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### **Women's wages and human capital formation between the Late Middle Ages and the Demographic Transition of the 19<sup>th</sup> century**

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#### **Abstract**

Why did the European Marriage Pattern that emerged in the North-Sea region in the late Medieval Period not result in a continuous shift from 'quantity' to 'quality'? This paper addresses this question focusing on the changing labour market position of women in England between 1500 and 1800. It is demonstrated that the gender wage gap increased strongly in this period; wages of women working in agriculture fell from about 80% to 40% of the wages of an unskilled labourer. This was probably the result of a decline in the demand for female labour in this period due to changes in the structure of agriculture, and was possibly also related from the movement from a labour scarcity economy in the 15<sup>th</sup> century to a labour surplus economy in 18<sup>th</sup> and early 19<sup>th</sup> century. This decline in female labour participation and in particular in the relative wages earned by women had important consequences for demographic behaviour and investment in human capital of children. It helps to explain the 'baby boom' of the second half of the 18<sup>th</sup> century, and the stagnation in human capital formation that occurred at the same time – in short, it contributes to the understanding of the 'Malthusian intermezzo' of this period.

**Keywords:** Demographic change, European Marriage Pattern, Female wage gap, Female labour participation

**JEL Codes:** J12, J16, N33

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## *Introduction*

There are two happy stories about the 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 2010a). It was, in our view, the first step in the switch from quality to quantity of offspring in Western Europe’s long term development trajectory, which laid the basis for (amongst others) the gradual build up of human capital that was fundamental for the long-term economic success of the region. There is a second ‘happy story’; the ‘demographic transition’ occurred in Western Europe in the post 1850 (or 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 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 18<sup>th</sup> century - or by extension, the ‘very long’ 18<sup>th</sup> century which may have started in the 17<sup>th</sup> century and ended around 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’ (a term introduced by Lindert 1983) and stagnating human capital formation during the ‘long’ 18<sup>th</sup> 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. Other economic historians have characterized 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 2007).

The question therefore is, how to explain ‘the Great Conundrum’ (Mokyr 1990) of the ‘long’ 18<sup>th</sup> century? Why did the first stage in the 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 modelling these

processes? Why this Malthusian intermezzo, in which – and that is perhaps its most striking feature – there was a long-term stagnation in human capital formation? This was stagnation at an, admittedly, 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 for 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, 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 16<sup>th</sup> 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 I focus in this essay. There, structural changes in the agricultural sector led to a long-term decline of the demand for female labour, which, in combination with the continuing growth of the population, meant that labour scarcity turned into surplus, resulted in a strong decline of the relative pay of women. Following the argument developed in the paper by De Moor and I on ‘Girlpower’, which is based on the kind of modelling of demographic behaviour as pioneered by Gary Becker (1973; 1991), 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). During the two periods of demographic transition – the late Middle Ages and the post 1850 period – these links resulted in a change towards ‘quality’ of offspring. During the 18<sup>th</sup> century, however, they worked in the opposite direction. Age of marriage declined, for example, and population growth accelerated, and this switch away from ‘quality’ towards ‘quantity’ of children resulted in the simultaneous stagnation of investment in human capital. This all helps to explain the Malthusian intermezzo.

### *The European Marriage Pattern (EMP)*

To explain why the Malthusian intermezzo is a problem and not the usual state of affairs in the history of Western Europe (as has been argued by Clark 2007), a brief introduction to the demographics of the EMP is required. John Hajnal's famous 1965 paper demonstrated that Western Europe from at least the 16<sup>th</sup> century was characterized by a peculiar demographic system, in which marriage was postponed until the spouses were in their mid or late twenties and in which a relatively large part of the population remained single. In other societies sometimes men married at a relatively advanced age (such was, for example the case in Ancient Greece and Rome) and/or remained single, but that these experiences were shared by women was quite unique. Hajnal was not entirely clear however what the causes of this EMP were, and why it emerged in Western Europe in the late medieval period. The debate about the topic concentrated on the statistical features of the EMP, and less on the factors which explained its emergence, as pointed out by Richard Smith some time ago: 'The search for the European marriage patterns as a "statistical" artefact is intriguing, but it would be unfortunate if, in being so preoccupied with actual ages (...) we failed to detect the wider social structural features that sustained it. Without this, any means of understanding the precise determinants of this unique arrangement will be thwarted' (Smith 1979: 101-102).

Recently Tine De Moor and I have tried to revive the debate about the genesis of the EMP (the present paper is a follow-up of the Girlpower paper we published in 2010). We argue that the essence of the EMP is that marriage is based on consensus of the two partners, who have – without much interference from the family – selected their partner themselves. This helps to explain the large difference with systems of arranged marriage, in which parents have a clear incentive to marry off the girl (and the boy) at an early age (before, for example, they fall in love with a candidate not selected by the parents). Young girls and boys have to enter the marriage market themselves and select a partner that suits them, and some of them may never find such a partner, or stay single voluntarily (which is not a real option in most systems with arranged marriages). We also tried to identify the reasons why such a consensus-based marriage system emerged in Western Europe. This probably started with the preaching of such a doctrine by the Catholic Church, which officially accepted this idea at the Fourth Lateran Council of 1215. The development of a market economy, and in particular the rapidly growing labour market, made it possible for young girls and boys to earn a decent living outside the confines of the household

sphere, which is dominated by the parents. This process was strongly reinforced by the Black Death, which led to an increase in the scarcity of labour resulting in a much higher level of real wages.

The EMP was the result of these changes, but why was it also a first step in the switch from quantity to quality? First of all, marriage was postponed by perhaps as much as ten years (for women from age 12-16 to age 22-30), which limited population growth. Moreover, because in the EMP marriage was neo-local, it became sensitive to economic pressures: the spouses first had to save money to set up a household, which was easier in good times than in bad times. Marriage was therefore postponed further when real wages were low. As a result, population growth tended to decline when times were harsh, possibly leading to a new equilibrium between population and resources. These effects of the EMP on population growth have received most attention in the recent literature – it has been argued that it was a homeostatic regime, which tended to move towards some kind of equilibrium rate of demographic (and economic) growth (Wrigley and Schofield 1981).

There is more to the EMP, however. By postponing marriage it created a different life cycle in which ample room for human capital formation existed. In systems of arranged marriages girls marry at a very early age, and are almost immediately confined to the role of partner and mother, which limits their potential to develop themselves. They usually do not work outside the household, do not get the opportunity to build new networks, and often move to the village of the husband after marriage. This is radically different in the EMP, where most boys and girls worked outside the household of the parents – girls often as servants, boys as apprentices. The EMP is therefore linked to a higher level of (formal and informal) human capital formation, a hypothesis we tested successfully (De Moor and Van Zanden 2010b).

#### *Relative wages of women 1500-1800*

One of the preconditions for the emergence of the EMP was the high labour market participation of women in the late Middle Ages and the relatively high wages they earned. This, however, was probably changing in the early modern period. To establish what happened, it is possible to build on the work of a number of scholars, including Sandy Bardsley (1999), John Langdon (2010) and Joyce Burnette (2008), who have, for various periods (the High Middle Ages and the 18<sup>th</sup> and early 19<sup>th</sup> century) put together a lot of data pointing at the same trends that will be identified

here. The real problem is to compare like with like: how to 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 or she was more capable than the ‘average’ worker, she or he might have 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 14<sup>th</sup> century onwards, the government actively intervened in English labour markets by trying to set maximum wages for all kinds of jobs and activities. This had been introduced in the aftermath of the Black Death as an attempt to protect the interests of the employers, in particular in agriculture. 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 wage assessment concerning 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 the wage norm. 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’) (Minchington 1972).

Beveridge collected a large number of wage assessments from many different sources, but did not publish them. I copied this collection from his files at the LSE, 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 estimate 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' wages 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 woman 8 d.. In Rutland, in 1563, a female haymaker's wage was set at 5 d., and that for men 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 reapers' wage 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 a female reaper 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 16<sup>th</sup> century a ratio of almost 80% was considered to be normal, this consistently declined to 50-55% in the middle decades of the 18<sup>th</sup> century. The first national wage regulation that set wages for women labourers, that of 1444, was even more favourable than the 16<sup>th</sup> 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 set, 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 three quarter (early 14<sup>th</sup> 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 18<sup>th</sup> century (see also Bardsley's (1999: 14)) estimate of a late medieval wage ratio of 71%). All medieval evidence therefore points to much smaller differences in wage levels between women and men than in the 18<sup>th</sup> and early 19<sup>th</sup> 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 knew 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.<sup>1</sup> 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 in the same direction (but unfortunately he did not test this in more detail). Similar evidence for the late 18<sup>th</sup> and early 19<sup>th</sup> 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 16<sup>th</sup> and the 1830s. A similar conclusion can be drawn from data on servants' wages: they declined from 75-95% in the early 17<sup>th</sup> century to 50-60% in the late 18<sup>th</sup> century, but the number of observations is quite small here (Burnette 1997: 270).

<sup>1</sup> Unfortunately, in the published version of the paper, this part of the analysis was omitted (Clark 2007).

Burnette's data also make clear that the low wage ratio found for 18<sup>th</sup> and 19<sup>th</sup> 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 the long-term evidence. This applies to similar explanations of the substantial gender gap at the start of the Industrial Revolution by Goldin (1990), who also points to physical strength as the main explanation. I therefore share the doubts, most clearly expressed by Ogilvie (2003: 7-8) that women's position in pre industrial societies was mainly determined by their 'physical endowments'.

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 15<sup>th</sup> century women who were hired occasionally on jobs such as cleaning and winnowing earned 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 16<sup>th</sup> century this began to change: wages of male labourers went 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) (see Table 2). Between the 1550s and 1590s a wage gap emerged that would increase even more during the middle decades of the next century, when female wages were less than 50% of those of males (but the ratio bounced back a little after 1670). Generally, no female wages are recorded after 1683.

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

	unskilled labourers		
	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. But perhaps Winchester is a rather exceptional case: not only is the wage parity before 1550 a bit extraordinary, but also the decline is rather extreme.

How exceptional was the long term decline of the relative wage of women? I 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). Boschma Aarnouds (2003: 344) reports the same absence of a gender wage gap for Edam in the 1540s. Nederveen Meerkerk (2010) found for 17<sup>th</sup> 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 18<sup>th</sup> century: in Zeeland until about 1700, women received the same wage as men for weeding, but this changed in the 18<sup>th</sup> century, when these wages for men went up, but for women remained the same (Priester 1998: 643). At the beginning of the 19<sup>th</sup> century relative wages of women in agriculture were 60% of those of men (Van Zanden 1985: 78-79, 116) – the decline in the Netherlands did therefore occur, but it was more modest than in England, and may have also started later.

#### *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 ‘customary’ 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 actually changed so much during this 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 15<sup>th</sup> century, suggesting that in the late medieval period they may have been 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, then, 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 be seen in the light of the long period of labour scarcity that began after the Black Death, which improved women's relative position, in particular during seasonal peaks in the demand for labour (De Moor and Van Zanden 2010a).

A second development that helps to explain the deteriorating bargaining power of women, particularly on agricultural labour markets, is that as a result of changes in the structure of this sector, the demand for their labour fell strongly. This is in particular clear from an analysis of the structure of the labour 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 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 agricultural sector, 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) (data for 1849, from Smits et.al. 2000: 112). In Britain, a number of changes in the structure of agriculture had led 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 (Humphries 1990: 31).

This was part of a more general tendency towards large, capital-intensive farms. The peasant farms that had still dominated English agriculture in the late medieval period, which also supplied a lot of work for women and children (as the relatively 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 the degree to which employment of men and women (and children) changed with the size of farms. His results point in the same direction: when farm size increases, from for example 0-50 acres to 600-700 acres, the labour input of men (per acre) declined 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 labour being only 20-30% of that for male labour (Allen 1992: 215). On arable farms these different patterns were very striking, but they did also occur on pastoral 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 lost this source of income and labour. As Cunningham (1990) pointed out some time ago, particularly in 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 substantially in the 18<sup>th</sup> and early 19<sup>th</sup> century: their role during the harvest probably diminished, and instead their work

became concentrated in spring. These changes led to a decline in female participation and earning capacity: he showed in detail how this led 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 in arable farming; in the livestock-farming districts the demand was much more stable. A fundamental change in the technology of the harvest played a significant role here: in the late 18<sup>th</sup> 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; as a result, the wages of female reapers were traditionally subject to wage setting (Table 2); the scythe, however, was the domain of men only because it required much more hard labour (Snell 1981: 425). The work during harvest time, which had been relatively well paid, fell as a result, and, if 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 what 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
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%

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. 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 plays an important role in those decision making processes (Becker 1973; 1991; Galore and Weil 1996). 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. Getting and raising children is a time-consuming activity, in which women have a 'natural' advantage. But time is scarce and therefore costly, and the opportunity costs of women's time – their (relative) wage – therefore determine in the Becker-approach the level of fertility. When 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 (getting and raising children); alternatively, when their relative wages are low, fertility will be high. 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 when women 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 as high as 8 to 10, their fertility declines to 1 to 3 children. The figure shows 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).

With this knowledge it is now possible to address a puzzle in English demographic history: why did population begin to grow so rapidly during the second half of the 18<sup>th</sup> 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 (1986) 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 behaviour 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. In every cohort, women (and men) married somewhat earlier than before – it was only in the first half of the 17<sup>th</sup> century that 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) (Schofield 1985). This is confirmed by later results published by the Cambridge group, which, however, do not include estimates for the marriage ages during the 16<sup>th</sup> century. During the 17<sup>th</sup> 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. This decline of age of marriage was, I 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 18<sup>th</sup> century, when mean age at first marriage was already declining significantly, real wages were going up, in the second half, when real wages 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 also does not ‘work’ during the second half of the 16<sup>th</sup> century, when again the mean age at first marriage declined, but real wages were 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 led 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 also 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 to the fluctuations in real wages. Goldstone (1986) assumes that the new proletarians simply did not need savings to get married – but it is not clear how this works, and why this constraint suddenly disappeared 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 this is a more convincing explanation because these processes coincide in time – although the decline in marriage ages is stronger in the 18<sup>th</sup> 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 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 (1965) in his seminal paper, and analysed in detail by Wrigley and Schofield (1981), may indeed have played a role as well. Perhaps the rise of mean age of marriage that occurred during the 16<sup>th</sup>

century may be explained in this way (as suggested in De Moor and Van Zanden 2010a). It is, however, much more difficult to explain the strong decline in age of marriage during the 18<sup>th</sup> 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 18<sup>th</sup> 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, particularly in the agrarian parts of the country, it led to the emergence of the ‘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 on the other hand we do not know what happened to women’s labour input; part of the increased effort by men may be a rational response of the ‘family economy’ to the growing disparities in earnings between the sexes.

#### *Human capital formation: a ‘failure’ of 18<sup>th</sup> century Britain?*

Another striking feature of English industrialization that is in my 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 19<sup>th</sup> century, human capital formation lagged behind enormously – school enrolment ratio’s were 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 19<sup>th</sup> century England was largely the result of the slow growth of human capital formation during the ‘long’ 18<sup>th</sup> century. This has been pointed out by a.o. Mokyr (2002) and Allen (2003), 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. 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), in their study of convicts, even found a decline in literacy among men and women in the late 18<sup>th</sup> and early 19<sup>th</sup> centuries. There is similar evidence that in the industrializing regions such as Lancashire, where population growth was especially rapid, there was a decline in literacy between about 1750 and 1820 (see the discussion in Mitch 1993: 276-280). The history of book production and book consumption also suggests that, after a very fast growth of demand for books in England in the 16<sup>th</sup> and 17<sup>th</sup> centuries, there was a stagnation in this proxy of human capital during much of the 18<sup>th</sup> century (Van Zanden 2009: 177-204; see also St. Clair 2004).

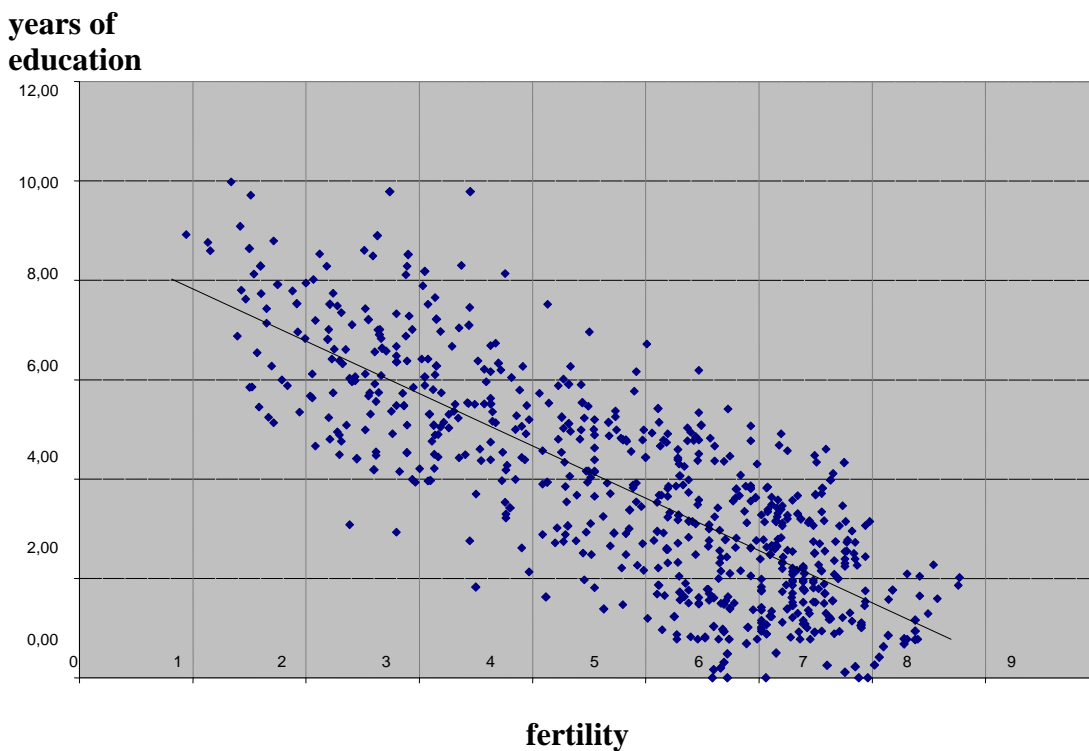
The failure of human capital formation during the 18<sup>th</sup> and early 19<sup>th</sup> century is, I argue, intimately linked to the weak economic position of women in this period, which led to earlier marriage, less time for human capital formation for women, and a switch back to ‘quantity’ at 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, 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 basically women’s empowerment that is driving the fertility decline and the increase in human capital formation during the ‘demographic transition’. In early modern England, a combination of socio-economic developments, via undermining of women’s 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 18<sup>th</sup> century ‘baby boom’. First, I stress that it was not only population growth that was ‘different’ in England, but that the stagnation of the rise of literacy and of human capital in general, also seems to be an anomaly in this period. This ‘conundrum’ has been explained in the following way. It has been demonstrated that in England the gender wage gap increased a lot during the early modern period, which was caused by: (a) the switch from post Black Death labour scarcity to labour surplus, which in particular harmed the economic position of women, and (b) 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. This is also suggested by the fact that on the Continent (in the Netherlands) a much smaller decline of female wages occurred, because there family farms continued to be quite important (additionally, the period of high demand for labour

during the Dutch Golden Age may have increased the relative pay of women (Nederveen Meerkerk 2010)). Moreover, 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 after 1750 than elsewhere in Western-Europe. It also helps to explain the stagnation in human capital formation that occurred during the 18<sup>th</sup> and early 19<sup>th</sup> century, again a feature peculiar to English development in these years. The explanation of ‘the great conundrum’ is therefore intimately linked to the changing position of women on the labour market and within marriage.

**Figure 1: Fertility and average years of school 15 years females**



Database as put together by Schultz 1997.

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