



Was Malthus right? The relationship between population and real wages in Italian history, 1320 to 1870

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ABSTRACT

In this article we investigate the relation between population and real wages in the Italian economy during the period 1320–1870. The main result is that the positive check is strong and statistically significant but the other equilibrating mechanism in the Malthusian model – the preventive check – based on the positive relationship between fertility and real wages does not operate in pre-industrial Italy. In contrast to the Malthusian hypothesis, we find a negative feedback from wage to population. The empirical result is clearly consistent with the theoretical framework of the “old age security motive”. We show, with a simple overlapping-generation model, that by allowing for substitution in a pre-industrial economy between child quantity and other assets (such as new seeds, better soybean quality, and new cultivation and irrigation methods) fertility may be negatively affected whenever income rises.

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1. Introduction

In his *Essay on the Principle of Population* of 1798 Thomas Malthus argued that the low and stationary level of per capita incomes prior to the end of the 18th century was causally related to the very slight rates of population growth. This causation works both ways.² Higher incomes increase population by stimulating earlier marriages and higher birth rates, and by cutting mortality from malnutrition and other factors (preventive and positive checks). Diminishing marginal productivity also leads to a drop in per capita income for higher populations. This dynamic model implies a stationary population in the long-run equilibrium.

In this article we investigate the relation between population and real wages in the Italian economy during the period 1320–1870. This relationship deserves to be tested for several considerations that still divide the literature. The disagreement concerns the uniqueness of the pattern of the variables before the middle of the 19th century, the selection of which element of the Malthusian scheme is crucial in the models, and the interpretation of the Malthusian model as the unique scheme for describing the economic and demographic patterns in the pre-industrial economies (see, for instance Nicolini, 2006; Allen, 2008 for a review of this literature).³

Here we are dealing with the latter issue. Although there is a large and growing body of literature which studies economic–demographic relations in pre-industrial Europe using econometric analysis, we do not know of studies for the Italian economy. The

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² Malthus (1970). The explanation suggested by Malthus has been widely discussed and tested using data of several European countries.

³ See also Nicolini (2004) and Allen (2001) amongst others. Brezis (2001) and Brezis and Young (2003) develop an alternative approach of modeling demographic transition based upon the interaction between different social classes.

object of this article is to test, with aggregate time series, whether Malthusian positive and preventive checks operate in the pre-industrial Italian economy.⁴

In modern data, the relationship between income per capita and population growth is negative, which is the opposite of what the Malthus model assumes. Several authors have developed theories to explain growth takeoff where a decline in fertility is interpreted as substitution of child quantity by child quality (parents invest in education or human capital). In this case, an increase in income per capita (via investment in child quality) lowers fertility.⁵ In this paper we address the following two questions: is the observation of a negative relationship between wages and population a necessary and sufficient condition for a growth takeoff? We seek to answer this empirical question by using Italian data for the pre-industrial epoch to show a negative relationship between wages and population. The second question, concerning a theoretical model which supports our findings, is the following: would substitution in the pre-industrial economies between child quantity (number of children) and other assets be possible and able to affect fertility negatively?

To support this interpretation we use a very simple overlapping-generation economy to emend the Malthusian model of Ashraf and Galor (2008) with the *old wage security motive* assumption. We show that the rise in income per capita may not generate an increase in population.

With regard to the empirical analysis, starting from preliminary statistical analysis based upon the decennial frequencies data set provided by Malanima (2002, 2003, 2005) and Federico and Malanima (2004), we perform a time series analysis to test whether this hypothesis fits the observed patterns in wages and population in pre-industrial Italy. In particular, we estimate and simulate a vector autoregressive (VAR) model. This approach was introduced into historical-demographic research by Eckstein et al. (1986) and is particularly useful in testing the Malthusian hypotheses, since both historical reconstructions and empirical estimates often explicitly impose exogeneity of population in their description of the model. In the Malthusian context, imposing this causal ordering entails ambiguity in the relationships between wages and demographic variables, and simple regressions between the two variables would provide misleading results. In VAR models all variables are treated as being a priori endogenous, and allowance is made for rich dynamics.

Among the main results of the article we find that a better standard of living (measured as an increase in rural real wages) does negatively affect population: one of the key elements to restore the equilibrium in the Malthusian scheme did not operate in Italy in the epoch considered. At least in the pre-industrial age in Italy, and in contrast to the Malthusian hypotheses, a negative relationship between wages and population does not seem to be a necessary and sufficient condition for growth takeoff.

The article is organized as follows. Section 2 reviews a selected literature on Malthus's assumptions, pointing out the causal ordering that many works impose in reading facts and estimating models. Section 3 reports the theoretical model. Section 4 discusses the data set and analyses the dynamics of population and real wages in agriculture. In this section we study the statistical characteristics of the available time series. Section 5 reports estimates and simulations of the real wage–population relationship using a VAR cointegrated model. A summary of the main results and implications ends the article.

2. The Malthusian hypotheses and causal ordering: A brief critique

There is an extensive literature concerning the economic–demographic relations in pre-industrial Europe. A very wide range of these studies sheds light on the Malthusian mechanisms. Abel (1966), Postan (1973), Wrigley and Schofield (1981), Slicher van Bath (1963), Grigg (1980), Weir (1991), and Clark (2007), amongst others,⁶ provide detailed descriptions of different European economies in accordance with the Malthusian model.⁷ These works report empirical and theoretical discussions on long chronological periods and concern the relationships between fertility, infant and child mortality, standard of living, grain and wheat prices, and population size in several periods between the 13th and 19th centuries. Similar interpretations are available for areas in several European countries.⁸ In Italy, detailed analysis of the pre-industrial Malthusian model is much less frequent, although there are some interesting exceptions such as Bellettini (1973), Romani (1975) and Malanima (2002).

A growing population and labor force encounters diminishing returns in agriculture and therefore a fall in real wage is the first essential element of the Malthusian population theory. Higher wages cause, on the one hand, lower mortality due to better nutrition, clothing and housing, on the other, higher fertility. These aspects are reported by the literature in contexts characterized by (exogenous) harvest variations, adverse weather conditions, epidemics etc. What is interesting is the emphasis laid, in this literature, upon the consequences of population changes (on labor productivity) rather than the consequences of changes in wages. Common to all these studies is the historical confirmation of preventive-positive checks, although the latter seem to have been historically more prevalent than preventive checks, which act more slowly.⁹

⁴ Aggregate time series have been used by many authors for investigating on demographic and economic relationships. See, for instance, Weir (1991), Lee (1997), Lee and Anderson (2002), Malanima (2005), Clark (2006), Crafts and Mills (2007), Eckstein et al (1986), Bengtsson and Brostrom (1997) and Nicolini (2006), amongst others.

⁵ See Galor and Weil (2000), Boldrin and Jones (2002), Galor and Moav (2002), Doepke and Zilibotti (2005) and Doepke (2004) amongst others, propose different causes which impinge on investment in child quality. See also Galor (2005).

⁶ Abel (1966) is in German. This seminal work has been translated into French and English, and recently Italian (1976).

⁷ See also Weir (1991) and Livi-Bacci (2007) for a review.

⁸ See, for instance, Livi-Bacci (2007) and the literature quoted therein.

⁹ Wrigley and Schofield (1981). See also Lee and Anderson (2002) and Allen (2008).

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