POSITIVE CHECK: THE MALTHUSIAN THEOREM AND THE COVID-19 PANDEMIC

Christopher E.S. Warburton, Ph.D.

Houghton College

Email: drceswarburton@gmail.com

Abstract: *Thomas Malthus (1798) had argued that human ingenuity and skill were incapable of controlling population growth. With less efficacious positive controls (moral suasion), he controversially relied on wars, diseases, famine, and deaths—probable circumstantial conditions—to check population growth. The theory of doom was subsequently derided and challenged because of scientific advances and improvements in technology. However, contemporary humans rely on scientific progress to reduce unacceptable levels of deaths through medical innovations and agricultural productivity. This paper evaluates the classical Malthusian prognosis in the light of the COVID-19 pandemic. It argues that death rates may neither increase per capita income nor revert wage rate per hour to a level of subsistence.*

I. INTRODUCTION

Thomas Malthus (1798) had argued that human ingenuity and skill were incapable of controlling population growth. With less efficacious positive controls (moral suasion), he controversially relied on wars, diseases, famine, and deaths—probable circumstantial conditions—to check population growth. The theory of doom was subsequently derided and challenged because of scientific advances and improvements in technology. However, contemporary humans rely on scientific progress to reduce unacceptable levels of deaths through medical innovations and

agricultural productivity. Yet scientific knowledge has not sufficiently developed to promptly contain the spread of all infectious or contagious diseases that are expected to increase death rates and per capita income. Intrinsic to technological neutrality is the concept that technological advances can also create larger and poorer populations (Galor and Weil, 1999) in such a way that short-term gains can be eviscerated over a longer period of time (Abramitzky and Braggion, 2003).

However, in the 1900s technological advances increased the supply of food and reduced hunger (Unat, 2020). Notwithstanding, population issues gained increased attention after World War II (a period of abeyance) as the sustainability of economic resources came into sharper focus. Neo-Malthusianism evaluated the merits of Malthusian theory with a nuanced focus. The COVID-19 pandemic elicits a renewed appraisal of the classical Malthusian prognosis when the propensity to increase per capita income is challenged by escalating death rates in the presence of technological or scientific advancement to increase food and prolong lives.

The 2019 COVID-19 pandemic reveals that the Malthusian theory of population growth and increasing per capita income may not be contingent on positive and/or preventive checks when national output is a function of acquired knowledge, productivity and employment, and consumption (absorption). Further the pandemic reveals that the relationship among wage per hour, subsistence wage, and population growth cannot be convincingly supported by the classical Malthusian theorem. The central arguments are subsequently evaluated.

A brief overview of the relevant Malthusian theorem is presented in the next section. The next section of this paper presents the Malthusian theorem in the light of technological innovation, death rates, wages per hour (WPH) and the subsistence wage. A brief conclusion is provided at the end of the paper.

1I. THE MALTHUSIAN THEOREM OF DOOM

Thomas Malthus had postulated that scientific innovation is an insufficient indicator of improvement on human welfare; pointedly, the preservation of life reduces income per capita because scientific innovation increases population beyond commensurate increases in output. Consequently, Malthus embraced the idea that war, diseases, and death—positive checks—could

bring about the growth of population in conformity with food production (output); agriculture (human output for subsistence that is contingent on scarce landed resource) was generally perceived as susceptible to diminishing returns (Ekelund and Hérbert:143). Consider the nineteenth century Malthusian model and its steady state connotations of y^0, $y*$ and y^1. The classical theory maintains that increases in the death rate, say as a result of a pandemic, can increase per capita income, while improvements in life-saving scientific advances are capable of reducing per capita income to y^0.

The theory of doom implies that population growth will outpace output because of inadequate preventive (deliberate moral checks)[1] and that scientific improvements such as the smallpox vaccine, which extended human lifespan, will only lead to a reduction in per capita income $(y*-y^0)$. The pandemic has increased death rates, say to y^1 (a movement of the Malthusian zero-population growth, ZPG equilibrium). Yet, output has correspondingly declined, albeit with less transparent time series data points.[2] This dichotomy presents a curious anomaly of the Malthusian prognosis of doom and the shifting steady states of prosperity.

Figure 1: The Malthusian positive check (theory of doom)

*Source: Van den Berg (2012a): 158 (modifications by author)*
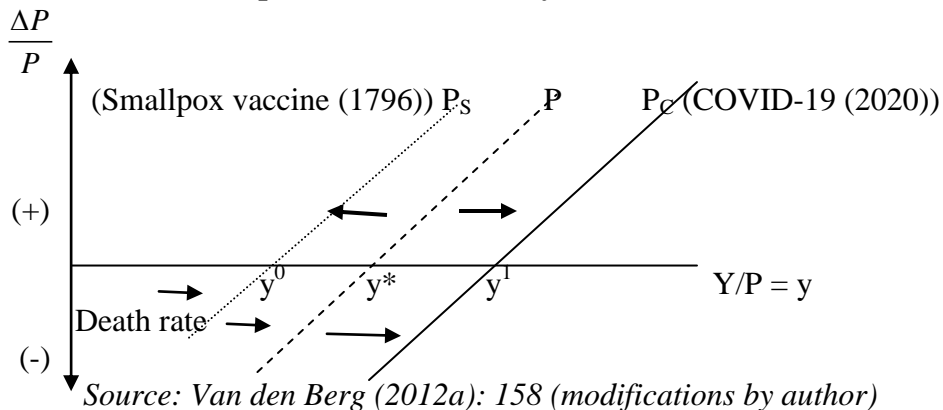
Inherent in the theory of doom is the notion of technological neutrality; that is, technological advances were neither deemed incapable of increasing agricultural production to the required level nor altering the long-run level of subsistence wage; consider Figure 2.

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[1] See Dun (1998) for further discussion of fecundity (moral suasion).

[2] The Malthusian ZPG is the point at which the change in population growth coincides with the change in output per worker $(\Delta P/P = Y/P)$.

Figure 2: Population and subsistence wage rate
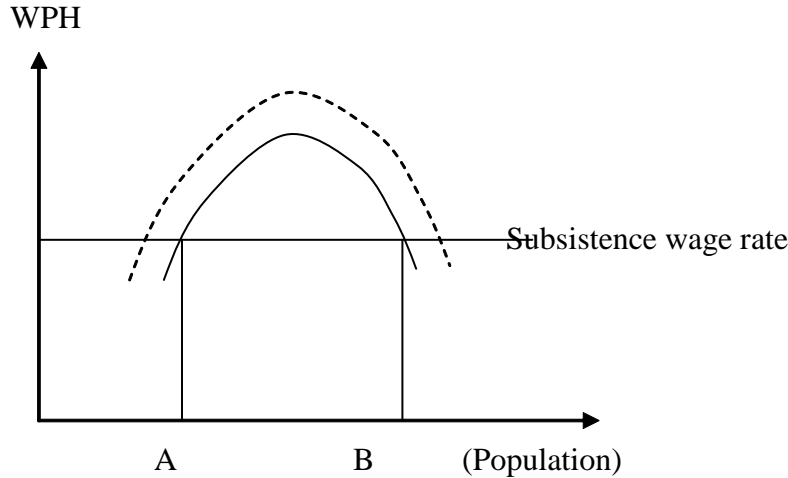
Source: Mark Blaug, *Economic Theory in Retrospect*: 73

The wage rate per hour (WPH) increases as population increases from point *A* but reverts to the level of the subsistence at point *B*. The broken line indicates that even with technological advances, which increases the WPH, scientific improvements cannot prevent the reversion to subsistence. Accordingly, the Malthusian positive check (prognosis) has implications for population growth and income. Is the Malthusian prognosis theoretically applicable to the COVID-19 pandemic?

III. THE COVID-19 PANDEMIC AND ITS IMPLICATIONS FOR MALTHUSIAN DIAGNOSIS

The relationship between death rates and economic activity (or per capita income) elicits an obvious premise of evaluation. The relationship between the COVID-19 pandemic death rates and growing per capita income is less apparent; partly because population growth cannot be cleanly extricated from technological advances, productivity, and output. Kremer (1993) made such an argument by endogenizing population growth and technological progress:

$$\Delta A = qPA \; ; \tag{1}$$

where A is for the stock of accumulated knowledge, P is for population, and q is the research productivity per person. Equation 1 implicitly shows that the growth in scientific or technological advances is somewhat correlated with the size of the population ($\Delta A/A = qP$); so, if output is a function of productivity (Equation 2), a decline in productivity and population will not necessarily increase output per capita:

$$Y = AP^{\alpha}N^{1-\alpha} \; ; \tag{2}$$

where Y is for output, N is for landed resources, and alpha is for the contribution of population and landed resources to output. Ashraf and Galor (2008) showed how technological advances have facilitated an escape from the Malthusian trap.

In a variety of ways, and contrary to the Malthusian prognosis, a pandemic could easily inhibit the growth of per capita output in the immediate period (without long-run promulgations) via the unemployment and consumption (absorption) channels. Lockdowns, decreased productivity, and plummeting output (Y), compounded by the decline in accumulated knowledge (refer to Figures 1 and 2, and Equation 2) are not growth enhancing and therefore, Y must fall. However, not enough time series data can be extrapolated to clearly justify the intuition at the time of this writing; Table 1 provides a benchmark of analysis for some countries that have been most seriously impacted by the pandemic. In all cases, per capita income rose except for France.

Table 1 GDP per capita 2015 to 2019 (2010 US prices,$)

	2015	2016	2017	2018	2019
US	52168.13	52643.92	53552.49	54832.98	55753.14
UK	42017.14	42499.78	43010.71	43324.05	43710.45
Germany	45208.06	45844.64	46862.04	47313.85	47469.48
France	41793.54	42140.04	43015.21	43720.03	44320.06
Italy	33961.44	34459.21	35086.48	35485.11	35677.38

Data Source: World Development Indicators (2020)

Further, the US, the wage rate per hour (WPH) has been unrelated to population growth and productivity. The lawful subsistence wage rate shows some amount of variations that are based on perceptions of consumer inflation. Of course, the relationship between population growth and cost of living can be confounding because population growth cannot be cleanly alienated from cost of living. Curiously, the pandemic in the US has facilitated calls for increases in the Federal subsistence wage rate as a compensatory measure for risky work during the pandemic; calls that have coexisted with cost-of-living arguments. Evidently, the modern circumstances and realities depart from the Malthusian prognosis. However, Figure 2 exhibits a curious affirmation of the consistency of subsistence wage (at least in the US). The rigidity of the subsistence wage before and after the pandemic is based on the value of the mode ($7.25) and the Federal rate for the past 12 years (2009-2021).[3] Estimated in terms of consumer inflation, the US dollar has actually lost about 23.5 percent in value over the twelve-year period.

CONCLUSION

Contrary to the Malthusian prognosis, a pandemic could inhibit growth of per capita output in the immediate period via the unemployment and consumption (absorption) channels; lockdowns decreased productivity and output (Y), compounded by the decline in accumulated knowledge are not growth enhancing factors that are concomitant to declining population and workforce.

The relationship between population growth and the WPH is imprecise or indirect. Today, WPH, which can also be contractual, fluctuates with inflation (cost of living) while the subsistence wage—a policy wage—is rigidly independent of fluctuating market rates and population growth. Accordingly, it is unclear how the Malthusian perception of WPH can revert to the subsistence wage as the population grows with dynamic variations in skill sets and the acquisition of knowledge.

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3 The mean rate of subsistence is $9.47 (excluding or including Puerto Rico) and the maximum is $15 (Washington DC). On the aggregate, and including Washington DC, there is a $5 variance. At the time of this writing, Arizona, Colorado, Delaware, Florida, Missouri, Montana, Nevada, New Jersey, Ohio, Oregon, South Dakota, and Washington make annual adjustments.

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