

The Role of Demand in Adam Smith's Theory of Natural Price

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By the use of a simple growth model, it is shown that prices are not determined purely by technological or cost considerations and the role of demand in the determination of prices is properly recognized in Adam Smith's theory of natural prices, in which the natural rate of wage is considered to be higher in an economy with a higher rate of growth and the higher wage and the higher rate of profit can coexist. Smith's theory of falling rate of profit is defended from Ricardo's criticism.

I

It has often been argued that the prices are determined purely by technological or cost considerations in the classical economics and the role of demand in the determination of prices is essentially disregarded by the classical school initiated by Adam Smith and followed by Ricardo, J. S. Mill, and Marx, among others. While this may be correct as far as Ricardo is concerned,¹ it is not so in the case of Adam Smith's theory of the natural price, as I suggested elsewhere. "Natural prices are by no means independent of demands, since the natural rate of wage, for example, is higher in a growing economy, such as that of new colonies where demands expand rapidly, than in a stationary economy or in a declining one."² The purpose of this article is to develop this point fully, by the use of a Smithian growth model which I constructed in Negishi(1988, pp. 83-9).

The Section II sketches the theory of natural prices, which Adam Smith(1723-1790) developed in *The Wealth of Nations*(1776). A simple Smithian growth model of Negishi(1988), in which capitalists

¹ This is, of course, so as far as natural prices are concerned, as will be seen in the section V below. See Casarosa(1978) for market prices in Ricardian system.

² Negishi(1988, p. 13). See also Negishi(1985, p. 25).

are assumed only to save and invest and not to consume, is extended in the Section III so that they can also consume labour products as well as labour services in their households. This extension of the model is necessary, since our aim is not only to explain the relations among the natural rate of wage, the natural rate of profit and the rate of growth, but also to consider the role of demand in the determination of natural prices. By the use of this model, then, it is argued in the Section IV that Smith's theory of the falling rate of profit, which does not advert to the diminishing returns in agriculture, can be defended, in spite of the famous criticism of Ricardo's. Finally, the Section V is devoted to show the role played by demand in our model of Smith's theory of natural prices.

II

Smith started in Chapter VI, Book I, of *The Wealth of Nations*, "Of the Component Parts of the Prices of Commodities", with the famous example of the deer and the beavers in the early and rude state of society which precedes both the accumulation of capital and the appropriation of land (Smith 1976, p. 65). But the consideration of the early and rude state is not very interesting, since there is no possibility of economic growth (Smith 1976, pp. 82-3). Economic growth is possible if and only if the net capital accumulation is caused by the existence of the positive rate of profit. If the rate of profit is positive, however, Smith argues that embodied labour theory of value does not hold.

In this state of things, the whole produce of labour does not always belong to the labourer. He must in most cases share it with the owner of the stock which employs him. Neither is the quantity of labour commonly employed in acquiring or producing any commodity, the only circumstance which can regulate the quantity which it ought commonly to purchase, command, or exchange for. An additional quantity, it is evident, must be due for the profits of the stock which advanced the wages and furnished the materials of that labour (Smith 1976, p. 67).

If we ignore the land and the land rent,³ therefore, Smith's natural price of a commodity is defined as the sum of wages and profit,

³ See Hollander (1980) for Smith's neglect of the implication of land scarcity in economic growth.

both at the natural rate, which is defined as follows.⁴

There is in every society or neighbourhood an ordinary or average rate both of wages and profit in every different employment of labour and stock. This rate is naturally regulated ... partly by the general circumstances of the society, their riches or poverty, their advancing, stationary, or declining condition; and partly by the particular nature of each employment. ... These ordinary or average rates may be called the natural rate of wages, profit, ... (Smith 1976, p. 72).

The liberal reward of labour, therefore, as it is the necessary effect, so it is the natural symptom of increasing national wealth. The scanty maintenance of the labouring poor, on the other hand, is the natural symptom that things are at a stand, and their starving condition that they are going fast backwards (Smith 1976, p. 91).

This argument of Smith should not be interpreted that the market rate of wage, which can deviate temporarily from the natural rate, is higher in a growing economy. When Smith defined the natural rate of wages and profit in Chapter VII, Book I, of *The Wealth of Nations*, "Of the Natural and Market Price of Commodities" (Smith 1976, p. 72), he footnoted that the natural rate of wage is shown, in Chapter VIII, Book I, "Of the Wages of Labour" (Smith 1976, pp. 82-104), to be different according to whether the economy is advancing, stationary or declining. Smith considered, therefore, that the natural rate of real wage or the equilibrium rate of real wage is high in an economy with a high rate of growth. Since the natural rate of wage must be at the subsistence level in a stationary economy so as to keep the population unchanged, then, the wage at the natural rate is higher than the subsistence wage in growing economies. Not only the natural rate of wage, furthermore, but also the natural rate of profit are considered by Smith to be higher in a growing economy than in a stationary economy.

The rise and fall in the profits of stock depend upon the same causes with the rise and fall in the wages of labour, the increasing or declining state of the wealth of the society (Smith 1976, p. 105).

In a country which had acquired that full complement of riches which the nature of its soil and climate, and its situation with respect to other countries allowed it to acquire; which could, therefore, advance no further, and which was not going backwards, both the wages of

⁴ See Smith (1976, pp. 72-81) for the definition of natural prices as long-run equilibrium prices. "The natural price, therefore, is, as it were, the central price, to which the prices of all commodities are continually gravitating" (Smith 1976, p. 75).

labour and the profits of stock would probably be very low. ... In a country fully stocked in proportion to all the business it had to transact, as great a quantity of stock would be employed in every particular branch as the nature and extent of trade would admit. The competition, therefore, would everywhere be as great, and consequently the ordinary profit as low as possible (Smith 1976, p. 111).

We may conclude, therefore, that a high natural rate of wage and a high natural rate of profit coexist in an economy with a high rate of growth, as Smith argued that "in our North America and West Indian colonies, not only the wages of labour, but the interest of money, and consequently the profits of stock, are higher than in England"(Smith 1976, p. 109).

III

Let us make an extension of a Smithian growth model, which is given in Negishi(1988, pp. 83-9), so that capitalist households can now consume labour products as well as labour services (labour power). Suppose that the period necessary for the reproduction of labour (power) in laborers' households is identical to the period of production of labour products and that a units of labour must be expended one period before to produce one unit of product and b units of the labour product must be consumed in households one period before to produce one unit of labour. Let us denote the capitalists' aggregate stock of the product at time t by $X(t)$ and the labour population at time t by $L(t)$. Then, from definitions of coefficients a and b , we have

$$eX(t) = bL(t+1) \quad (1)$$

and

$$cL(t) = aX(t+1) \quad (2)$$

where $0 < e < 1$, $0 < c < 1$, and capitalists are assumed to use e of their stock of products to employ labour and to use $(1-c)$ of their employees in the households as unproductive labour. In other words, they consume $(1-e)$ of the stock of products and capitalists' rate of saving is ec while laborers are assumed not to save.

To consider a balanced growth solution of our model (1) and (2) in which both $X(t)$ and $L(t)$ grow at the common rate of g , substitute

$X(t+1)=(1+g)X(t)$ and $L(t+1) = (1+g)L(t)$ into (1) and (2). It can be easily seen that the rate of growth g and the given coefficients must satisfy the condition

$$ab(1+g)^2=ec. \quad (3)$$

Particularly, the given coefficients must satisfy the condition $ec>ab$ to assure the positive rate of growth. The rate of growth g is higher, if the rate of saving ec and the labour productivity $1/a$ are higher, or the real rate of subsistence wage b is lower.

Since equilibrium relative prices remain unchanged through time on such a balanced growth path of the economy, let us denote the natural price of the product by p and the natural rate of wage by w . According to Smith, then,

$$p = (1+r)aw \quad (4)$$

and

$$w = (1+s)bp, \quad (5)$$

where r is the natural rate of profit, and r and s are assumed to be positive if g is positive. In other words, the natural price of the product is the sum of the wage aw and profit raw at their natural rates, since we assume away the land rent, and in a growing economy the natural rate of wage is higher than the subsistence wage bp , which is the wage at the natural rate in a stationary economy. From (4) and (5), it can be easily seen that

$$1 = (1+s)(1+r)ab \quad (6)$$

must be satisfied by s and r .

From the definition of e ,

$$wL(t) = epX(t). \quad (7)$$

By substituting $L(t+1) = (1+g)L(t)$ and (7) into (1), we have

$$w = (1+g)bp. \quad (8)$$

Smith's assumption that s is positive when g is positive is justified, therefore, in the balanced growth path of our model, since $s = g$ from (5) and (8).

Similarly, by substituting $X(t+1) = (1+g)X(t)$ and (7) into (2), we have

$$ecp = (1+g)aw. \quad (9)$$

As Smith assumed, therefore, r is higher if g is higher, since (4) and (9) imply that $ec(1+r)=(1+g)$. In view of the fact that $s=g$, then, both s and r can be higher, if g is higher, provided that the rate of saving ec remains constant. In other words, the coexistence of high profit and high real wage is possible, if the labor productivity $1/a$ is high so that the rate of growth is high.

IV

If the rate of saving is increased either through an increase in e or through an increase in c , there is an increase in the rate of growth g , as is seen in (3). This increases s and the real wage w/p in (5), since $s=g$ as we saw in the above. The increased s implies that the rate of profit r decreases from (6). As far as the balanced growth path is concerned, therefore, the analysis of our Smithian growth model would confirm the following argument insisted by Adam Smith in *The Wealth of Nations*.

The rise and fall in the profits of stock depend upon the same causes with the rise and fall in the wages of labour, the increasing or declining state of the wealth of the society; but those causes affect the one and the other very differently. The increase of stock, which raises wages, tends to lower profit. When the stocks of many rich merchants are turned into the same trade, their mutual competition naturally tends to lower its profit; and when there is a like increase of stock in all the different trades carried on in the same society, the same competition must produce the same effect in them all (Smith 1976, p. 105).

This argument of Smith was, however, criticized severely by Ricardo. He insisted that the rate of profit falls as capital accumulated, only through the diminished labour productivity in agriculture, as a result of the capital accumulation on the limited land, an effect which we assumed away in our Smithian growth model.

[N]o accumulation of capital will permanently lower profits, unless there be some permanent cause for the rise of wages. If the funds for the maintenance of labour were doubled, trebled, or quadrupled, there would not long be any difficulty in procuring the requisite number of hands, to be employed by those funds; but owing to the increased difficulty of making constant additions to the food of the country, funds of the same value would probably not maintain the same quantity of labour. If the necessaries of the workman could be constantly increased with the same facility, there could be no permanent alternation

in the rate of profits or wages, to whatever amount capital might be accumulated. Adam Smith, however, uniformly ascribes the fall of profits to accumulation of capital, and to the competition which will result from it, without ever adverting to the increasing difficulty of providing food for the additional number of labourers which the additional capital will employ (Ricardo 1951, p. 289).

The difference between Smith and Ricardo arises from the different definitions of the natural rate of wage. For Ricardo, the natural wage is a constant real wage at the subsistence level. "The natural price of labour is that price which is necessary to enable the labourers, one with another, to subsist and to perpetuate their race, without either increase or diminution" (Ricardo 1951, p. 93). It cannot, therefore, rise as the real wage, i.e., the wage in terms of food. It can rise only in the sense that the embodied labour value of the subsistence wage rises. In our notations in the previous section, the real subsistence wage is b while its labour value is ba , which rises when a , i.e., the difficulty of providing food, is increased. According to Ricardo, it is the market wage or the market price of labour that can be higher than the subsistence wage, when the labour is scarce and the population is increasing.

For Adam Smith, as we saw, the natural, not the market, rate of real wage is higher, when the rate of saving is higher, even if the difficulty of providing food remains unchanged. In spite of Ricardo, this rise in wage is not "a temporary rise, proceeding from increased funds before the population is increased" (Ricardo 1951, p. 289). As a matter of fact, the natural rate of wage is reduced, rather than increased, by the increasing difficulty of providing food itself, since higher a implies lower g from (3), and lower g implies lower w/p from (8).

V

Let us now consider the role of demand in the determination of natural prices of commodities by using the model which was developed in the Section III. There are two consumers' goods in this simple model, the labour service which is consumed in the capitalists' households, and the labour product which is consumed by both capitalists and labourers. Smith considered that the former good is produced by what he called unproductive labour and simultaneously consumed by consumers. "His services generally perish in the very

instant of their performance" (Smith 1976, p. 330). The latter is, on the other hand, produced by what Smith called productive labour which, unlike unproductive one, needs a period of production to be produced but yields positive profits to what is advanced by capitalists. "Thus the labour of a manufacturer adds, generally, to the value of the materials which he works upon, that of his own maintenance, and of his master's profit" (Smith 1976, p. 330).

The natural price of the latter good is defined as the sum of wages and the profit, both at the natural rate, i.e.,

$$p=(1+r)aw \quad (4)$$

while the natural price of the former good is the natural rate of wage itself, i.e.,

$$w=(1+s)bp, \quad (5)$$

as was considered in the Section III.

As was seen in the Section IV, Ricardo considered that the natural wage is the subsistence wage, so that $s=0$ and $w=bp$ in (5). From (4) and (5), then,

$$(1+r)=1/ab, \quad w/p = b \quad (10)$$

in Ricardo's natural equilibrium.⁵ Since a and b are technological parameters, we can say that natural prices (including natural rate of profit) are determined by purely technological or cost consideration in Ricardian economics and the role of demand is essentially disregarded by Ricardo.

In the case of Smith's theory of natural prices, however, $s=g$ as we saw in the Section III so that w/p depends on g from (5). Since g is dependent on demand parameters e and c as well as on technological parameters a and b as we saw in (3) in the Section III, the role of demand is definitely taken into consideration in the determination of relative price of two consumers' goods. Any changes in c and e , which increases (decreases) the rate of saving ec , and therefore the rate of growth g , increases (decreases) the real wage w/p , i.e., the relative price of a good with the zero period of production to a good with a positive period of production. The rate of profit is, of course, reduced (raised) by an increase (a decrease) in ec . Although there are only two goods in our model, it requires little stretch of

⁵ See Pasinetti(1960) for Ricardo's natural equilibrium, in which capital is accumulating while population is stationary.

imagination to suppose that generally the high real wage and the low rate of profit, caused by the high rate of saving, make the relative price of a good with a longer period of production cheaper.⁶

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⁶Our Smithian model of growth disregards the possibility of not only diminishing returns but also of increasing returns. Unlike the former possibility, however, Smith emphasized the latter one in his theory of the division of labour. See Negishi (1988, pp. 89-95) for the role of demand for the determination of prices in Smith's theory of the division of labour.