

The new views on demographic transition: a reassessment of Malthus's and Marx's approach to population*

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1. Introduction

In the nineteenth century, the debate between Marx and Malthus regarding population and wages focused not only on concepts and beliefs, but also on economic policy regarding the poor, which elicited harsh statements from Marx against Malthus. Malthus's 'general laws of nature' has been perceived by Marx as a 'sell-out' to the bourgeois: 'This baboon thereby implies that the *increase of humanity* is a purely natural process, which requires *external restraints, checks* to prevent it from proceeding in geometrical progression' (Marx 1973: 606).

The age-old debate and opposition of ideas between Marx and Malthus has been projected on to the development of recent theories on 'demographic transition'. In particular, demographic transition and Malthusian growth have been the focus of interest among scholars doing research on the theory of growth over the past decade. Studies that have explicitly related demographic transition and growth are Becker *et al.* (1990), Galor and Weil (1996, 2000), and Dahan and Tsiddon (1998). These models incorporate altruism and human capital, and are based on Malthus's theory regarding fertility rate and economic development. However, while these models have in common with Malthus their assumptions about the economics of the family, *i.e.* that parents derive utility from having more children, they are different regarding their assumptions about the economy as a whole. Malthus's views are based on the assumption of decreasing returns to scale, whereas the New Growth Theory assumes that the economy displays increasing returns to scale.

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Recently, an alternate approach has been developed, which focused on additional factors that may explain demographic transition. Brezis (2001) shows that the interaction between different social classes can be an alternative means by which to understand the demographic transition that took place in the nineteenth century. More specifically, social classes, child labour and capital (instead of altruism and human capital) may provide an explanation for the observed patterns of fertility rates and their relationship to industrialization. Brezis's model is based on Marx's views regarding child labour and the family, and fits Marx's descriptive writings of the period, wherein the main elements of economic and social behaviour at the time were social classes, capital and the labour market.

The purpose of this paper is to focus on the various elements presented by Marx and Malthus, and to show that their divergence of views leads today to two different ways of modelling demographic transition. This paper will examine the divergence of views of these two thinkers regarding the family and the labour market, and the differences in the present-day modelling process, which is linked to the specific differences in perception of the two thinkers regarding the place of children in the family over time.

For Marx, children were considered a necessity for survival; they were an *investment/production* good. More precisely, the Marxian view suggests that the 'proletarianization' of the workforce (a term coined by Tilly) brings on a fertility increase, since the working masses attempt to accumulate the one factor of production over which they do have control: labour power.¹ In contrast to this view, Malthus and the work based on his theory perceived children as a *consumption* good. This view is a consequence of *the laws of nature*, an approach on which models of fertility (starting with the works of Becker 1960, 1988, 1990) have based altruism.

In this paper, we will analyse the debate between these two lines of reasoning by means of a formal model that differentiates between the two views. In sections 2 and 3 of the paper, we present Malthus's and Marx's views respectively. In section 4, we present the alternate models that derive from their respective views. In section 5, we present some historical facts, and in section 6 we provide some conclusions regarding the efficacy of the alternative models as explanations of the historical data presented in the paper.

2. Malthus's principles

Before describing the views of Malthus (1766–1834), one must recall that he held what was in effect the first Chair of Political Economy in England (at Haileybury) to which he was appointed due to his insights on questions

of mortality, fertility and population increase. Furthermore, his work on the principle of population also gave rise to the entire field of demography. However, his point of view on wages and the Poor Law and his ideas regarding human nature are somewhat more problematic.

2.1 Malthus's view on the principle of population

Malthus's demographic theory regarding the relationship between fertility and the mortality rate is based on his basic philosophy regarding human beings, which he termed 'the general laws of nature'. His view of population derives from the assumption that human behaviour is driven by nature and men will have as many children as nature gives them the possibility of sustaining. Malthus maintained that 'There is no reason whatever to suppose that anything besides the difficulty of procuring in adequate plenty the necessaries of life should either indispose this greater number of persons to marry early or disable them from rearing in health the largest families' (Malthus 1970: 243). His theory on population can be summarized as follows:

Since population tends to press to the limit of available subsistence; since the power of production is beyond all comparison weaker than the power of reproduction; and since the equilibrium between population and resources can be maintained only by the constant operation of various checks, all of which are kind of either vice or misery, then population will always grow until there is enough misery or enough vice or more likely a sufficient mixture of both to achieve equilibrium.

(Flew 1970: 47)

In other words, since population, if not 'checked', will increase by more than food production, a disequilibrium will arise. When the population of a nation reaches the limit of its food production possibilities, there are only two ways to maintain equilibrium: positive checks or preventive checks, or both. The preventive checks are defined as all actions that reduce the fertility rate (late marriage, birth control), while the positive checks are those that increase the mortality rate (war and epidemics). If a country reduces the preventive checks (i.e. more marriage), in consequence the positive checks will increase (higher mortality) and vice-versa: 'If the positive checks to population had been unusually small, the preventive checks must have been unusually great' (Malthus 1970: 261).

For Malthus, these checks can be also divided into three different 'ideological' categories: the checks of *vice*, of *misery*; and of *moral restraint*. The positive checks are of two ideological categories, either of misery (war, epidemic), or vice (abortion, infanticide), while the preventive checks are either of vice (birth control, since Malthus was opposed to it

and saw birth control as a vice), or through moral restraint, i.e. postponing marriage.

However, we cannot disregard the fact that Malthus's views contain on the one hand, a side that is purely theory-based, yet concomitantly, on the other hand, a side that is based on his own moral values. For Malthus, the only way of keeping population in equilibrium with the means of subsistence, and which is perfectly consistent with virtue and happiness, is 'moral restraint'. As he put it 'Moral restraint is the only mode of keeping population on a level with the means of subsistence which is perfectly consistent with virtue and happiness' (ibid.: 250).

2.2 Malthus's views on wages

As a corollary to his views on moral restraint for the workers, i.e. 'the poor', Malthus presented a theory regarding wages, unemployment and fertility that has as its basis not only the 'iron laws of wages', but also an ostensible contempt for the poor that is translated into his view against higher real wages. His position is that an increase in the real wages of workers (or in transfers) would not be good since it would:

- (1) Reduce their supply of labor, since higher real wages would permit them to attain subsistence level with less work. This, in his view, would lead to idleness.
- (2) Increase the demand for bread and meat, leading to a price increase, but not to an increase in the quantity purchased or supplied. In his words (ibid.: 94–8):

Suppose that by a subscription of the rich, the 18 pence a day which men earn now was made up 5 shillings, it might be imagined that they would than be able to live comfortably and have a piece of meat every day for their dinners. But this would be a false conclusion... The transfer of 3 shillings and 6 pence a day would not increase the quantity of meat in the country... It would make every man able to indulge himself in many hours or days of leisure... and in a short time not only the nation would be poorer but the lower classes themselves would be much more distressed than when they received only 18 pence a day... I feel no doubt whatever that the parish laws of England have contributed to raise the price of provision and to lower the real price of labour.

- (3) Increase the fertility rate and encourage marriage. Since, according to Malthus, the 'laws of nature' dictate that workers will have as many children as possible, higher real wages will lead to an increase in population. Therefore Malthus claimed that 'The poor laws of England tend to depress the general conditions of the poor... Their

first tendency is to increase population without increasing the food for its support. A poor man may marry with little or no prospect of being able to support a family' (ibid.: 97).²

Malthus's overall theory led him to express strong political opinions regarding the poor laws: 'The evil is perhaps gone too far to be remedied, but I feel little doubt in my own mind that if the Poor Laws had never existed... the aggregate mass of happiness among the common people would have been much greater than it is at present' (ibid.: 101).

3. Marx's views

The debate between Malthus and Marx was not only a polite debate over theories; both Engels and Marx attacked Malthus virulently. Their strident reactions included calling him 'a shameless sycophant of the ruling classes' who 'was in fact plagiarist by profession' (Marx 1969:120) and for whom 'utter baseness is a distinctive trait'. (ibid.: 117). Or even 'Malthus, this wretch' (ibid.: 118). Malthus's views on the 'poor' and more specifically the Poor Laws led them to write: 'The hatred of the English working classes for Malthus was thus fully justified and the people's instinct was correct here, in that they felt he was no man of science, but a bought advocate of their opponents. He falsifies science for these interests' (ibid.:120)

3.1 Marx's views on the general principle of population

In order to understand the differences in their conceptions of demographic development, one must focus on the difference between the Marxian and the Malthusian concepts of human nature. As shown above, the main assumption of Malthus's theory is that the decisions of men are driven by nature. This was not the case for Marx and Engels: 'Marx and Engels did not contend that human reproduction was simply a function of the sex drive and the high birth rate of the laboring class was due to their inability to control this passion' (Wiltgen 1981: 111). For Marx, man *controls* nature:

Man therefore is able to control nature consciously and make his own history. It is this ability that allows him to produce beyond subsistence and which guarantees that he will not have subjected to the dilemma that Malthus has described... According to Marx and Engels, man was the only form of life which could master nature.

(ibid.: 109)

In the view of Marx and Engels, decisions about fertility are related to the modes of production: 'In fact every special historic mode of production has its own special laws of population, historically valid within its limits alone'. (Marx 1976: 784). Since the decisions about fertility are related to the modes of production, there should be a difference in family decisions between the social classes – the bourgeois and the proletariat.

3.2 Marx's view on the children of the bourgeoisie

Regarding the bourgeoisie, children are a means for continuing the family business: 'On what foundation is the present family, the bourgeois family based? On capital, on private gain' (Marx and Engels 1955: 27). In other words, the capitalistic orientation of the bourgeoisie will determine the optimal number of children that are the legal heirs of the business.

3.3 Marx's view on the children of the proletariat

For the proletariat, a social class without property, '...his [the worker's] relation to his wife and children has no longer anything to do with bourgeois family relations' (ibid.: 21). Instead, it is formed by the dependence of all on the family's wage labour. Indeed, 'Individual workers, millions of workers do not get enough to be able to exist and reproduce themselves' (Marx 1978: 206). There is a need for the work of children in order to ensure the family's survival: 'All family ties among the proletarians are torn asunder, and their children transformed into simple articles of commerce and instruments of labour' (Marx and Engels 1955: 28). As expressed by Marx: 'In order that the family may live, four people must now not only labour, but expend surplus labor for the capitalist... Previously, the workman sold his own labor power, which he disposed of nominally as a free agent. Now he sells wife and child. He has become a slave dealer' (Marx 1967: 395).

Regarding the relationship between real wages and population changes, Marx rejected the Ricardian and Malthusian 'iron law of wages', which held that an increase in population must drive real wages to a minimum regardless of the form of social organization, instead asserting that the problem originated on the supply side.³

Marx makes no explicit remarks regarding the optimal number of children from the point of view of the worker. However, he wrote that the relationship between the size of the family and the level of real wages can be the inverse of that denoted by Malthus. Marx claimed that family size is inversely related to real wages. As he wrote, 'In fact... the absolute size of

the families stands in inverse proportion to the height of wages' (Marx 1976: 796–7), and in the footnote on this sentence, Marx quoted Laing: 'Misery up to the extreme point of famine and pestilence, instead of checking, tends to increase population' (ibid.: 797).

4. Malthusian and Marxian models of family and fertility

Despite the differences in the views of Malthus and Marx regarding family, they still share some common points in the way in which they analysed family structure. For both, the overall decisions of the individual regarding restraining reproductive power are related to economics: fertility rates are affected by income. As the Malthusian theory has been integrated into models for some time now, while the Marxian view on population has been integrated only recently, we will therefore only briefly present the well-known Malthusian modelling approach, while discussing the Marxian one in more detail.

4.1 Malthusian models of fertility

The Malthusian model of fertility rates has been developed by Becker in a series of papers on fertility, and more recently by Galor and Weil.⁴ The Malthusian laws of nature are incorporated into these models by assuming that the number of children enters in a positive way into the utility function. Indeed, Becker considers his line of reasoning to be a continuation of that of Malthus when including the fertility rate in the utility function:

'Malthus' famous discussion was built upon a strongly economic framework; mine can be viewed as a generalization and development of his... For most parents, children are a source of satisfaction... Children would be considered a consumption good... I will try to show that the theory of demand for consumer durables is a useful framework in analyzing the demand for children.

(Becker 1960: 209–11)

Later, Becker's models incorporated altruism instead of the notion of consumption goods: 'Our model is based on the assumption that parents are altruistic toward their children... Parents are altruistic toward children in the sense that the utility of parents depends positively on the utility of their children' (Becker 1988: 2–3).

However, the use of the term 'altruism' here is somehow problematic, since if one has altruistic feelings, then they should include not only one's own children, but also extend to those of others. Therefore, the

way to interpret the notion of altruism toward children is to adopt, as Becker (1960) does, the laws of nature of Malthus. In other words, altruism toward children is not pure altruism *per se*, i.e. giving for an *alter huic*, but it is only giving to ensure the natural continuation of ourselves (an argument which is clearly underlined in Galor and Weil 2000). The utility function of an individual that is maximized is therefore:

$$U_0 = v(C_0, n_0) + a(n_0)n_0 \cdot U_1. \quad [1]$$

where U_0 is the utility function of an adult, C_0 is its consumption, n_0 is the number of children, and U_1 is the utility function of each of that adult's children. This utility function assumes that the utility of each person depends on his own consumption, number of children, and own utility of the child. The first term represents the utility of the adult itself, which is a function of his consumption and number of children (this last term is removed from all of the models for the sake of simplicity). The second term represents the fact of caring about children, and $a(n_0)$ represents the degree of altruism.

Galor and Weil (2000) offer a specification slightly different from that of Becker:

$$U_0 = v(C_0, n_0 z_1) = c_0^{1-\gamma} (n_0 w_1 h_1)^\gamma. \quad [2]$$

In their model, the individual does not care about the consumption of his heirs, but rather about their income (z_1), which is equal to the wage per efficiency unit of labour (w_1) multiplied by the level of human capital of each child (h_1).⁵

The budget constraint in these models is quite usual, where the costs of having and raising children are introduced. Since children are a consumption good (they enter the utility function in a positive way), the outcome of these models is that when income increases, *ceteris paribus*, the fertility rate will also increase.

In order to describe the overall dynamics of demographic transition that took place in the nineteenth century, these models also incorporate human capital. These models display a richer dynamics which is due to a tradeoff between quantity and quality of children. In the first phase of their model, due to an increase in income, the fertility rate increases. The decrease in fertility that takes place later on is due to the fact that when education is needed, agents prefer to have fewer children who are educated, rather than more uneducated children.

4.2 A Marxian model of fertility

The way to model Marx's views on population is to distinguish the utility function of the workers from that of the bourgeoisie, as was done by Brezis (2001).⁶

4.2.1 *The bourgeoisie*

The utility function A possible Marxian way to model the fertility decision of the bourgeoisie during the nineteenth century would be to emphasize that for this class, family size is based on the family business. The business elite was concerned about the family business and had an interest in the continuation of the familial enterprise, or as summed up by Crouzet (1999: 47): 'Many dynasties have disappeared, because of a lack of offspring'. In other words, the elite care about having a dynasty, and do not necessarily think about the well-being of their offspring, but rather about the continuation of what they have developed – that is to say, their firm.⁷

It is the uncertainty of survival of the firm that influenced the family's decision regarding number of children. Mortality remained high during the nineteenth century, and the survival of the firm was a function of the number of children the business elite had; so that the higher the number of children in a family, the higher the probability of that family's firm's survival.

Indeed, data show that the fertility rate among the business elite was very high. Examples of prominent British industrialists who had large families were Sir John Guest (10 children), William Crawshay (14), and Henry Overton Wills (18). In Alsace, France, the Koechlings had 14 children, and the average number of children for the families of the business elite in northern France engaged in the textile industry was more than 10. As Crouzet (1999: 47) points out: 'Large families were not only a guarantee against early deaths, they allowed the appointment of the most able sons.' Family firms based on families without many children usually did not survive. For instance, the André and the Schneider dynasties disappeared because of the small number of children (three) who died leaving no offspring.⁸

This model therefore incorporates uncertainty about the survival of the firm. Denoting p , as the probability of survival of the firm, we assume that:

$$p = p(n^b) \quad \text{where } p' > 0 \text{ and } p'' < 0. \quad [3]$$

where n^b is the number of children per family in the business elite.

The utility function of the bourgeois is a function of consumption, C_t , and the incremental value of the firm, which is a function of the savings of

the entrepreneur, S_t . Assuming an additive function with the same weight on each argument, we get:

$$U_t = U(C_t, S_t) = U(C_t) + U(S_t). \quad [4]$$

The value of the firm is not known with certainty, since it depends on whether the dynasty has offspring. Therefore the business elite maximizes an expected utility. When it has children who can take over the firm, the utility of the savings is $U(S)$. But when there are no children, savings are lost and we obtain $U(S) = 0$. Assuming a log function, we therefore obtain that expected utility is:⁹

$$\begin{aligned} EU &= p[U(C_t) + U(S_t)] + (1 - p)[U(C_t)] = \\ &U(C_t) + p(n_t^b)U(S_t) = \ln(C_t) + p(n_t^b)\ln(S_t) \end{aligned} \quad [4']$$

Timing and budget constraint We assume that each generation lives for one period. The income of the entrepreneur is the rents that he receives on inherited capital, $r_t K_t$. He divides his income between his own consumption, the consumption of his children, and savings, S_t :

$$r_t K_t = \tilde{C}_t + S_t. \quad [5]$$

where \tilde{C}_t includes his own consumption and that of his children.¹⁰ A share λ of this total consumption C_t goes to his own consumption and a share $(1-\lambda)$ goes to the children. We assume that the children's consumption increases as a function of the number of children, i.e. the $\lambda(n_t^b)$ function is negatively sloped, so that the higher the number of children, the lower the entrepreneur's own consumption. We also assume that the function is convex. A simple form for this function is to choose an exponential form: $\lambda = e^{-n}$.

Substituting in equation [4'], we obtain that the entrepreneur chooses his savings and the number of his children so as to maximize:

$$\ln[(r_t K_t - S_t)\lambda(n_t^b)] + p(n_t^b)\ln(S_t). \quad [6]$$

Let us note that this utility function is similar to the one based on Malthus's view. While the assumptions regarding *human behaviour* are *different* in Marxian and Malthusian models, *economic behaviour* in *both* is *similar for the bourgeois*.

The first-order conditions, shown in equations (7) and (8), determine the amount of savings, consumption, and number of children chosen by the entrepreneur:

$$S_t = [p(n_t^b)/(1 + p(n_t^b))]r_tK_t = P(n_t^b)r_tK_t \quad P = p/(1 + p) \quad P' \geq 0 \quad P'' < 0. \quad [7]$$

$$-\lambda'(n_t^b)/\lambda(n_t^b) = p'(n_t^b)\ln(Pr_tK_t). \quad [8]$$

Equation (7) indicates that savings are a linear function of rents (r_tK_t). The right-hand side of equation (8) is downward-sloping,¹¹ while the left-hand side is upward sloping (and in the case where the λ function takes an exponential form, it is linear).¹² Consequently, there is a unique solution of the number of children, shown in Figure 1.

An increase in the capital stock (K_t) implies that the upward-sloping curve moves to the right, which leads to an increase in the optimal number of children. Thus, in this model, the economic behaviour of the business elite is similar to that in a Malthusian one: When income increases (i.e., rents), the fertility rate of the elite increases.

4.2.2 *The proletariat*

As we have shown above, Marx stated that during industrialization, there is a proletarianization of the workforce. Since the wage of one person was not enough for subsistence, having children work brought about an increase in family income. The way to model this is to assume that the utility function

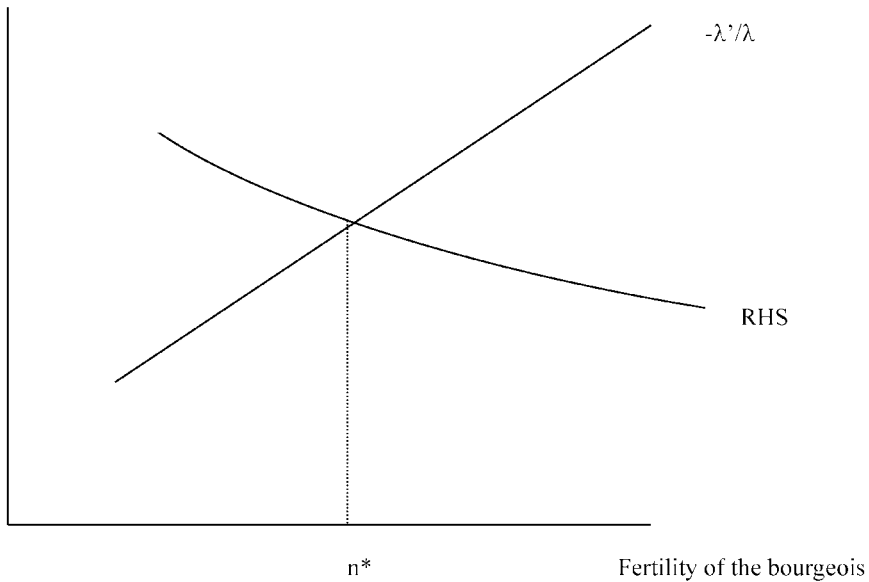


Figure 1 The optimal number of children of the bourgeoisie

of the proletariat is not inherently different from that of the business elite, since they are not ‘different beings’, yet their economic situations *are* different. At their level of income, proletarian workers do not save at all. Moreover, real wages were below subsistence level, i.e. $\bar{C} > w$, so that in contrast to the bourgeois, the workers are constrained in their consumption. Therefore, for simplicity’s sake, the utility function of the worker displayed in this model is slightly different from that of the business elite.¹³ In each period, workers choose to maximize a utility that is a function of their own consumption and the number of children that they raise:

$$U = U(C, n) \quad \text{and} \quad U_1 \geq 0, U_2 \leq 0. \quad [9]$$

In contrast to Malthus, who assumes that nature leads human beings to want as many children as possible, Marx did not believe this, which means that children do not directly influence the utility function in the Marxian model. However there is still the suffering of parents who see that their children have to work hard, that is to say, there is an indirect influence due to the fact that parents would prefer that their children not work, but have no choice. In their *Communist Manifesto*, Marx and Engels appealed for the abolition of child labour in factories. Undoubtedly, child labour should be perceived in a Marxian model in a negative way. We therefore assume that $U_2 < 0$.

The budget constraint of the family in each period is:

$$C + l(n^w) = w + wn^w \quad [9']$$

$$\text{and } C \geq \bar{C}. \quad [9'']$$

\bar{C} is the subsistence level of consumption for an adult, n^w is the number of children that the worker has, and $l(n^w)$ is the consumption of children. We assume that $l(n^w)$ is upward-sloping and concave ($l' > 0$ and $l'' < 0$). The constraint in equation (9'') means that consumption cannot be lower than the subsistence level of consumption.

On the right-hand side of equation (9'), we have family income. This includes the worker’s wages as well as children’s wages. Children’s wages were, in reality, lower than wages of adults (about half in the textile industry), but in order to simplify the model, we take all wages as equal. On the left-hand side, we have the outlays, i.e. the worker’s consumption, as well as his children’s consumption.

The top part of Figure 2 represents the utility function as a function of the number of children n , by substituting consumption from the budget constraint (9'). However, the wage rate is so low that at the maximum of the utility function, consumption is lower than the subsistence level. Therefore, equation (9'') is binding, and the number of children is such that:

$$w + wn^{w*} - l(n^{w*}) = \bar{C}, \quad [10]$$

as shown in the lower part of Figure 2. The optimum number of children is therefore higher than the non-binding optimum.

When wages increase (a shift to the left of the straight line in Figure 2), the constraint is reduced, and therefore the fertility rate decreases. This negative relationship can be also shown algebraically in equation (11):

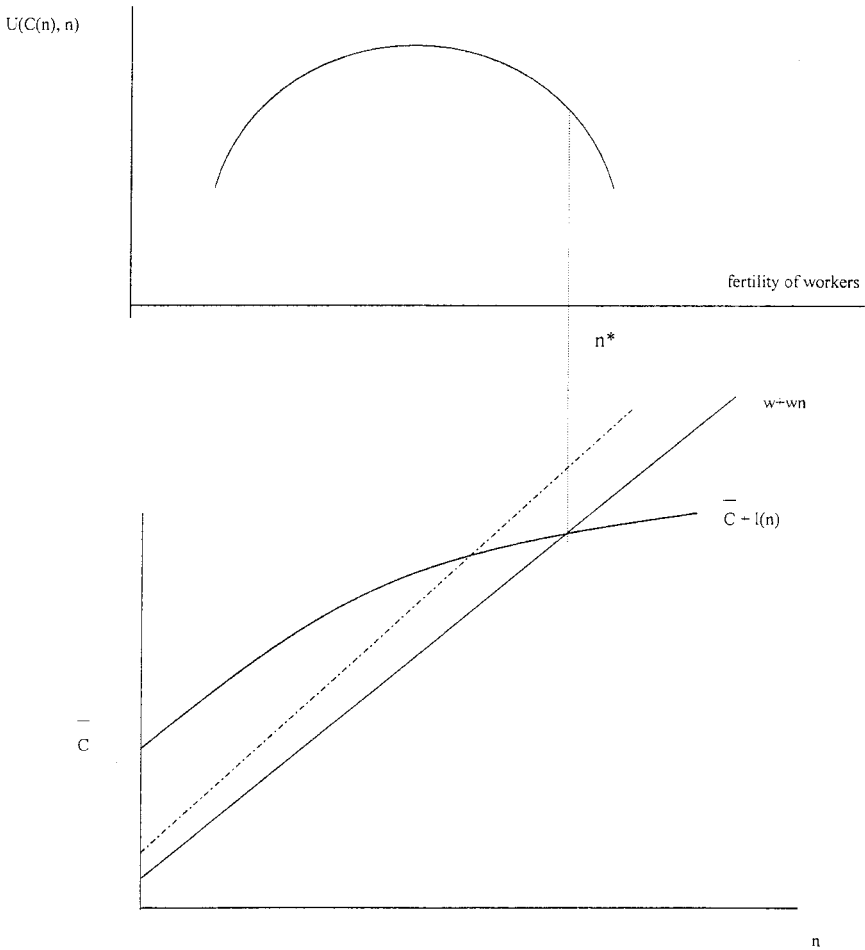


Figure 2 The optimal fertility rate for the workers

$$dn^w */dw = (1 + n)/(1' - w) < 0. \quad [11]$$

An assumption that is necessary for this model is that at equilibrium, the net wages of children at the margin is greater than zero, i.e. the inter-generational transfer goes from children to parents, an assumption that holds for the proletariat during the nineteenth century.¹⁵

The main conclusion of this model is that a decrease in real wages leads to an increase in the fertility rate of the proletariat. The intuitive reason is that in this model, in true Marxian fashion, children are an investment good; their wages are necessary for the family and become even more necessary when wages decrease. This negative relationship between fertility rates and wages has been asserted by Marx and is in complete opposition to the Malthusian model and the 'iron law of wages'.

4.3 A Comparison between the Marxian and the Malthusian paradigms

The main difference in the conclusions of these two types of models is that while a Malthusian paradigm implies that an increase in income leads to an increase in the fertility rate, a Marxian one will imply the opposite for the proletariat. Indeed, the interpretation of equation (11) is that when wages decreased, families needed more children to survive, and the fertility rate went up. So the model presenting Marx's view permits us to see that while Marxian and Malthusian models show similarity regarding the business elite (i.e. that an increase in income leads to an increase in the fertility rate), *they give opposite results for the proletariat*. In the next section, we examine which of these two models corresponds best with the historical data.

5. Historical facts

The difference in the outcomes of these two paradigms is linked to the importance of child labour during the industrialization process, and whether we observe that when income increased, there was an increase or a decrease in fertility.

5.1 Real wages and fertility rates

Galor and Weil (2000), who presents a Malthusian model, have stated that the increase in income that occurred in the first half of the nineteenth century—which led, via an income effect, to an increase in fertility—corroborates the assumptions of their model. However, while there is no

doubt that overall income rose in the first half of the nineteenth century, the income of the most important social class—the workers—did not increase and actually decreased slightly, so that the Galor and Weil model thus predicts a decrease in workers' fertility.

Indeed, there is an ongoing debate in the literature regarding the evolution of wages and more generally, the standard of living in nineteenth century England. While the optimists (Clapham, Ashton, Hartwell, and Lindert and Williamson) show that industrialization was equivalent to an increase in the standard of living of the workers, the pessimists (starting with Engels, Thompson, Toynbee, Hammond, and later Hobsbawm) disagree with this view.¹⁶ This economic debate was tainted with philosophical connotations and was related to the debate on the *bienfaits* of capitalism. The data displayed in Table 1 corresponds to the pessimistic view and shows that: 'If the Chartists in 1837 had called for a comparison of their time with 1787, and had obtained a fair account of the actual social life of the working-man at the two periods, it is almost certain that they would have recorded a positive decline in the standard of life of large classes of the population' (Hobsbawm 1957: 61).¹⁷

In conclusion, the data presented in Table 1 fits a Marxian model better than it does a Malthusian one. Moreover, the next section, which presents the facts about child labour in the nineteenth century, corroborates the assumption of the Marxian model that child labour was an important element of this period.

Table 1 Fertility rate, real wages and the capital–labour ratio in England, during the nineteenth century

	<i>Ig (Fertility rate)</i>	<i>Real wages in the cotton industry</i>	<i>K/L in the industrial sector</i>
1800	0.65	98	396
1810	0.65	76	383
1820	0.65	53	375
1830	0.65	45	335
1840	0.66	49	340
1850	0.67	52	346
1860	0.67	68	378
1870	0.68	81	400
1880	0.65	87	420
1890	0.62	95	434

Sources: column (1): the index of fertility rate (*Ig*), Bardet and Dupaquier (1998); column (2): nominal wages, Mitchell and Deane (1971: 349) divided by cost of living index, Feinstein (1998: 653); column (3): for capital: Feinstein (1981); and for labour: Maddison (1995).

5.2 Child labour

Child Labour in the nineteenth century was an important element in the cotton industry, the leading sector of industrialization. Children under 12 years old comprised 8 percent of the labour force in the cotton industry, with children aged 13–18, another 10 percent (see Evans 1990: 250). In certain regions, they were a predominant part of the workforce. Some of the textile machines were better suited to be operated by children. For example, the Roberts machine that was adopted after 1824, required nine children (and one adult), instead of the two adults required for the technology used previously (see Bairoch 1998: 434).

Usually, children began working at the age of eight or nine, and the incomes of all members of the family were pooled. After the age of 13, children were allowed to retain some of their wages to build up a small amount of capital prior to marriage. As Engels pointed out: ‘When they (the children) get on far enough to earn more than their cost to their parents from week to week, they begin to pay the parents a fixed sum of board and lodging and keep the rest for themselves. This often happens from the fourteenth or fifteenth year’ (Engels 1962: 177).

Children’s income was a necessity for the proletariat: ‘At no stage in this family history, had they been able to manage only on the husband’s wage’ (Meyering 1990: 141).¹⁸ Indeed among counties in England in 1851, there was a positive correlation between fertility and percentages of children between 9–14 years old who were employed (see Birdsall 1983: 116).

In the nineteenth century, since few children attended schools and housing standards were poor, the marginal cost of an additional child would be food, a cost much lower than the marginal benefit. When considering benefits, wages received by children were around half that of adults. For instance, in France, children were paid around 450fs a year, working from 5am to 7pm (while adults were paid around 755fs). From that they kept around 20fs for themselves. In England, in a cotton mill survey in 1859, men were paid a weekly wage of 18s and boys were paid 7s (see Evans 1990).

The costs of raising children were very low. However there was an increase in these costs in the late nineteenth century due to the enforcement of restrictions on child labour and schooling that were enacted at the beginning of the century. In 1802, the Peel Factory Act was enacted. This limited the maximum hours of work for children to 12 hours a day. In 1833, the Factory Act prohibited child labour under the age of nine; children between the ages of 9–13 were

permitted to work 8 hours per day (48 h/week, 52 weeks/year), and between the ages of 14–18, 12 hours per day (69 h/week). These laws were directed solely at the textile mills. After 1878, all sectors were covered under the Factory Act.¹⁹ In 1891, elementary schooling was made compulsory.²⁰

All of these laws were only actually enforced around 1880, and thus led to an increase in the costs of raising children at the turn of the century. Moreover, at about the same time, it also became more expensive to raise children due to the Poor Law of 1868, which made it an offence for parents to fail to supply their children with such basic necessities as food, lodging, and clothing. To sum up then, the intergenerational income flows during the nineteenth century were from children to parents, as implied in the Marxian model.

6. Conclusion

The two analytical frameworks regarding the subject of population in the nineteenth century were those of Marx, on the one hand, and Malthus, on the other hand. This paper has illustrated the divergences between them, as well as their common features. The main divergence is the way in which the two see the interaction between man and nature. While Malthus takes the state of nature as a *given*, and as being the *main* influence on the individual's decision making, Marx sees the *social framework* as important in explaining the decisions made by people. For Marx, the differences of behaviour between classes is something *that cannot be ignored*.

This paper has shown that both analytical frameworks can explain the increase in fertility that took place in the first half of the nineteenth century. However, the decrease in wages as shown in Table 1 *would best fit a Marxian one*.

Moreover, for more liberally oriented observers who have some difficulty in accepting Malthus's argument and who feel that 'The Malthusian moral stance—the idea that poverty is the responsibility of the poor themselves, the necessary consequence of their own unbridled reproduction—is not only based on a falsehood, but is odious and hypocritical, especially when it comes from a well-heeled clergyman who was firmly opposed to contraception' (Cottrell and Darity 1988: 187), the Marxian model could be adopted to explain the demographic transition.

And, of course, one does not have to be a Marxist of any vintage to accept the Marxian model of demographic transition presented in this paper.

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Notes

- * We wish to thank two anonymous referees as well as Yehuda Don, Neri Salvadori, Holger Strulik and participants at the Conference on 'Old and New Growth Theories' in Pisa, October 2001, for their helpful comments.
- 1 Proletarianization is the shift from self-employment with control over the means of production to working for others.
 - 2 There is an apparent contradiction in these three seemingly differing views of Malthus on wages. On one hand, in part (2) his view is that an increase in nominal wages leads to higher prices and therefore to no changes in real wages. On the other hand, in part (3) Malthus refers to an increase in real wages which leads to an increase in population. One way to reconcile the ostensible difference between them is to assert that the shift in real wages is due to a real shock in the economy resulting from technological progress, or alternatively to an increase in capital, while a nominal increase in wages, on the other hand, does not lead to a real change, but only to higher prices. Another possibility is not to try to reconcile them, thereby asserting that Malthus held contradictory views in his theory.
 - 3 An increase in population was in the interest of the elite, as it increases the 'reserve army' of labour, and thus pushed down wages.
 - 4 See Becker (1960); Becker *et al.* (1990); and Galor and Weil (1996, 2000).
 - 5 To get their results, they also assume that consumption has to be above a subsistence level.
 - 6 The term 'bourgeoisie' refers as in Marx to the class that owns capital and uses it as a factor of production.
 - 7 As Badinter (1980) has shown, love and desiring the well-being of children did not emanate from nature, and in the nineteenth century, it seemed that the elite related more to their firm and their wish that it would continue on as a dynasty, that is, with their name forever, even at the price of hurting some of their heirs.
 - 8 See Crouzet (1999) and Lewis (1986).
 - 9 We could have added the well-being of the children but it does not change the consequence of the model. Moreover, as explained in note 7, it is not clear whether it should be there at all, and whether Marx indeed believed that parents cared about the well-being of their children.
 - 10 The spouse's consumption is included in his own consumption.
 - 11 The RHS might be upward-sloping for small n , then downward-sloping. If we assume that K is large enough or p is very concave, then the RHS always has a negative slope.
 - 12 For the SOC to be negative, we have to assume that λ is such that $\lambda'^2 \geq \lambda''\lambda$. Under this condition, we obtain that the left-hand side is upward-sloping.
 - 13 A unified utility function could be presented, but it would complicate the model and would not add any insight.
 - 14 We also assume U_{11} , U_{22} , $U_{12} \leq 0$, so that $u(n)$ has an optimum and $d^2U/dn^2 < 0$. [$u(n)$ being the utility function as a function of n by substituting consumption from the budget constraint.]
 - 15 In other words, $P < w$.
 - 16 See Hartwell (1972), Lindert and Williamson (1983) and Feinstein (1998).
 - 17 There are also data that show that real wages increased, see for example Lindert and Williamson (1983). However, while there is no debate about the fact that wages went down, the debate is rather how much prices declined. Feinstein

- (1998) has shown that prices cannot have declined as much as Lindert and Williamson suggest. Moreover, both the biological variables (height and mortality) as provided by Feinstein, as well as the consumption side, where the decrease in income was been reflected in a decrease of consumption of meat, sugar and tea in the first half of the century (see Taylor 1975: 31), leads us to prefer the pessimistic view.
- 18 The need for child labour was also due to the fact that in the pre-industrialization era, women worked at home (i.e. the 'family-economy'). In the nineteenth century, during industrialization, the dichotomy between the home and the factory emerged. Women stopped working when having children (only 28 percent of working women were married) so that child labour was needed even more.
 - 19 There were Factory Acts already enacted in 1853 and 1867, but they led only to minor changes.
 - 20 In France the situation was similar, since laws equivalent to the Factory Acts were enacted in 1830 and 1841.

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Abstract

The purpose of this paper is to examine the divergence of views of Marx and Malthus regarding the family and the labour market. The paper analyses the divergences between them, as well as their common features. The main divergence is the way in which the two see the interaction between man and nature. We show that their divergence of views, and the specific difference in perception of the two thinkers regarding the place of children in the family over time, is related to the alternate ways of modelling demographic transition today. We analyse the debate between these two lines of reasoning by means of a formal model that differentiate between the two views.

Keywords

Marx, Malthus, social classes, fertility rates, capital, proletariat, child labour

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