The Malthusian Intermezzo
Women's work and earnings, and human capital formation between the Late Middle Ages and the Demographic Transition of the 19th century

First draft, please do not quote

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Introduction

There are two happy stories about demographic transition – and there is a problem in between. The first 'happy story' is about the genesis of the European Marriage Pattern in the late Medieval Period: it is, as Tine de Moor and I have tried to demonstrate, a story of women's empowerment, due to the emergence of marriage based on consensus, which was linked to high levels of participation on the labour market, and which created more scope for human capital formation – both for women and for men (De Moor and Van Zanden 2010). It was, in our view, the first step in the switch from quality to quantity of offspring in Western Europe's long term development path, which lay the basis for (amongst others) the gradual building up of human capital that fundamental for long-term economic success of the continent. There is a second 'happy story', the 'demographic transition' occurring in Western Europe in post 1850 (or even post 1870) period, due to the decline in mortality, which was followed, after a certain time-lag, by a similar decline in fertility. This has often been seen as the crucial switch towards 'quality', in which, also, the increased human capital of women may have played a role, but there is still considerable debate about the forces driving the decline of fertility (see for example the discussion in Janssens 2007).

In between these two happy stories, however, there is the rather grim 18th century - or by extension, the 'very long' 18th century which may have started in the 17th century and ended at about 1850 (as 'long centuries' are supposed to do). This is, even in the most prosperous part of Europe, Great Britain, the world of Malthus, in which population growth accelerated, real wages were depressed (in spite of the fact that per capita GDP was rising in the long run) and levels of literacy stagnated. The combination of a 'baby boom' (the term has been introduced by Lindert 1983) and stagnating human capital formation during the 'long'18th century has lead economic historians such as Mokyr (2002) and Allen (2003) to doubt, for example, the importance of human capital in explaining the industrial revolution of these years, and have induced other economic historians to characterize the British economy of that time as being (still) Malthusian, dominated by the growing tension between a rising population and an inelastic supply of foodstuffs (Clark 2007b).

The question therefore is, how to explain 'the Great Conundrum' (Mokyr 1990) of the 'long' 18th century? Why did the first switch from 'quantity to quality' – the rise of the European Marriage Pattern – not lead to the kind of acceleration of economic growth and related deceleration of population growth as is expected by economic theories modeling these processes? Why the Malthusian intermezzo, in which – and that is perhaps its most striking feature – there was a long-term stagnation in human capital formation. At, admittedly, a, by international standards, relatively high level, but this is also exactly the problem: why did the movement

towards more investment in skills and education stop suddenly in this period of, by all other measures, a gradually accelerating pace of economic growth? Why did it take so long before the second phase in the switch from quantity to quality occur?

To find out 'what went wrong' this essay starts with the late Medieval period, and tries to analyse which changes occurred in the position of women on the labour market (which is, as I hope to show, is the most logical starting point for the reconstruction of this story). As Tine de Moor and I have pointed out, the economic position of women in late medieval period was relatively strong, in particular in the North Sea area. In the century and a half after the Black Death, their wages were often comparable to those of unskilled male labourers and employment was booming, thanks to the general scarcity of labour. There are signs however that things began to change during the 16th century, and that the economic position of women came under increased pressure in the centuries before the Industrial Revolution. There are reasons to believe that this was especially the case in England, on which we focus in this essay. There, for reasons that we will explain, structural changes in the agricultural sector lead to a long-term decline of the demand for female labour, which, in combination with the continuing growth of the population – which meant that labour scarcity turned into surplus - resulted in a strong decline of the relative pay of women. Following the argument developed in the Girlpower paper, that there are links between the relative remuneration of women's work, their demographic behaviour (for example, their age of marriage), and investment in human capital (of themselves and their children), I will also try to demonstrate that this had important consequences for the long term development of the economy and society of England in this period (see the theoretical discussion of these links in Mason 1987). Age of marriage declined, for example, and population growth accelerated, and this switch away from 'quality' towards 'quantity' of children also resulted in the stagnation of investment in human capital during this period mentioned already. This all helps to explain the Malthusian intermezzo.

Relative wages of women 1500-1800

Measuring the relative wages of women is a difficult job. We can build on the work of a number of scholars, including Sandy Bardley (1999), John Langdon (2010) and Joyce Burnette (2008), who have, for various period (the High Middle Ages and the 18th and early 19th century) put together a lot of data which point at the same trends that will be identified here. The real problem is to compare like with like: control for the kind of jobs they did, and for the region (and obviously the period) concerned. Moreover, ideally one would even like to abstract from the individual worker who received a certain wage: when he of she was more capable than the 'average' worker, she or he might received a premium which would distort the picture that emerges from the data.

One way to do this is to study wage setting by the courts. From the mid 14th century onwards, the government actively intervened in English labour markets by trying to set maximum wages for all kinds of jobs and professions. This had been introduced in the aftermath of the Black Death as an attempt to protect the interests of the employers – and in particular agricultural employers. In the 1560s the national system of wage regulation was reorganized into a regional one, where the courts of different counties were expected to draft assessments specifying maximum wages (Woodward 1980; Minchington 1972). These assessments have their specific legal and socio-political backgrounds, and probably reflect market condition only rather

indirectly, but I think they can be used to get an impression of what the justices of the courts in various parts of England considered to be a 'normal' wages – or perhaps more specifically, the wage norm (see the contributions to Minchington 1972). Moreover, they are usually very detailed: they distinguish different groups of workers: artisans first class (masters), second class, and apprentices, and different wages for agricultural workers: time wages for mowers, reapers (women and men), haymakers (women and men), labourers in husbandry, and piece wages such as the remuneration for mowing and reaping per acre and for threshing per quarter. The wages are also specified according to the season ('hallowtide-candlemas' and 'candlemas-hallowtide'), and whether or not the employer supplies the food ('with food' or 'finding self').

Beveridge has collected a large number of wage assessments from many different sources, but did not publish them. From his files at the LSE we copied this collection, in order to see what happened to relative wages of women as set by these courts. The total number of wage assessments from this source is almost 100, but not all give full details, and women's wages are missing from many of them. For 53 we can estimates the relative wages of women in reaping, and for 26 in haymaking; these are all spread rather well over the country (17 counties are represented); there is a peak in their number in the 1680s, but for the rest they are more or less equally spread over the 1560-1760 period (the rise and decline of this institution is discussed in Minchington 1972). For a number of counties we can follow the relative wages of women over a long period. In Northampton, female reapers in 1560 were set at 5 d. per day, men at 6 d. which gives a ratio of .83; this declined to .67 in 1673 (the next assessment in the collection), when a man earned 12 d. and a women 8 d.. In Rutland, in 1563, a female haymaker was set at 5 d., and man at 6 d., also implying a .83 ratio; in 1610 this was 5 d. and 8 d. respectively (or a ratio of .63). In Sussex, in 1606, a female reaper was assessed at 8.d, men were set at 10 d. (second sort) and 12 d. (first sort); it is clear from later assessment that all women reapers were considered to be 'second sort' so this would set the ratio at 80%. In 1742 she would be earning 10 d. per day, and a 'second sort' man 18 d., a ratio of .56.

The averages that can be calculated from these sources are presented in Table 1. The trends in reaping and haymaking wages are very consistent: whereas in the late 16th century a ratio of almost 80% was still considered to be 'normal', this consistently declined to 50-55% in the middle decades of the 18th century. The first national wage regulation that set wages for women labourers, that of 1444, was even more favourable than the 16th century wage assessment: the maximum wage of a women labourer 'finding self' was set at 4,5 d., which was even somewhat higher than the maximum wage of 'every other labourer', set at 3,5 d. (the same paradox appears in the category 'with food': for a woman labourer the maximum is then 2,5 d, for every other labourer 2d.). The explanation is probably that female labourers were mainly employed during harvest time, and that the comparable wage is therefore not that of 'every other labourer', but that of the reaper (5 d.) and mower (6 d), which still would imply a wage ratio of 90% or 75%. In 1495 and again in 1514 the same maximum wages were, indicating that the 1444 rules were not an error. John Langdon (2010: 74-75)), who studied women working at medieval building sites, finds a wage ratio ranging from two-third (1290s) to 75% (early 14th century), but also occasionally, levels as high as 80% to 100%. His results confirm that in the late Middle Ages the wage gap was much smaller than in the 18th century (see also Bardsley's (1999: 14) estimate of a wage ratio of 71%). All medieval evidence therefore points to much smaller difference in wage level between women and man than in the 18th and early 19th century.

Table 1

Ratio of wages of women to those of men in reaping and haymaking, according to the wage assessments, 1560/1609-1730/1769

	Reaping	N=	Haymaking	N=
1560-1609	0,76	8	0,79	2
1610-1649	0,67	14	0,69	4
1650-1689	0,65	19	0,68	13
1690-1729	0,58	6	0,55	4
1730-1769	0,54	6	0,49	3
		53		26

Source: dataset wage assessments from Beveridge Files LSE (no. F1)

It would, of course, be even better if we know what wages were actually paid out to women and men. In one of his papers, Greg Clark (2004) estimated the determinants of the long term evolution of nominal wages in England in the very long run.[1] He also measured the degree to which women's wages were lower than those for men, and came to the conclusion that the female dummy before 1560 was much lower than after 1560, which points into the same direction (but unfortunately he did not test this in more detail). Similar evidence for the late 18th and early 19th century has been published by Joyce Burnette (1997; 2008). The agricultural wage data in particular point to a further decline of relative wages of women: between 1760 and 1800 she estimated a wage ratio of about .48, declining to .42 between 1800 and 1840. In 1833 the ratio had fallen even more, to .37 in winter, .38 in summer and .45 in harvest time, suggesting that women's wages declined the most during the slack season, when demand for labour was low (Burnette 2008: 207). Linked to the evidence in Table 1 this would mean that the wage ratio more than halved between the 16th and the 1830s. A similar conclusion can be drawn from data on servants' wages: they decline from 75-95% in the early 17th century to 50-60% in the late 18th century, but the number of observations is quite small here (Burnette 1997: 270).

Burnette's data also make clear that the low wage ratio found for 18th and 19th century agriculture, is more or less representative of the economy as a whole. Her explanation of the high gender gap, which she sees as being caused by the lesser physical strength of women and the resulting lower productivity of their work, can seriously be questioned on the basis of these results. It is unlikely that the relative productivity and the relative strength of women declined (so much) between 1500 and 1800.

The Beveridge collection also contains detailed data on the development of the actual wages paid by Winchester college, a school founded in 1382 (in Winchester, Hampshire), from whose records he collected a large set of wage data. In the late 15th century women who are hired occasionally on jobs such as cleaning and winnowing, earn 2 d., the same as the unspecified, unskilled labourers (probably, given the low level of these wages, food was supplied by the school). In the second half of the 16th century this began to change: wages of male labourers went

[1] Unfortunately, in the published version of the paper, this part of the analysis was not included anymore (Clark 2007a).

up to 3 to 3.5 d., whereas female wages did not move at all (and occasionally were even lower than at the beginning of the century). Between the 1550s and 1590s a wage gap emerged that would even increase during the middle decades of the next century, when female wages were less than 50% of those of males (but the ratio bounced a little back after 1670 – typically there are no female wages anymore on record after 1683).

Table 2
Ratio of female to male wages of unskilled labourers in Winchester college, 1500/09-1680/89

	Men	Women	Ratio
1500/09	-	2,0	
1510/19	2,0	-	
1520/29	-	2,0	
1530/39	-	2,0	
1540/49	2,0	2,0	1,00
1550/59	2,8	-	-
1560/69	3,5	2,0	0,57
1570/79	3,3	2,1	0,64
1580/89	3,2	2,0	0,62
1590/99	3,1	1,4	0,45
1600/09	3,2	-	-
1610/19	6,6	3,8	0,59
1620/29	8,2	4,0	0,49
1630/39	9,0	4,0	0,44
1640/49	8,8	4,0	0,45
1650/59	10,8	4,0	0,37
1660/69	12,0	4,7	0,39
1670/79	12,0	6,0	0,50
1680/89	12,0	8,0	0,67

Source: wage data from Winchester College in Beveridge Collection LSE, no. F8

If these data are representative of the actual development of the wage level, then the divergence between men and women occurred much earlier and much faster than can be established on the basis of wage assessments. Perhaps Winchester is a rather exceptional case: not only the wage parity before 1550 is a bit extraordinary, but also the decline is rather sudden and extreme.

How exceptional was the long term decline of the relative wage of women? We have also tried to reconstruct the development of the gender wage gap for the Netherlands. In the late Middle Ages we find a similar situation: different sources report a wage gap that is very small. In Holland, in the years just before the Black Death, we find a wage gap of 3% for carrying peat, and of 14% for working at the chalk ovens (Hamaker, 1975: 432-34, 440-465). The next observations suggest even smaller differences: in Vollenhove in 1507, women and men received the same wage for carrying peat (Heeringa 1926: 746), and Boschma Aarnouds (2003: 344) reports the same absence of a gender wage gap for Edam in the 1540s. Nederveen Meerkerk (2010) found for 17th century Leiden, that piece wages in spinning were the same for men and women, and that the relative pay of female spinners, thanks to the fact that this was ‘booming business’ during the 1580-1670 period, was almost equal to that of a male craftsman. Wage parity certainly

disappeared in the 18th century: in Zeeland until about 1700, women received the same wage as men for weeding, but this changed in the 18th century, when these wages for men went up, but for women remained the same (Priester 1998: 643). At the beginning of the 19th century relative wages of women in agriculture were about 60% of those of men (Van Zanden 1985: 78-79, 116) – the decline in the Netherlands did therefore occur, but it was smaller than in England, and may have started later as well.

Why did the relative wages of women decline so much?

The large changes in the gender wage gap make it possible to more or less ignore ideas about the 'costumary' nature of female wages – for example, that they are always fixed at a certain level compared to men (see the discussion in Burnette, 2008: 125-135). It also demonstrates that the productivity of women compared to men is at best only one of the factors affecting this ratio: it is, we think, highly unlikely that the relative physical strength or the relative ability to perform certain tasks did actually change so much during is period. We can, however, not exclude the possibility that the physical strength of women did change somewhat. Nicholas and Oxley have documented that the height of English females born in the period 1790-1820 declined, both in absolute terms and relative to those of men, which may have had caused their ability to work to decline as well (but the decline was not huge). This fall in female heights was more rapid in the countryside than in the cities (Nicholas and Oxley 1993: 736). On the other hand, Koepke and Baten (2005) have shown that in their European dataset the relative height of women peaked in the 15th century, suggesting that the late medieval period their strength was relatively strong. The explanation Nicholas and Oxley (1993) offer for the relative decline of female's stature is the decline of their employment opportunities and of their relative wage: they earned less, so their share in consumption also fell, as households concentrated their limited budgets on the adult men who were contributing the largest part of the income (see also Johnson and Nicholas 1995).

Changes in physical strength may have played a role, but probably a limited one, considering the radical change in the pay ratio. What did change the relative bargaining power of women on labour markets in such a dramatic way? Two developments help to explain it. The first one was the fact that women were, in general, a relatively marginal group on the labour market, in the sense that all kind of 'core' activities were carried out by men, and women often had a 'supplementary' role as unskilled helpers, who were particularly in demand during seasonal peaks in the demand for labour – such as during the harvest – but played a less important role during the rest of the year. This marginal position is perhaps best expressed by one of the answers to the question about the employment of women and children of the Report on the Poor Laws from 1834: 'Women and children are not now so much employed as formerly, because labouring men are so plentiful, and their labour so cheap' (the answer is from Selattyn, cited from Cunningham 1990: 135). Similarly, Mate (1999: 28) argues for the Middle Ages that '…it was perfectly natural for women to be recruited in the labour force when the need arose, but in many places they functioned as a reserve pool of labour, to be called upon in times of scarcity, and ignored when supplies of male labour were adequate' (similar quotes in Langdon 2010: 68). In short, men tended to crowd out women on the labour market when supply was abundant, even in the 1830s, when relative wages of women were at a historic depth. The small gender gap that we find in the late medieval period should also been seen in the light of the long period of labour scarcity that began after the Black Death, which improved their relative position, in particular during seasonal peaks in the demand for labour (De Moor and Van Zanden 2010).

A second development that helps to explain the deteriorating bargaining power of women on in particular agricultural labour markets is that as a result of changes in the structure of agriculture, the demand for their labour fell strongly. This is in particular clear from an analysis of the structure of the labor force in the 19th century, when we see the remarkable phenomenon that only a tiny share – less than 4% - of women are employed in agriculture, whereas the share of men working there was still about 31% (Table 3). In other parts of Europe, women continued to be very active in the agricultural labour market. Even in the Netherlands, which also had a highly productive agriculture, the structure of employment of men and women was much more similar, and the share of women engaged in agriculture was still 47% (and 36% for men). In Britain, a number of changes in the structure of agriculture had lead to a rapid decline of the demand for female labour. Enclosures are part of this story: as a result the common lands were divided, which had been an important source of income and work for women and children. As Jane Humphries (1990: 31) concluded: "the growth of wage dependency which accompanied enclosure was not universally perceived as a drawback. The farmers actively welcomed it. Disliking common rights precisely (if not solely) for the independence that they bestowed on labouring families, the farmers opposed the transfer of any functional equivalents into the post-enclosure relations of agricultural production".

This was part of a more general tendency towards large, capital-intensive farms based; the small peasant farms that had still dominated English agriculture in the late medieval period, and which also supplied a lot of work for women and children (as the relative small farms on the Continent did), disappeared in the process…As David Davies wrote in 1795, when men occupied or rented tenements of land " their wives and children too, could formerly, when they wanted work abroad, employ themselves profitably at home; whereas now, few of these are constantly employed, except in harvest" (Cunningham 1990: 124) . Robert Allen (1992) has estimated of the degree to which employment of men and women (and children) changed with the size of farms, point into the same direction: when farm size increases, from for example 0-50 acres to 600-700 acres, the labour input of men (per acre) declines by about 40%, whereas that of women fell by almost 90% and that of boys by about 80%. Whereas on small farms the demand for labour from men and women was about the same, on the really large farms the difference was quite large – the demand for female labor was only 20-30% of that for male labor (Allen 1992: 215). On arable farms these different patterns were very striking, but they did also occur on pastural farms. With the disappearance of the small 'family farm', which had given women and children a constant and stable source of employment at a certain income level, women – partners of wage labourers on the new capital intensive farms – were now without such a source of income and labour, which meant that their 'opportunity costs' went down a lot. As Cunningham (1990) pointed out some time ago, in particular in the predominantly agricultural regions women and children were often un- or underemployed – only industry, where it existed, was an important source of female employment in the countryside.

Enclosures and the disappearance of the small family farms in a way undermined the bargaining power of women and children on the labour market. These changes were fundamental, but they were supplemented by changes in the seasonal demand for labour. Snell (1981) has demonstrated that the seasonal demand for female labour changed strongly in the 18th and early 19th century: their role during the harvest probably diminished, and instead their work became concentrated in spring. These changes lead to a decline in female participation and earning capacity: he demonstrates in detail how this lead to a decline in the relative wages of women, especially in the eastern part of the country (Snell 1981: 420) (confirming other research in this field, as we saw already). The decline of the demand for female labour was mainly concentrated

in the regions specializing on arable farming (in the livestock-farming districts the demand was much more stable). A fundamental change in the technology of the harvest played a large role here: in the late 18th century, the sickle began to be replaced by the scythe and the bagging hook, as Collins (1969) has shown. The sickle was used by both men and women (which is also clear from the fact that the wages of female reapers were still subject to wage setting (Table 2)), but the sickle was the domain of men only, as it required much more hard labour (Snell 1981: 425). The work during harvest time, which had been relatively well paid, declined, as a result, and, of the data published by Snell are correct, the peak in the annual work cycle of women switched to the, often not very well paid work of weeding during Spring (Snell 1981: 428-9).

It has been argued by Crafts (1985: 48-70) that was peculiar about the English Industrial Revolution is that it went together with a rapid decline in agricultural employment, at a much more rapid pace than was 'normal' in the rest of Western Europe. He linked this to the changes in the structure of agriculture, in particular the rise of large, capital intensive (and labour extensive) farms. It was in particular the demand for female labour that suffered, and declined much more than in the rest of Western Europe (where the family farm persisted).

Table 3 Occupational structure of men and women in 1841 compared with tentative estimates for 1522

			primary	secondary	Tertiary
occupational structure	1841	men	30.6%	44.7%	24.7%
		women	3.5%	24.0%	72.5%
		total	23.4%	39.2%	37.4%
	1522	men	70.0%	21.0%	9.0%
		total**	70.0%	21.8%	8.2%

**women work 25% of their time, of which 25% in spinning, 5% tertiary, and 70% agriculture

Source: Broadberry et.al. (2010)

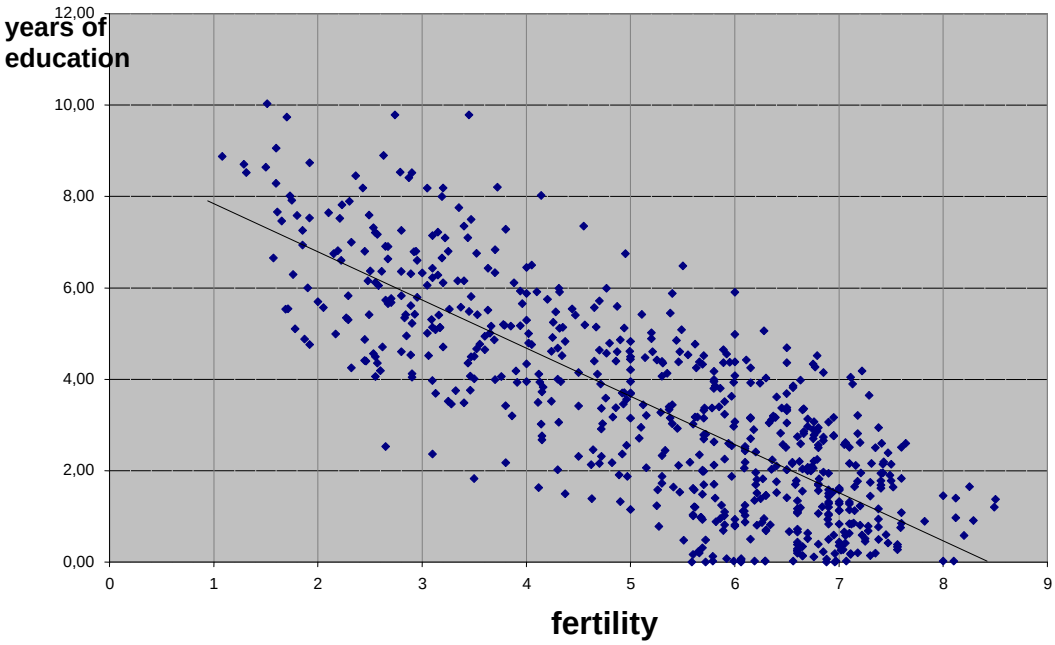
The consequences for population growth

Women's relative wages declined by half during the early modern period as a result of the falling demand for their labour, especially from agriculture, the result of enclosures and the disappearance of the small family farms. In large parts of England, no alternative employment opportunities were available – (proto)industry and services often were too small in scale to compensate for this. But what were the consequences of these changes for demographic behaviour and human capital formation?

It is one of the central ideas of the new demographic economics that has emerged since the pioneering work by Gary Becker and others into the determinants of demographic behaviour, that relative remuneration of men and women play an important role in those decision making processes (Becker 1973; 1991). Marriage is in essence, according to this theory, an act of specialization, and the larger the differences between men and women – in terms of their pay and human capital – the more benefits can be derived from it. Relative remunerations will also affect behaviour within marriage: if the wages of women are relatively high, they will have strong incentives to allocate a large part of their time to wage work, and spend less time on reproductive activities – i.e. getting and raising young children. In recent research this has turned out to be a

very robust relationship, in particular when the expected wage for women is proxied by their level of human capital (Schultz 1997). When women are highly schooled, and are expected to earn a lot of income, their fertility is much lower than for women who have received almost no schooling. Figure 1 illustrates this link for the developing world in the 1950-2000 period: when women did not receive any schooling, their fertility was as high as 5.5 to 8 children, when the average years of schooling is a s high as 8 to 10, their fertility declines to 1 to 3 children. The figure shows, in a way, quite clearly the switch from 'quantity' to 'quality' that plays such an important role in the approach developed by Becker (1973). Economic development would, normally, lead to a movement to the right along the regression line: from low levels of schooling of women and high levels of fertility, to high levels of schooling and low fertility. That it is the level of schooling of women that is crucial, has, amongst others, been demonstrated by T. Paul Schultz (1997), who found that more schooling for women indeed had this strong negative effect on fertility, but that higher levels of human capital formation for men had a contrary effect, and tended to lead to higher 'demand for children' (which is again consistent with the expectations based on the Beckerian model: higher wages for men will lead to more specialization within the household, and more time for women for reproductive activities).

Figure 1 Fertility and average years of school 15 years females



With this knowledge it is now possible to address a puzzle in English demographic history: why did the population began to grow so rapidly during the second half of the 18th century? We will ignore the role mortality plays in this story – which was limited – and concentrate, as Wrigley and Schofield (1981) and Wrigley (1983) have done, on the determinants of fertility and nuptiality. In fact, the demographic acceleration of the post 1750 period was, as Goldstone has argued, caused by a number of changes that began much earlier. Fertility within marriage did not change a lot during the whole 1550-1800 period (Wrigley and Schofield 1981: 254; Wrigley 1983: 131), the most important driving factor was the change in the age of marriage. Wrigley and Schofield have in their seminal study on the English demographic history

of this period stressed the links between real wages and reproductive behavior but, as argued already by Goldstone (1986) and Lindert (1983), this does not appear to explain these changes sufficiently. The mean age of marriage – the key variable in their analysis – shows a consistent decline from (according to one study: Schofield 1985) 26.7 years in 1554/1578 to 22.6 in 1779/1804. According to this study, in every cohort, women (and men) married somewhat earlier than before – only in the first half of the 17th century was this trend interrupted (1616: 25.6 and 1641 26.7). The decline was particularly marked after about 1700, when in one century it was almost 4 years (from 26.4 years in 1691 to 22.6 years in 1791). This is confirmed by later results published by the Cambridge group (which, however, do not include estimates for the marriage ages during the 16th century). During the 17th century marriage ages seem to remain more or less stable, but they decline strongly from the early 1700s onwards, a decline that was driving the 'baby boom' that began in the second half of that century (changes in mortality, not considered here, also played a role). This decline in marriage age was, we believe, the most important change in demographic behaviour in this period. But it is difficult to explain on the basis of the real wage estimates that Wrigley and Schofield used: in the first half of the 18th century, when mean age at first marriage already fell a lot, real wages were going up, in the second half, when they declined – or at best stabilized – the process continued. There does not appear to be a link between the real wages of men and the average age of marriage (it does also not 'work' during the second half of the 16th century, when again the mean age at first marriage declines, but real wages are falling) (see Goldstone 1986 and Lindert 1983 for detailed critiques along these lines).

Two other explanations have been suggested in the literature. On the basis of research into the demographics of proto-industrial villages, it has been suggested that this particular form of family-employment created a strong demand for the labour of (young) children, and therefore lead to a rise in fertility. The fall in the age of marriage may therefore be driven by the rise of proto-industrial activities – by more instead of less employment for women and children (Levine 1977). The problem with this interpretation is that, as already remarked by Smith (1983), the same decline of marriage ages that can be found in proto-industrial villages, is present in agricultural parishes. Goldstone (1986: 24) therefore suggested that it was not proto-industry that mattered, but proletarianization – the growth of a class of wage workers who 'are able to marry at younger ages than traditional labourers'. The latter group 'still probably required a certain period of accumulation before marrying', as a result of which they were sensitive for the fluctuations in real wages. Goldstone assumes that the new proletarians simply do not need the savings to get married – but it is not clear how this works, and why this constraint suddenly disappears for this new class.

I think that these explanations are not entirely convincing because they attempt to explain the behaviour of women (their mean age of marriage) using real wage (and employment) data that only refer to men. The decline of relative wages of women compared to men is a much more convincing explanation of the fall in mean age of first marriage between the 1560s and the 1800s. Firstly, because these processes coincide in time – although the decline in marriage ages is stronger in the 18th century, whereas the decline of relative wages already started well before 1700. Secondly, because the link is suggested by theory: it is exactly what the Becker-model predicts would happen if such a drastic change in relative incomes occurs – the larger the wage gap, the more both partners can profit from specialization within marriage, and the more profitable marriage will be, the earlier it will take place. This does not imply that the female wage rate is driving everything: the link between real wages of both men and women and the possibilities for acquiring the assets necessary for setting up a household, stressed by Hajnal in his seminal paper, and analysed in detail by Wrigley and Schofield (1981), may indeed have

played a role as well. Perhaps the rise if mean age of marriage that occurred during the 16th century may be explained in this way (as suggested in De Moor and Van Zanden 2010). It is, however, much more difficult to explain the strong decline in age of marriage during the 18th century in a similar way, because real wages do not go up (a bit during the first half, but they go down again during the second half), and the general impression is that living standards did not really improve during the Industrial Revolution (as is also clear from the information derived from heights – see Nicholas and Oxley 1993).

The 'baby boom' during the second half of the 18th century was quite exceptional: demographic growth in England was much faster than elsewhere (Wrigley 1983), and, given the poor employment prospects of women and children in in particular the agrarian parts of the country, it lead to the emergence of a 'labour surplus' economy that was so characteristic of industrializing England (Allen 1992). On the one hand the labour input of men increased (Voth 2000), but we do not know what happened to women's labour input - so part of the increase effort by men may be a rational response of the 'family economy' to the growing dispartities in earnings between the sexes.

Human capital formation: a 'failure' of 18th century Britain?

Another striking feature of English industrialization that is in our view linked to these changes, is the 'failure' of human capital formation in this period. This has been diagnosed in a number of ways. Crafts (1985: 63), for example, demonstrated that, when comparing English economic growth with the 'normal' patterns of European industrialization in the 19th century, human capital formation lagged behind enormously – school enrolment ratio's were, perhaps, only a third of the level that other European countries had at similar levels of economic development. The low level of literacy and school enrolment in 19th century England was largely the result of the slow growth of human capital formation during the 'long' 18th century. This has been pointed out by a.o. Mokyr and Allen, and is used by them to argue that human capital formation was not a major source of economic growth or a cause of the Industrial Revolution. And indeed, a lot of evidence points to stagnation in the level of literacy in this period. It is clear from the research into the development of literacy in this period (Stephens 1990; Mitch 1993). A social decomposition of these trends has been given by Stone (1969), who shows that literacy among farmers and craftsmen continued to grow, but that for 'labourers and servants' it stagnated at a level of about 45% (Stone 1969: 109-111) (data for Gloucester and Oxford). Nicholas and Oxley (1993) found in their study of convicts even a decline in literacy among men and women in the late 18th and early 19th centuries. There is also evidence that in the industrializing regions such as Lancashire, where population growth was especially rapid, there was actually a decline in literacy between about 1750 and 1820 (see the discussion in Mitch 1993: 276-280).

There is other information – on the development of book production – that confirms the rather pessimistic view on the 18th century. Estimates of the development of book production in different parts of Europe in the 1454-1800 period have been published elsewhere (Van Zanden 2009: 177-204). At first sight, these show strong growth of British book production and consumption, which expanded much more rapidly than the European average. In the 16th century British output levels were, on a per capita basis, substantially below those of Europe as a whole (but it was also a large importer of books). This changed during the 17th century: already during the first decades of that century, when European output stagnated (in particular in the south of the continent), British production continued to grow, overtaking the European average at about 1620 (given the large margins of error here, not much importance should be attached to the exact date,

but the diverging trends are quite clear). The real 'big boom' occurred during the Civil War of the 1640s, however: production jumped up from 550 in 1639 to more than 4000 in 1642, and it remained on a much higher level during the rest of the century (Figure 3 gives the estimates on a per capita basis). Two factors help to explain this: the royal system of censorship had kept production at an 'artificial' low level before 1641; when it was abolished in that year, it lead to a true revolution in output levels. Moreover, the political struggles of those years, created a huge demand for pamphlets and books about socio-political issues – the political battle was partly fought via the printing press (a pattern that we see occurring in other parts of Europe as well: the Dutch revolt of the 1570s and the French Revolution had similar effects). During the second half of the 17th century the industry continued to expand rapidly, and English levels of book consumption even surpassed those of the Low Countries in these years. This evidence points to a continued expansion of the demand for books in the 1640-1700 period, but surprisingly, as Figure 2 and 3 demonstrate, after about 1700, per capita growth ended, and in the first three quarters of the 18th century, book consumption and production fell both in absolute and relative terms. In 1710 book production still peaked at more than 3110 new editions, but this level was only surpassed after 1774 – for almost 75 years, the industry was in recession. The explanation of this is, on the one hand, the stagnation in the development of literacy in the 18th century, but added to this, the introduction of an Act by Parliament in 1710 to protect intellectual property rights. This lead to the return of monopoly in the printing industry – the London printing industry was 'able to act as an unregulated and unrestrained private commercial monopoly over the whole text-based culture of England, and this is what it proceeded to do' (St. Clair 2004: 93). Prices went up sharply; the price of the cheapest edition of the collected works of Shakespeare, for example, increased from 30 shilling in 1709/10 to 42 shilling in 1733, and 48 shillings in 1747 (St. Clair 2004: 155). Moreover, high book prices must also have discouraged the acquisition of reading skills, further depressing the industry (this was actually an argument used in the debate on these reforms: conservatives were afraid that abolishing the system would lead to a further spread of reading among the population: 'to encourage the poor man to read and think, and thus to become more conscious of his misery, would be to fly in the face of divine intention' was an not unpopular opinion (St. Clair 2004: 109; the quote is from Soame Jenyns and dates from 1757). It was only in 1774 – the year of Adam Smith' Wealth of Nations! - when these regulations were abolished, mainly thanks to a ruling by a Scottish court. Free competition more or less returned in the printing industry as a result. Output reacted directly (Figure 2), and whereas compared to the Low Countries, Sweden en the European average, consumption per capita had declined strongly in the first 75 years of the 18th century, it began to recover again after that year (between 1790 and 1800 it was on par again with the Low Countries, at the same relative level were it had been before 1710) (Figure 3).

Figure 2. Per capita book production in Europe, 1454-1800 (semi-log-scale)

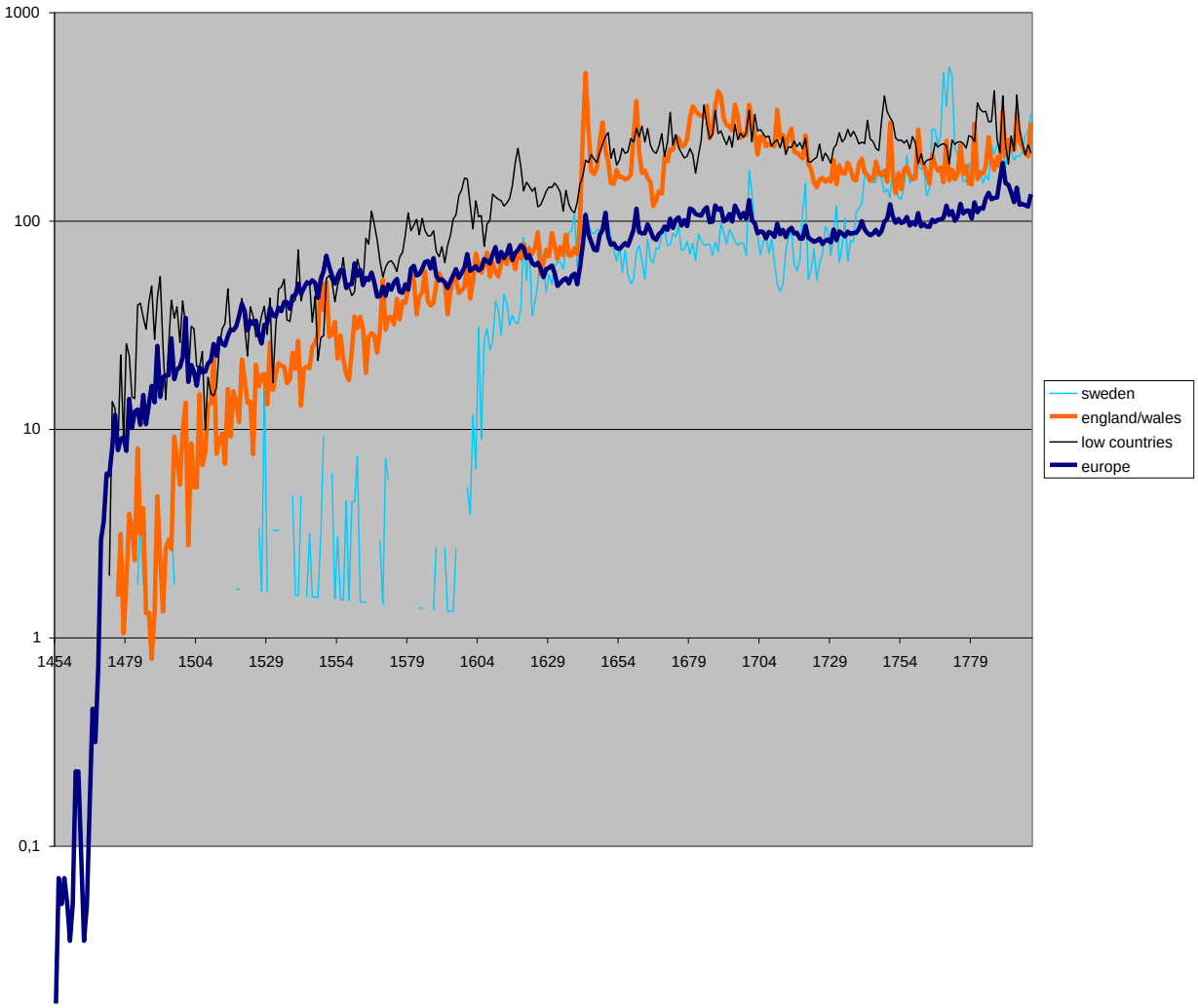
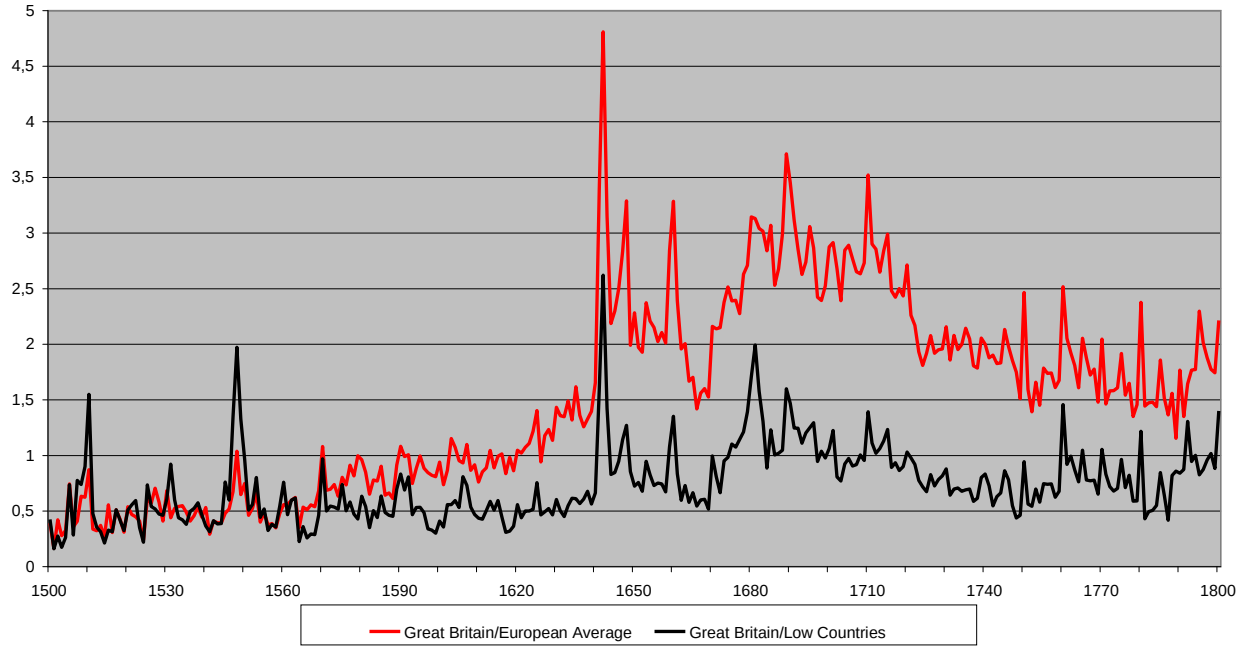


Figure 3. Book production per capita: ratio between Great Britain and Low Countries/Europe as a whole, 1500-1800.



The point of this small digression into the history of book production is that the relative position of England also declined in this respect during the greater part of the 18th century, demonstrating that the demand for books was also not growing rapidly, even more slowly than in the rest of Western Europe. It further confirms the story told here, that human capital formation was stagnating in these years (a fact also known from other evidence, as we saw already). The failure of human capital formation during the 18th and early 19th century is, we argue, intimately linked to the weak economic position of women in this period, which lead to earlier marriage, less time for human capital formation for women, and a switch back to 'quantity' at the expense of 'quality'. Moreover, the educational level of women is not only of crucial importance for their own fertility and their age of marriage (see the paper by Carmichael at this conference), but also for the educational opportunities of their children, and via the 'grandmother effect' on their fertility again (Baizan and Camps 2007; Field and Ambrus 2008). This new literature argues that it is finally women's empowerment that is driving the fertility decline and the rise in human capital during the 'demographic transition'. In early modern England, a combination of socio-economic developments, via undermining of their economic position and halving their relative wage, therefore caused the Malthusian intermezzo

Conclusion

I have tried to offer a new explanation for 'the great conundrum', the 18th century 'baby boom'. First, I stress that it was not only population growth that was 'different' in England, but the stagnation of the rise of literacy and human capital in general, seems to be an anomaly in this period. This 'conundrum' has been explained in the following way:

- that in England the gender wage gap increased a lot during the early modern period, which was caused by:
- the switch from post Black Death labour scarcity to labour surplus – which in particular harmed the economic position of women
- changes in the structure of agriculture, leading to the rise of large-scale, capital intensive and labour extensive farms, which had a very limited demand for female (wage) labour
- for comparative proposes: in the Netherlands a much smaller decline of female wages occurred, but this was more modest due to 1. the absence of fundamental changes in the structure of agriculture – family farms continued to be quite important, and 2. the period of high demand for labour during the 17th century, which may have increased the relative pay of women
- the decline of English wages had important effects on its demographic development; it offers an explanation for the decline of the average age of marriage of in particular women between 1600 and 1800, and the related increase in fertility that occurred in this period – resulting in a much faster rate of population growth after1750 than elsewhere in Western-Europe
- it also helps to explain the stagnation in human capital formation that occurred during the 18th and early 19th century – again a feature peculiar for the English development in these years.

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