Lecture Note 5

Comments to Malthus

1. On the possibility of a general over-supply

The comments of Malthus on possible imbalance between aggregate production and aggregate demand has been rediscovered in the 20th century as an early approach to the contemporary theory of employment. Clearly, the standard model of Keynesian economics cannot be applied as it is to the world of Malthus, so we must consider what was actually the message of Malthus, who argued that there could be situations where the use of the incomes generated from production would not automatically ensure that the product is demanded.

Here is a version of Malthus' theory as formulation by Eagly (1974). We consider an aggregate model of an economy with a work force $\overline{N}$ of given size, consisting of productive labour N_1 producing material goods and unproductive labour N_2 which produces services, so that

$$\overline{N} = N_1 + N_2. \tag{1}$$

To produce the material goods, we assume that one will need both labour and machines in a ratio α, so that the capital needed to employ a worker is $w + \frac{p}{\alpha}$ (where p is the price of the (aggregated) good and w is the wage rate), so with a capital of the fixed size $\overline{K}$, the need for productive labour is

$$N_1 = \frac{\overline{K}}{w + \frac{p}{\alpha}}. \tag{2}$$

There is no need for capital outlays in the production of services. Net output of the good in the economy Z is proportional to N_1,

$$Z = aN_1,$$

and it can be used either for consumption C, which takes the form of services, or for investment, that is increase in the capital stock. The supply of commodities going to this inter-sectoral exchange is assumed to be a given fraction of output,

$$C = cZ,$$

and for this to fit with the number of workers in the service sector, we must have that $wN_2 = cZ = caN_1$ or

$$N_2 = \frac{ca}{w} N_1. \tag{3}$$

Finally, we have that the produced quantity Z, or equivalently aN_1, is fully used up for investment I and consumption,

$$aN_1 = I + wN_2. \tag{4}$$

If investment is given (or "exogenous", as one would say today), then we have three variables N_1, N_2 and w, but we have four equations, namely (1) – (4), so the system does not necessarily have a solution. This might be considered as what Malthus had in mind: in order to have an equilibrium, the level of investment cannot be exogenously given but has to take a specific value – technically I should be a variable and not a constant.

In economic terms it means that there is no automatic adjustment which would establish an equilibrium as suggested by Say. To get there one would have to add some mechanism for dividing income into investment and consumption. This could be obtained by adding a theory about loans and interest rates, introducing a new variable i (the rate of interest) and letting I depend on i, making the system determined.

Malthus is very explicit about the problems of determining the right level of investment in society. If investment is too low, the growth of society's wealth is endangered, and if it is too big, and consumption is too small, then the incentives to invest are destroyed. This problem, that "the principle of saving, pushed to excess, would destroy the motive to production", a formulation close to the "paradox of saving" in macroeconomics textbooks. Malthus suggests that a political decision may be necessary to determine the correct size of investment.

Here is a model of Lange (1938) which captures the idea of adding a market for loanable funds. We begin with a simple Keynesian model,

$$\begin{aligned} Y &= C + I && (5) \\ I &= F(i, C) && (6) \\ M &= L(i, Y), && (7) \end{aligned}$$

where (as usual) Y is aggregate income, C consumption, I investment, i the interest rate, and M the (given) quantity of money held by individuals. The problem of the optimum propensity to consume is to find a level of C which maximizes I given that the equations of the model should hold, so that i and Y can be determined suitably.

We may characterize the optimum as follows: If I^* be the maximal value of I, then inserting it into (6) we obtain C as an implicit function of i with derivative $\frac{\mathrm{d}C}{\mathrm{d}i} = -\frac{F'_i}{F'_C}$. Similarly, (7) gives us Y as implicit function of i with derivative $\frac{\mathrm{d}Y}{\mathrm{d}i} = -\frac{L'_i}{L'_Y}$. Now differentiating (5) w.r.t. i, using that $\frac{\mathrm{d}I}{\mathrm{d}i} = 0$ in optimum and inserting the other derivatives, we get that

$$\frac{F'_i}{F'_C} = \frac{L'_i}{L'_Y} \text{ or, equivalently, } \frac{\mathrm{d}i}{\mathrm{d}C} = -\frac{F'_C}{F'_i} = -\frac{L'_Y}{L'_i} = \frac{\mathrm{d}i}{\mathrm{d}Y}.$$

Using the last expression, we see that an increase in I caused by a higher level of consumption will induce an increase in the rate of interest which in its turn will reduce investment. In this way, we have found a balance between consumption and investment at I^*.

Whether this was what Malthus had in mind, is open to doubt and has indeed been debated. Malthus probably did not think in Keynesian terms, but he definitely had an impact on the thinking of Keynes.

2. Malthus' criticism of Adam Smith

The emphasis on division of labor which is a main theme with Adam Smith, had the natural consequence that he saw the development of manufacture or industry as the way towards increasing wealth in society. Malthus, on the other hand, considered agriculture and its development as the key factor in promoting the wellbeing of society's inhabitants.

Behind this difference of opinion lies not only different assessments of the contribution of the two sectors, but also a different view of what should be the objective of society's economic activity. While Adam Smith and some of his contemporaries made a big leap forwards by the identification of society's wealth as the annual product of its activities (rather than the amount of gold which it has collected), one can see Malthus' argumentation for the importance of agriculture as a consequence of an even more sophisticated approach to what constitutes the happiness of society.

The following simple formalism, due to Hisamatsu (2015), illustrates the arguments of Malthus. We consider a society which produces two goods, namely (1) "food" and (2) "luxuries", using only labor inputs and with fixed coefficients,

$$X_1(t) = a_1 N_1(t),\ X_2(t) = a_2 N_2(t)$$

The input $N_i(t)$ of labor in the sector i is assumed to change at a rate n_i, $i = 1, 2$which in its turn depends on rates of capital accumulation, considered as given (we are in a classical world where capital accumulation takes the form of a wage fund, the annual outlays to labor).

Following Adam Smith, the real wealth of society at date t is determined by $(X_1(t), X_2(t))$, and without entering into a discussion of the exact way of weighing the two quantities together (which would demand a theory of value which Malthus largely avoided), we notice that if

$$X_i(t+1) \geq X_i(t),\ i = 1, 2,\ \text{and}\ (X_1(t+1), X_2(t+1)) \neq (X_1(t), X_2(t)),$$

then society's wealth has increased.

But wealth may not be (and with Malthus, is not) the same as overall wellbeing, or as Malthus would put it, happiness. According to his early writings, this happiness depends crucially on health and the command of the necessaries and conveniences of life. With respect to the health, Malthus repeatedly notices the unhealthiness of living conditions in the cities, where people are crowded together in overfilled rooms, and encouragement of agriculture would therefore increase the inflow to the market of goods produced under healthy conditions. If we let

$$b(t) = \frac{N_1(t)}{N_2(t)},$$

then a rise in $b(t)$ would mean that the relative social level of health is increasing. For the second aspect of happiness aspect, Malthus states that food is the most important part of the necessities of life, so we may abstract from the products of industry which goes largely to the owners of land and capital. Assuming that the latter also consume a fraction c of the agricultural products, the average worker's command over food is

$$\omega(t) = \frac{(1-c)X_1(t)}{N(t)}. \tag{8}$$

Taking logarithms and differentiating, we get that

$$\frac{\omega'(t)}{\omega(t)} = \frac{X_1'(t)}{X_1(t)} - n,$$

where $n = n_1 + n_2$ is the growth rate of labour, and we conclude that the growth rate in ω is positive or negative depending on whether the growth rate in output of food exceeds or falls short of the growth rate of labor.

Phrased in terms of this simple model, the argument of Malthus against Adam Smith goes as follows: Assume that the available surplus of capital is used only to increase manufacturing capital and not to agriculture. This means that the $n_2 > 0$ whereas $n_1 = 0$. With an unchanged labor force in sector 1 and more labor in sector 2, we get that $X_1(t+1) = X_1(t)$ and $X_2(t+1) > X_2(t)$. Thus, wealth has increased.

But what about happiness? Clearly, $b(t)$ must be falling over time, and rewriting (8) as

$$\omega(t) = \frac{(1-c)a_1 N_1(t)}{N(t)} = \frac{(1-c)a_1}{1+\frac{N_2}{N_1}} = \frac{(1-c)a_1}{1+\frac{1}{b(t)}}$$

we see that also $\omega(t)$ decreases. But then both components of happiness have become smaller, so wellbeing has deteriorated.

References

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Lange, O. (1938), The rate of interest and the optimum propensity to consume, Economica 5, 12 – 32.