation, taking into account the new force of industrialization, can clarify why, for a long period in England, fertility and real wages literally went separate ways (fertility up, real wages down); and why, in nineteenth century England (a period for which the question of whether workers' living standards rose or fell is still hotly debated), fertility gradually fell. An economic explanation relies on two critical changes in the labor market that occurred in sequence as the process of industrialization took hold: first, the rapidly increasing opportunities for nonagricultural work; and second, the gradually increasing importance of skills (and thus education) in the work force. Initially, fertility rose with "proletarianization" and the shift to nonagricultural wage labor. But with child labor laws and the rising importance of education, families wishing to preserve their wealth had to raise more costly children, and the secular fertility decline we associate with the European demographic transition took hold.

Notes

This article represents the views of the author, not those of the World Bank. The author is grateful for the comments of an anonymous referee and the comments of Richard Smith on an earlier draft.


5 Mortality also declined, but especially for the latter half of the eighteenth century and early nineteenth century there is evidence that "a rising birth rate was the major cause of the growth of the English population"; J. T. Krause, "Changes in English fertility and mortality, 1781–1850," Economic History Review, 2nd series 11, no. 1 (August 1958): 70.


8 See Franklin F. Mendels, "Proto-industrialization: The first phase of the indu-


10 See David Levine, Family Formation in an Age of Nascent Capitalism (New York: Academic Press, 1977), pp. 58–87. He also shows how demographic trends in Colyton can be related to the rise and fall of rural industry (pp. 103–115).


16 Slicher van Bath, cited in note 12, p. 618.


22 Charles Tilly, "Demographic origins of the European proletariat," University of Michigan, Center for Research on Social Organization Working Paper no. 27, December 1979, pp. 60–64. He cites studies by Andorka, Gaunt, Levine (see note 10), and Wrigley.

23 Michael Anderson, "Family, household and the industrial revolution," in The American Family in Social-Historical Perspective, ed. Michael Gordon (New York: St. Martin’s Press, 1973), p. 66. This is not to say that parish support, as suggested by Smith, was not a substitute for family support in old age, but only that family support must have been preferable.

24 For a formalization of this idea, see R. J. Willis, "A new approach to the economic theory of fertility behavior," Journal of Political Economy 81, no. 2, part 2 (March/April 1973): S14–S64. This is a central tenet of the "new home economics," which explains fertility as the result of utility maximization by parents constrained by a household production function and a full-income constraint, both including time of parents.


in the distribution of the labor force among sectors are inadequate for England before the census of 1851, and after 1851 still tend to be inconsistent. Households were sometimes lumped together, so that disaggregation according to female and child employment is impossible (Deane and Cole, cited in note 18, pp. 138–140).

28 Ogle, cited in note 27.


30 Deane and Cole, cited in note 18, p. 121.

31 Caldwell’s early statement is in “Toward a restatement of demographic transition theory,” cited in note 2. The later emphasis on the change in relations of production is in “The mechanisms of demographic change in historical perspective,” cited in note 2.


33 Branson, cited in note 32, p. 142.


38 Deane and Cole, cited in note 18, Table 30, p. 142: "almost a doubling of the numbers in the trade and commerce group between 1861 and 1891."

39 With widespread education, parents who do not send their children to school must expect their children’s place in the income distribution to be lower.


41 Habakkuk, cited in note 27, p. 44. See also Krause, cited in note 5, pp. 67–68.

42 For a careful consideration of the cost of children and how the shift to earnings-reducing and time-intensive children with economic development raises their costs relative to other commodities, see Peter H. Lindert, "Child costs and economic development," in Population and Economic Change in Developing Countries, ed. Richard A. Easterlin (Chicago: University of Chicago Press, 1980), pp. 5–69. Lindert discusses how his relative cost concept can explain the historical rise and then decline in fertility (p. 62).


44 Wrigley, cited in note 35.

45 Deprez, cited in note 8, p. 627.
No. 269. James R. Follain, Jr., Gill-Chin Lim, and Bertrand Renaud, “Housing Crowding in Developing Countries and Willingness to Pay for Additional Space: The Case of Korea,” *Journal of Development Economics*


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