Thomas Robert Malthus and His 1798 Theory of Oscillations †

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The theory of population presented by Thomas Robert Malthus in the first edition of *Principle of Population* (1798) has had great influence on the progress of economic and political thoughts. In relation to the issue of population, Malthus provided an account of economic fluctuations of the kind he himself called 'oscillation', for which various interpretations and mathematical reconstructions have ever been offered by many modern authors. Representative studies may be seen in research by Eltis (2000 [1984]) and Waterman (1987).

Eltis (2000 [1984]: 117, 142) described Malthusian oscillations as the continuing fluctuations in real wages and rates of population growth which are represented by a 'cobweb' diagram, arguing 'because adjustment of population to the wage occurred only after a lengthy time-lag, wages and population tended to fluctuate around these equilibrium value'. On the other hand, Waterman (1987: 265, 269) argued that Malthus's account of oscillations 'is not a dynamic cobweb' about a 'stationary equilibrium' or 'a steady state equilibrium' of the real wage and rate of population growth, 'but is a concertina-like edging towards stationary equilibrium', as described by 'the zig-zag path of real wages' between their maximum and minimum. Hollander (1997: 46) objected to Waterman's account of Malthusian oscillations superimposed onto 'a land scarcity-based model' on the main grounds that Malthus's 'oscillatory account makes no mention of increasing land scarcity'. Moreover, these reconstructions of Malthusian oscillations do not explain the difference between nominal and real wages, which Malthus considered as the main cause of oscillations in the first place.

In this paper, we formalize the Malthusian population theory found in the *First Essay* using a simple mathematical model and propose a view of Malthus's theory of oscillations that is different from both Eltis and Waterman. The main feature in the paper is to develop a simultaneous differential equations model of Malthus's population dynamics in order to explore how the difference between nominal and real wages causes oscillations. There are two differential equations for price and population dynamics. The former is the function of the difference between demand for food and its supply and the latter is the function of the real wage represented by the ratio between the nominal wage and price of food. Furthermore, regarding the issue of oscillations, we apply Malthus's argument that a change in the nominal wage rate always preceded the change in price of food. Through this analysis, we can clearly explain how the oscillations were influenced

by England's poor laws, which Malthus considered as one of the minor causes, and we emphasise his statement presented throughout the *First Essay* that it is most important to increase the investment in agriculture, but not in manufacturing.

Main References

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