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MACRO EQUILIBRIUM AND EXPECTATION

By Satoshi SECHIYAMA*

I Introduction

Keynes and post-Keynesian, as Kregel insists, have been putting emphasis in their analyses on the principle of the effective demand and its extension in the dynamic context by locking up the effect of expectations and uncertainties. But, as Kregel also admits, the question still remains important how macro equilibrium will shift in face of a change in expectations[1]. In fact, Keynes himself often referred in *General Theory* to the shift of macro equilibrium caused by a change in expectations.

The common procedure to handle this question has been to look for the cause of the shift of equilibrium in the shift of the aggregate demand, especially in the shift of investment. It is not wrong to do so. But in view of the fact that a change in expectations will give rise to not only a shift of the aggregate demand curve, but a shift of the aggregate supply curve, the procedure does not seem to have incorporated the full effect of a change in expectations. The purpose of the present paper is to make clear the neglected relation between expectation and the aggregate supply curve which appears to be just a summary of technological data, and, by specifying the time horizons of expectation, to show the possibility that the aggregate demand function and the aggregate supply function will connectedly shift in face of a change in expectations. Later it will become clear that these arguments are based on the existence of the user cost which reflects the future expectations of an entrepreneur.

II Formulation of the User Cost

An entrepreneur should decide his today's production plan so as to fit his future production. Due to the fact that some equipments or raw materials cannot be purchased in required amount just when needed, the use of such fixed resources in today's production necessarily affects the scale of future production. So the entrepreneur is forced all at once to decide the entire stream of inputs and outputs flowing from today ($t=0$) to a particular period in future ($t=\nu$)[2].

Suppose that the entrepreneur faces the following situation. There are n goods, each of which we divide further into $\nu+1$ different goods, according to the point of time

* Associate Professor.

1) J. A. Kregel, 'Economic Methodology in the Face of Uncertainty: The Modelling Methods of Keynes and the Post-Keynesian's, *Economic Journal*, vol. 86 (June 1976).

2) We define ν as the nearest point of time in future when the fixed resource can become currently purchasable. We shall consider it in more detail in section IV.

when they get involved in production. Then the entrepreneur's decision should cover $n(\nu+1)$ goods, x_{it} $(i=1,2,\dots,n;\ t=0,1,\dots,\nu)$. To simplify the matter, his outputs consist only of the first sort of goods with the rest all inputs. That is, $x_{1t}>0$ $(t=0,1,\dots,\nu)$ and $x_{it}<0$ $(i=2,3,\dots,n;\ t=0,1,\dots,\nu)$. And let us further assume that the n th sort of goods is the only fixed resource in his production. He possesses a bundle of blue prints as to technology, which could be summarized in the following transformation;

$$f(x_{10},\ \dots\dots,\ x_{n0};\ x_{11},\ \dots\dots,\ x_{n1};\dots\dots;\ x_{1\nu},\ \dots\dots,\ x_{n\nu})=0. \tag{1}$$

The set of $n(\nu+1)$ goods has as its counterpart the set of $n(\nu+1)$ positive prices, $p_{it}>0$ $(i=1,2,\dots,n;\ t=0,1,\dots,\nu)$, among which today's prices are defined tentatively as market prices prevailing today, while future prices as what the entrepreneur expects to be in future. Then the optimal production for him is the one to maximize the present value of expected profits based on his expectations as to future prices; that is, to organize production such that, subject to the technological restriction (1), it will maximize

$$\Pi=\sum_t\Big(\sum_i \beta_t p_{it} x_{it}\Big), \tag{2}$$

where β_t stands for the present value of 1 yen at the t th period.

If the transformation (1) is endowed with certain desired properties, the optimal set of inputs and outputs should be determined so as to satisfy

$$\frac{p_{ir}\beta_r}{p_{js}\beta_s}=\frac{\dfrac{\partial f}{\partial x_{ir}}}{\dfrac{\partial f}{\partial x_{js}}} \qquad \begin{array}{l} i,j=1,\ 2,\ \dots\dots,\ n \\ r,\ s=0,\ 1,\ \dots\dots,\ \nu. \end{array} \tag{3}$$

Obviously from (3), today's production depends not only on today's prices but on expected future prices. Corresponding to the optimal production, there exists the optimal price-cost relation. A unit increase in today's output will cause the inputs and outputs of future goods as well as today's inputs to change such that

$$\frac{\partial f}{\partial x_{10}}dx_{10}+\frac{\partial f}{\partial x_{20}}dx_{20}+\dots\dots+\frac{\partial f}{\partial x_{n\nu}}dx_{n\nu}=0.$$

Substitute the equilibrium condition (3) into this, then

$$\begin{aligned} p_{10}=\beta_0&\Big(-p_{20}\frac{dx_{20}}{dx_{10}}-\dots\dots-p_{n0}\frac{dx_{n0}}{dx_{10}}\Big)+\dots\dots \\ +\beta_t&\Big(-p_{1t}\frac{dx_{1t}}{dx_{10}}-\dots\dots-p_{nt}\frac{dx_{nt}}{dx_{10}}\Big)+\dots\dots \\ +\beta_\nu&\Big(-p_{1\nu}\frac{dx_{1\nu}}{dx_{10}}-\dots\dots-p_{n\nu}\frac{dx_{n\nu}}{dx_{10}}\Big). \end{aligned}$$

With $\beta_0=1$ and $\Pi_t\equiv\beta_t\sum p_{it}x_{it}$, we get

$$\begin{aligned} p_{10}=&\Big(-p_{20}\frac{dx_{20}}{dx_{10}}-\dots\dots-p_{n0}\frac{dx_{n0}}{dx_{10}}\Big)+\dots\dots \\ &+\Big(-\frac{d\Pi_1}{dx_{10}}\Big)+\dots\dots+\Big(-\frac{d\Pi_\nu}{dx_{10}}\Big), \end{aligned} \tag{4}$$

or

$$(4)' \qquad \frac{d\Pi_0}{dx_{10}} = \left(-\frac{d\Pi_1}{dx_{10}}\right) + \cdots\cdots + \left(-\frac{d\Pi_\nu}{dx_{10}}\right).$$

In the state of equilibrium the price of today's output should make up for not only the marginal costs incurred by using some goods in production but the foregone future profits entailed just by the same activity. (4) shows this. Alternatively, as is shown in (4)′, the increase in present profits[3] due to a unit increase in today's output should be equal to the amount of sacrificed future profits. If all inputs could be currently purchasable and their carrying costs were prohibitively high, then any change in today's output would never affect the level of future profits. But the existence of the fixed resource will connect a change in today's output with a change in future profits because the entrepreneur must allocate given total services of the fixed resource over productions operated in various periods of time. Thus it is natural that we should consider the foregone fuutre profits in terms of the fixed resource, i.e., the n th goods.

The price of the n th goods is the one for which the entrepreneur purchased it in the market. But, in view of sacrifice in future profits suffered by using some portion of the n th goods in today's production, to evaluate its value by p_{n0} would amount to undervaluation. The real costs as to the n th goods, incurred by a unit increase in today's output, should be estimated not by p_{n0}, but by a new price such that

$$(5) \qquad -p_{n0}'\frac{dx_{n0}}{dx_{10}} \equiv -p_{n0}\frac{dx_{n0}}{dx_{10}} + \left(-\frac{d\Pi_1}{dx_{10}}\right) + \cdots\cdots + \left(-\frac{d\Pi_\nu}{dx_{10}}\right),$$

or

$$(5)' \qquad p_{n0}' \equiv p_{n0} + \frac{d\Pi_1}{dx_{n0}} + \cdots\cdots + \frac{d\Pi_\nu}{dx_{n0}}.$$

Let us suppose that the factor cost consists only of labour. With x_{20} labour inputs today, the user cost U for producing x_{10} is given by

$$(6) \qquad -U = \sum_{i=3}^{n-1} p_{i0}x_{i0} + p_{n0}'x_{n0}.$$

In the Appendix to Chapter 6 in *General Theory* Keynes remarks on the user cost;

> User cost constitutes one of the links between the present and the future. For in deciding his scale of production an entrepreneur has to exercise a choice between using up his equipment now and preserving it to be used later on. It is the expected sacrifice of future benefit involved in present use which determines the amount of the user cost, and it is the marginal amount of this sacrifice which, together with the marginal factor cost and the expectation of the marginal proceeds, determines his scale of production.

The user cost defined in (6) gives a more definite formulation to what Keynes had in mind about the user cost[4].

3) This definition differs from Keynes' profit in that he regards as a cost element not only $-\sum_{i=2}^{n} p_{i0}x_{i0}$ but sacrificed future profits.

4) Cf. J. R. Hicks, *Value and Capital*, 2nd ed. 1965, p. 198.

III The Aggregate Supply Function and Its Shift

Given prices of present and future goods, the optimal production has been determined so as to satisfy (3). With the set of inputs and outputs thus determined, the aggregate supply is defined as the difference between the sales proceeds and the user cost. That is,

$$Z \equiv p_{10}x_{10} - U. \tag{7}$$

Replacing today's output price p_{10} with the level of employment x_{20} as an independent variable, we can regard (7) as a function of the level of employment and all prices other than p_{10}. We call it the aggregate supply function after Keynes.

To begin with, we consider the shape of the function[5]. For the firm to be viable, the optimal production should enable the entrepreneur to earn positive profits. This would mean that the marginal cost given by (4) should exceed the average cost

$$-p_{20}\frac{x_{20}}{x_{10}} - \sum_{i=3}^{n-1} p_{i0}\frac{x_{i0}}{x_{10}} - p'_{n0}\frac{x_{n0}}{x_{10}}.$$

This condition will normaly hold since

$$\frac{dx_{i0}}{dx_{10}} < \frac{\partial x_{i0}}{\partial x_{10}} < \frac{x_{i0}}{x_{10}} < 0,$$

if we take for granted that a unit increase in output should require an increase in each input. With the total cost C, the average cost $\frac{C}{x_{10}}$, and the marginal cost C', let us compare the change in the total revenue $C'x_{10}$ with the change in the total cost. Then the former is greater than the latter, because in the equation

$$\frac{d}{dx_{10}}(C'x_{10}) = C' + C''x_{10},$$

$C''>0$ from the stability condition attached to (1). Let us further compare the change in the marginal revenue with the change in the marginal cost. In the equation

$$\frac{d^2}{dx_{10}^2}(C'x_{10}) = 2C'' + C'''x_{10},$$

it is not unreasonable to assume that $C''' \geqq 0$. Then it follows that the former is greater than the latter.

Thus we have confirmed the two rules as to the relation between the change in the total revenue and the change in the total cost, each entailed by a unit increase in output. Since a rise in the level of employment would lead to an increase in output and *vice versa*, the same rules are expected to hold between the change in the total revenue and the total cost the increased level of employment will cause. From the first rule

$$-\frac{\partial}{\partial x_{20}}\left(-p_{20}x_{20} - \sum_{i=3}^{n-1} p_{i0}x_{i0} - p_{n0}'x_{n0}\right) < -\frac{\partial}{\partial x_{20}}(p_{10}x_{10}).$$

5) Not a few economists have referred to the shape of the aggregate supply function, but they have not paid any attention to the existence of the user cost. See, for example, A. L. Marty, 'A Geometrical Exposition of the Keynesian Supply Function', *Economic Journal*, vol. 71 (Sept. 1961).

Adding $\frac{\partial}{\partial x_{20}}(p_{10}x_{10})-\frac{\partial}{\partial x_{20}}(p_{20}x_{20})$ to both sides,

$$\frac{\partial Z}{\partial x_{20}}<-\frac{\partial}{\partial x_{20}}(p_{20}x_{20})=-p_{20}<0.$$

Therefore the aggregate supply will increase with a rise in the level of employment (N.B. The amounts of input carry the negative sign). From the second rule, we get

$$\frac{\partial^2}{\partial x_{20}^2}\left(-p_{20}x_{20}-\sum_{i=3}^{n-1}p_{i0}x_{i0}-p_{n0}'x_{n0}\right)<\frac{\partial^2}{\partial x_{20}^2}(p_{10}x_{10}).$$

Hence $$\frac{\partial^2 Z}{\partial x_{20}^2}>0.$$

Thus the aggregate supply function is convex to the origin with the level of employment on the horizontal axis.

Applying the same rules, we can say a few things on the change in price brought about by an increase in output or the level of employment. Because of the increasing marginal cost, the output price will rise with the level of employment. How about the value of the fixed resource? Obviously from the rules, the current profits, which amounts to the profits in Keynesian sense as the difference between the total revenue and the sum of the user cost and the factor cost, will cumulatively rise with an increase in output. Therefore the present profit defined in the last section as

$$\Pi_0\equiv\sum_{i=1}^{n}p_{i0}x_{i0}$$

will increase more cumulatively than the current ones. That is,

$$\frac{d^2\Pi_0}{dx_{10}^2}>0 \quad\text{or}\quad \frac{\partial}{\partial x_{20}}\left(\frac{d\Pi_0}{dx_{10}}\right)<0.$$

In view of (4)′, this would mean that the marginal sacrifice of future profits will increase with a rise in the levels of output and employment. From (5)′ we get

$$\begin{aligned}\frac{dp_{n0}'}{dx_{10}}&=\frac{d}{dx_{10}}\left(\frac{dx_{10}}{dx_{n0}}\right)\left(\frac{d\Pi_1}{dx_{10}}+\cdots\cdots+\frac{d\Pi_\nu}{dx_{10}}\right)\\&\quad+\frac{dx_{10}}{dx_{n0}}\cdot\frac{d}{dx_{10}}\left(\frac{d\Pi_1}{dx_{10}}+\cdots\cdots+\frac{d\Pi_\nu}{dx_{10}}\right).\end{aligned}$$

For the above reason all the factors except $\frac{d}{dx_{10}}\left(\frac{dx_{10}}{dx_{n0}}\right)$ in the equation take the negative sign, whereas $\frac{d}{dx_{10}}\left(\frac{dx_{10}}{dx_{n0}}\right)$ will be positive since the marginal amount of the fixed resource required for a unit increase of output is supposed to increase with the level of output. So the change in the value of the fixed resource depends on the magnitudes of the first and second terms in the equation. Of course we cannot say much about the direction of the change unless we could somehow specify the technological transformation (1). But if, as is the case with the fixed resource such as capital equipments, the marginal required amount remains constant in spite of a change in output, then we might well take $\frac{d}{dx_{10}}\left(\frac{dx_{10}}{dx_{n0}}\right)$ as zero. In that case $\frac{dp_{n0}'}{dx_{10}}>0$. So the conclusion would be that the value of the fixed resource is very likely to get higher with a rise in the level of output.

Since the aggregate supply price includes the user cost, so there will arise its shift corresponding to a change in expectations. Now let us consider the effect of a change in expectations on the aggregate supply function by taking up a specific pattern of expectational change. Suppose that any change in expectations occurs in such a way that each expected price of future goods varies at the same rate. Then the proportionate price change with respect to the group of future goods I_F will exert on the group of present goods I_P such an effect as

$$\sum_{i\in I_F}\sum_{j\in I_P} p_j \frac{\frac{\partial x_j}{\partial p_i}}{p_i}.$$

From Hicks' rules[6], the effect is negative. In other words, since $\sum_{i\in I_F}\sum_{j\in I_P} p_i p_j X_{ij}'>0$ with $X_{ij}'\equiv-\frac{\partial x_j}{\partial p_i}$, there will prevail the technological substitution between the two groups. Thus a change in expectations would decrease the present profits. This is easily seen by rewriting the above equation in the form that

$$\text{(8)} \qquad \sum_{j\in I_P} p_j\left(\sum_{i\in I_F}\frac{\frac{\partial x_j}{\partial p_i}}{p_i}\right)<0.$$

Let us designate the state of expectations and its change respectively as E and $\varDelta E$. Then a change in expectations will bring about the following change in the position of the aggregate supply function:

$$\frac{\partial Z}{\partial E}\equiv\frac{\partial(p_{10}x_{10})}{\partial E}+\frac{\partial}{\partial E}\left(\sum_{i=3}^{n-1}p_{i0}x_{i0}\right)+\frac{\partial p_{n0}'x_{n0}}{\partial E},$$

where, needles to say, x_{20} and the prices of current inputs p_{i0} $(i=2, 3, \ldots, n)$ are supposed to remain constant. The right side to the equation can be grouped into $p_{10}\frac{\partial x_{10}}{\partial E}+\sum_{i=3}^{n-1}p_{i0}\frac{\partial x_{i0}}{\partial E}+p_{n0}'\frac{\partial x_{n0}}{\partial E}$ and $x_{10}\frac{\partial p_{10}}{\partial E}+x_{n0}\frac{\partial p_{n0}'}{\partial E}$; we call the former quantity effect of an expectational change and the latter price effect. $p_{n0}'\geq p_{n0}$, and $\sum_{i\in I_F}\frac{\frac{\partial x_{n0}}{\partial p_i}}{p_i}\equiv\frac{\partial x_{n0}}{\partial E}<0$ from the very definition of the fixed resource. So, together with (8), the quantity effect is negative. To give the direction of the price effect, we begin with the change in the output price. Differentiating both sides of (4) with respect to E, we get

$$\text{(9)} \qquad \frac{\partial p_{10}}{\partial E}=\left[-p_{20}\frac{\partial\left(\frac{dx_{20}}{dx_{10}}\right)}{\partial E}-\cdots\cdots-p_{n0}\frac{\partial\left(\frac{dx_{n0}}{dx_{10}}\right)}{\partial E}\right]+\left[-\frac{\partial}{\partial E}\left(\Sigma\frac{d\Pi_t}{dx_{10}}\right)\right].$$

The first and the second bracket in the right side give the change in marginal inputs costs

6) See Hicks, *ibid.*, pp. 321–2.

and the change in the marginal sacrifice of future profits respectively. So $\frac{\partial p_{10}}{\partial E}$ will be positive or negative according to whether or not the increase in the marginal sacrifice of future profits gets greater than the decrease in the marginal costs.

Next we turn to the change in the value of the fixed resource. The marginal cost as to the fixed resource has already been given in (5). Differentiating it with respect to E, we get

$$-\frac{\partial p'_{n0}}{\partial E}\cdot\frac{dx_{n0}}{dx_{10}}=-\frac{\partial}{\partial E}\left(\sum_{t=1}^{\nu}\frac{d\Pi_t}{dx_{10}}\right)+(p'_{n0}-p_{n0})\frac{\partial}{\partial E}\left(\frac{dx_{n0}}{dx_{10}}\right).$$

The marginal sacrifice of future profits will rise with the proportionate price hike as to future goods, i.e., $\frac{\partial}{\partial E}\left(\sum_{t=1}^{\nu}\frac{d\Pi_t}{dx_{10}}\right)<0$. And since, as is also known, $\frac{\partial}{\partial E}\left(\frac{dx_{n0}}{dx_{10}}\right)\geq 0$ and $p'_{n0}\geq p_{n0}$, the right side in the equation is positive. Therefore $\frac{\partial p'_{n0}}{\partial E}>0$, considering that $\frac{dx_{n0}}{dx_{10}}<0$. Thus the value of the fixed resource will go up with the proportionate increase in the expected prices of future goods.

When a change in expectations takes place, the price of output, unlike that of the fixed resource, would change in either direction. Since the price effect is given as a sum of both price changes with the amount of current output and that of the current input as their respective weights, it is difficult to tell which direction the price effect will take. The only case in which the definite answer will come up is the one where $\frac{\partial p_{10}}{\partial E}\leq 0$. In this case the price effect is negative. But even if $\frac{\partial p_{10}}{\partial E}>0$, we could derive the negative price effect from the assumption that the marginal required amount of the fixed resource will remain constant with a rise in output.

Rewriting (9) in view of the definition of p_{n0}', we get

$$\frac{\partial p_{10}}{\partial E}=-p_{20}\frac{\partial\left(\frac{dx_{20}}{dx_{10}}\right)}{\partial E}-\cdots\cdots-p_{n-10}\frac{\partial\left(\frac{dx_{n-10}}{dx_{10}}\right)}{\partial E}-p_{n0}\frac{\partial\left(\frac{dx_{n0}}{dx_{10}}\right)}{\partial E}-\frac{\partial p_{n0}'}{\partial E}\cdot\frac{dx_{n0}}{dx_{10}},$$

where all the terms are negative except for the last one which is already known to be positive. Hence

$$\frac{\partial p_{10}}{\partial E}+\frac{\partial p'_{n0}}{\partial E}\cdot\frac{dx_{n0}}{dx_{10}}<0.$$

Taking into account the previous assumption that $\frac{dx_{n0}}{dx_{10}}\approx\frac{x_{n0}}{x_{10}}$,

$$x_{10}\frac{\partial p_{10}}{\partial E}+x_{n0}\frac{\partial p'_{n0}}{\partial E}<0.$$

Thus we get the negative price effect.

Many empirical studies on the cost behaviour so far tell us that the constant returns to scale prevail especially among large corporations. This fact would allow us to add a plausible assumption that $\frac{dx_{i0}}{dx_{10}}$ $(i=2, 3, \ldots, n)$ remains constant in the vicinity of the equilibrium. Then $\dfrac{\partial\left(\dfrac{dx_{i0}}{dx_{10}}\right)}{\partial E}=0$ $(i=2, \ldots, n)$. Therefore

$$\frac{\partial p_{10}}{\partial E}=-\frac{\partial p_{n0}'}{\partial E}\cdot\frac{dx_{n0}}{dx_{10}}.$$

In the case of constant returns to scale, the output price will vary proportionately with the price of the fixed resource. But the price effect is zero because the price changes of both goods cancel each other.

We could summarize our arguments as follows. It is likely that the aggregate supply curve will shift downward with the proportionate rise in future goods' prices since the price effect is in practice nonpositive and the quantity effect on the other hand definitely negative. And the same change in expectations will lead through a rise in the marginal sacrifice of future profits to a higher evaluation of the fixed resource, which will, in turn, push up the current output price in the case of constant returns to scale: otherwise a sufficiently large change in the value of the fixed resource would end up with the same result. Anyway it is true that whenever the output price goes up, it always accompanies a rise in the value of the fixed resource.

IV The Time Horizon in Expectations

In sections II and III we referred to a particular point of time as "the nearest point of time in future when the fixed resource becomes currently purchasable" (p. 55 fn.). What economic implication does this point of time have?

The entrepreneur is usually supposed to frame two types of expectations about future. The first type is concerned with the price, the cost and the level of output which he can get for his finished goods; the second type being concerned with future returns he can hope to earn if he carries an investment as an addition to his capital equipment. It is well known that Keynes called the former short-term expectation and the latter long-term expectation[7]. The short-term expectation in the Keynesian sense corresponds with our current values such as x_{i0}s and p_{i0}s.

The short-term expectation plays an important role in determining daily output, but so does the expectation as to future lying beyond the point of time when the entrepreneur has carried out his current production plan. For the expectation as to those future periods from $t=1$ to $t=\nu$ as well affects the level of daily output through the user cost, especially through the value of the fixed resource. On the other hand the long-term expectation is concerned with the future profits the entrepreneur can hope to get from his investment. Since investment is nothing but an addition to the fixed resource he ownes, the stream of expected returns from the investment will begin to flow from the $\nu+1$ th period on. And the entrepreneur would determine the level of investment such that the value of investment should be equalized to the cost of investment, i.e.,

7) See J. M. Keynes, *The General Theory of Employment, Interest and Money*, 1936, pp. 64–7.

$$(10) \qquad I=\sum_{t=\nu+1}^{T} \Pi_t, \ \Pi_t=\beta_t \sum_{i=1}^{n} p_{it}x_{it}.$$

In the equation T refers to the final point of time the new equipment is expected to survive, and x_{it} belongs to a new production frontier made available by the investment.

Taking all into account, we should pay due attention to the expectation taken as to those periods $t=1$ to ν. We shall define it as the middle-term expectation.

But those three time horizons in expectation are not completely separate from each other. In terms of time, they combine to form a chain with links. In addition there also exists some dependence among them. For example, the short-term expectation depends on the middle-term or long-term one, though not vice versa.

Given these considerations, we shall briefly explain the shift of macro equilibrium caused by a change in the long-term expectation. When the long-term expectation takes a favourable turn for the entrepreneur, he is supposed from (10) to expand his investment. He will also expect the sales proceeds in the system as a whole to increase and is likely to alter the expected price of his output. In short he will make some suitable adjustments to the change in the long-term expectation along his aggregate supply curve.

The procedure which explains the shift of macro equilibrium mainly in terms of a shift of the aggregate demand function implicitly focuses on this type of the entrepreneur's adjustment. But this is not all a change in the long-term expectation would bring about. It will also induce the entrepreneur to make another type of adjustments which will result in a shift of his aggregate supply function. For the change in the long-term expectation would lead him in the following way to revise his expected prices as to future goods and current input goods which have been treated as given data in his aggregate supply function. We shall begin with the revision as to future goods prices. According to the definitions above, future goods' prices belong to the middle-term expectation. Then a change in the long-term expectation will filter into the middle-term expectation through the link between, and lend itself to a change in the middle-term expectation. So, if a change in the long-term expectation is for the better, the entrepreneur will revise his expectation as to future goods prices in the same direction. In the light of the conclusion in the last section this revision is likely to induce him to make such type of adjustments as to shift the aggregate supply function downward.

If the entrepreneur expects that a change in the long-term expectation will soon or later produce an increase in the effective demand, he will also revise his expectations not only as to current output and its price level but as to the prices of current inputs. Let us suppose again that he expects all inputs' prices to rise at the same rate. Then the demand for inputs and therefore the level of output will decrease. Since, from the first rule in the last section, the total revenue decreases more than the total cost with a decrease in output, this will result in a decrease in current profits. That is,

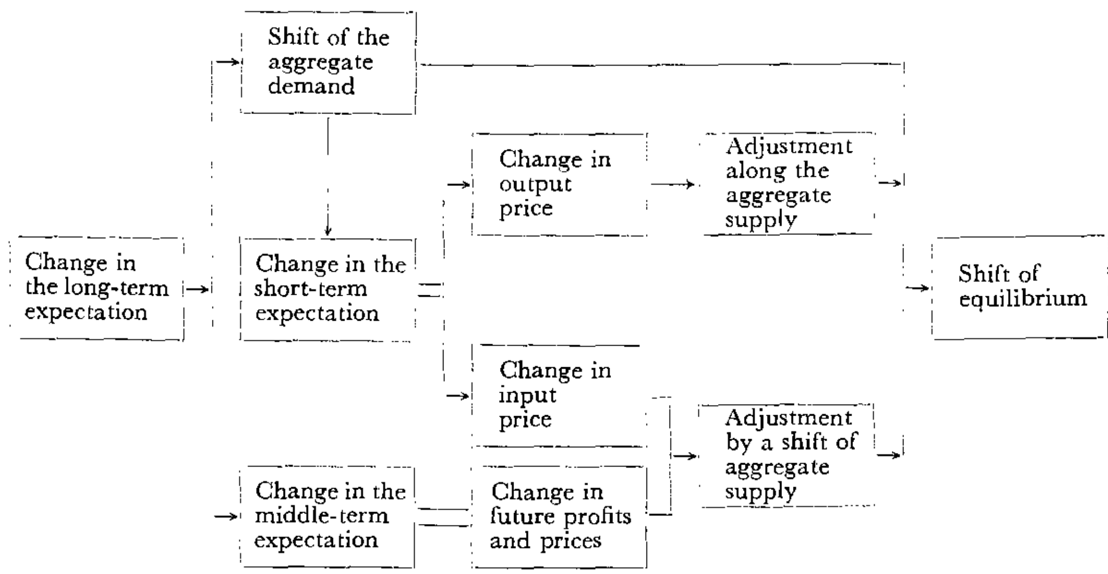
$$\frac{\partial}{\partial E'}\left(p_{10}x_{10}+p_{20}x_{20}+\sum_{i=3}^{n-1} p_{i0}x_{i0}+p'_{n0}x_{n0}\right)<0,$$

where E' stands for the state of expectation before change. In the equation x_{20} should be kept constant, and p_{20}, from the Keynesian assumption on the wage rate, could be regarded as a constant. Hence

$$\frac{\partial}{\partial E'}\left(p_{10}x_{10}+\sum_{i=3}^{n-1}p_{i0}x_{i0}+p'_{n0}x_{n0}\right)<0.$$

Thus a proportionate rise in expected prices of current inputs will cause a downward shift of the aggregate supply function.

A change in the long-term expectation will produce a shift of macro equilibriun in a cumulative way; first by inducing a shift of the aggregate demand and secondly by altering the middle-term and short-term expectations which will in the end make for a shift of the aggregate supply.



V Concluding Remarks

We have considered on various effect of a change in expectations, though by postulating a very specific pattern of it. The emphasis in the arguments is on the relation between the user cost and expectations.

As for the user cost *per se* there still remain a few problems to be considered. Robinson and Eatwell remarked on the significance of the user cost that it had provided an alternative explanation vieing with the theory of imperfect competition by Sraffa, Harrod and Robinson to account for the fact in the 30's that there existed positive gross profit margins with a lot of plants under-utilized[8]. In our terms the fact could be interpreted like this. When the entrepreneur hopes to get positive future profits (and

8) J. Robinson and J. Eatwell, *An Introduction to Modern Economics*, Revised ed., 1974, p. 173.

therefore p'_{n0} is greater than p_{n0}), positive gross profit margins will occur to him since he determines his price so as to cover the prime costs which include his evaluation of the fixed resource as an element in the user cost.

There is another interesting aspect to the user cost. As is shown in section II, the entrepreneur should determine his output price so as to cover not only the marginal prime cost $\left(-\sum_{i=2}^{n} p_{i0}\frac{dx_{i0}}{dx_{10}}\right)$ but the marginal sacrifice of future profits $\left(-\sum_{t=1}^{\nu}\frac{d\Pi_t}{dx_{10}}\right)$. In other words by repeating such procedure in each period, he would be reimbursed not only his initial costs but his expected future profits. Then

$$\sum_{t=1}^{\nu}\frac{d\Pi_t}{dx_{10}}\Big/\sum_{i=2}^{n} p_{i0}\frac{dx_{i0}}{dx_{10}}$$

will give him a mark-up ratio to be followed in his pricing. Thus it is not groundless to say that Keynes' concept of short-period supply price does have a lot in common with the full cost pricing.

Reference

[1] J. R. Hicks, *Value and Capital*, 2nd ed. 1965.

[2] J. M. Keynes, *The General Theory of Employment, Interest and Money*, 1936.

[3] J. A. Kregel, 'Economic Methodology in the Face of Uncertainty: The Modelling Methods of Keynes and the Post-Keynesians', *Economic Journal*, vol. 86 (June 1976).

[4] A. L. Marty, 'A Geometrical Exposition of the Keynesian Supply Function', *Economic Journal*, vol. 71 (Sept. 1961).

[5] J. Robinson & J. Eatwell, *An Introduction to Modern Economics*, Revised ed., 1974.