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Imperfect Markets and Commodity Prices Under Demand Pull

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ABSTRACT

This paper presents a theoretical view of imperfect market. It concludes that an increase in the price of products does not give any incentive to increasing production which shows the mechanism for upward trends in prices.

I. Introduction

Markets for resources as well as for products in general are characterized by imperfect competition. For example, labor markets are imperfect, partly due to the presence of unions and partly due to the minimum wage laws. Similarly, products are sold under either monoplistic competitions, oligopoly, or monopoly. Accordingly, the focus of this study is to show that under imperfect market conditions, a producer facing "demand pull" has no incentive to increase production, unless the price of the product rises beyond a certain level.

II. Analysis

For simplicity, let us consider that a monopsony firm uses two inputs: Labor (L) and capital (K). Let the monopsonist produce according to the following production function with the two inputs above:

$$Q = F(L,K) \quad \partial Q/\partial L > 0 \ ; \ \partial Q/\partial K > 0 \tag{1}$$

Where Q is the total output, L is the amount of labor and K is the amount of capital. The firm's total cost (TC) when it uses L units of labor at a price (w) and K units of capital at a price (r) to produce a speciated level of output Q is:

$$TC = A + wL = rK \tag{2}$$

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Where A is the fixed cost: As mentioned earlier, it is further assumed that markets for factors of production are imperfect; that is, prices w and r depend upon the amount of the factors used. Specifically, the demand functions for labor and capital are:

$$w = H(L)\ ;\ \partial H/\partial L > 0 \tag{3}$$

$$r = G(K)\ ;\ \partial G/\partial K > 0 \tag{4}$$

It can be easily shown (2,3) that the condition for the most efficient combination of factors to produce an output Q is:

$$\frac{w + L\partial H/\partial L}{\partial F/\partial L} = \frac{r + K\partial G/\partial K}{\partial F/\partial K} \tag{5}$$

Equation (5) states that the marginal outlay (MO) of a factor divided by the marginal productivity of that factor must be the same for all factors. It can also be shown that the marginal cost (MC) is given by:

$$MC = \frac{dtc}{dQ} = \frac{(w + L\partial H/\partial L)dL + (r + K\partial G/\partial K)dK}{\frac{\partial F}{\partial L}.dL + \frac{\partial F}{\partial K}.dK} \tag{6}$$

For simplicity, let us assume that the amount of capital employed in production is fixed. It is easy to see that in this case the marginal outlay by the firm for the variable factor must be equal to the marginal cost of the firm's output multiplied by the marginal product of the factor; that is,

$$MO\ (L) = w + L.dH/dL = MC.\partial F/\partial L \tag{7}$$

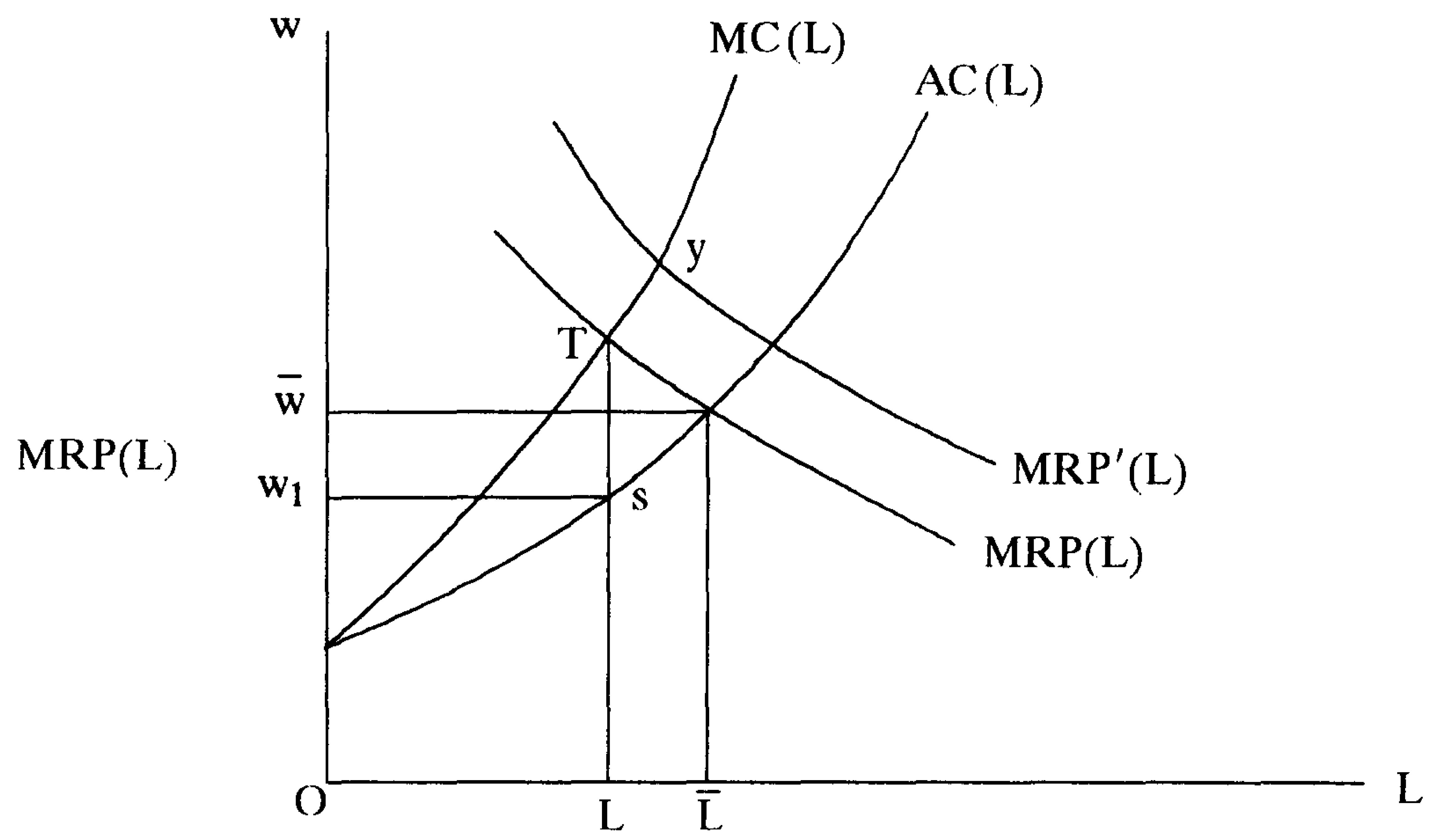
Where MO(L) is the marginal outlay of labor. Equation (7) may be rewritten as:

$$MC = \frac{MO(L)}{\partial F/\partial L} = \frac{w + L.dH/dL}{\partial F/\partial L} \tag{8}$$

Equation (8) states that the marginal cost of the product depends not only on the price of labor but the rate of change in this price and the marginal productivity of labor. It is well known (1,3) that the monoposonist producer, in the absence of union or government influence, would employ where MO(L) is equal to the marginal productivity of labor and pay a wage rate equal to w. This situation is shown in figure 1 by OL, where the amount of labor at the wage rate is equal to OW_1. However, when the government fixes the minimum wage rate, say w, equal to the wage rate which would prevail to the producer, the labor would be the price taker as well. Alternatively, one may even consider that the union strength dictates employment equal to OL at a wage rate equal to OW^{-1}. Under such conditions, the function (6) reduces to:

$$\overline{MC} = \bar{w}/\partial F/\partial L \text{ for } L \leq \bar{L} \tag{9}$$

Figure I: Labor Market



Equation (9) implies that the firm could produce up to $\bar{Q}$ units of output by hiring labor up to L units at a constant wage rate w (figure 1) to produce more than Q units, the firm must hire labor at a wage rate more than w. These facts produce discontinuities both in the marginal outlay function of labor and the marginal cost function of output (figures I and II). It can be easily proven that the marginal revenue product (or the marginal revenue) function interesects the marginal outlay (the marginal cost)function at the lowest point of this discontinuity.

The producer faced with increasing demand would find that frrm a profit maximization point of view, it would be optimun to employ $\bar{L}$ amount of labor and to produce output $\bar{Q}$ unless the demand curve DD has risen to D′ D′ so that the new marginal revenue function intersects just beyond the highest point of the discontinuity of the marginal outlay of labor. These situations are also graphically shown in figure I and II. The obvious result of this discontinuity is that in spite of the increase in price (within the above limits of discontinuity), the producer has no incentive to increase the output. This naturally adds fuel to the problem of demand pull inflation.

In order to examine the level of this inflation, let the two demand curves DD and D′ D′ for the product be represented respectively by the following functions:

$$P_q = f_1(Q) \; ; \quad df_1/dQ < 0 \tag{10}$$

$$P_q = f_2(Q) \; ; \quad df_2/dQ < 0 \tag{11}$$

where P_q is the price of the product and Q is the quantity demanded.

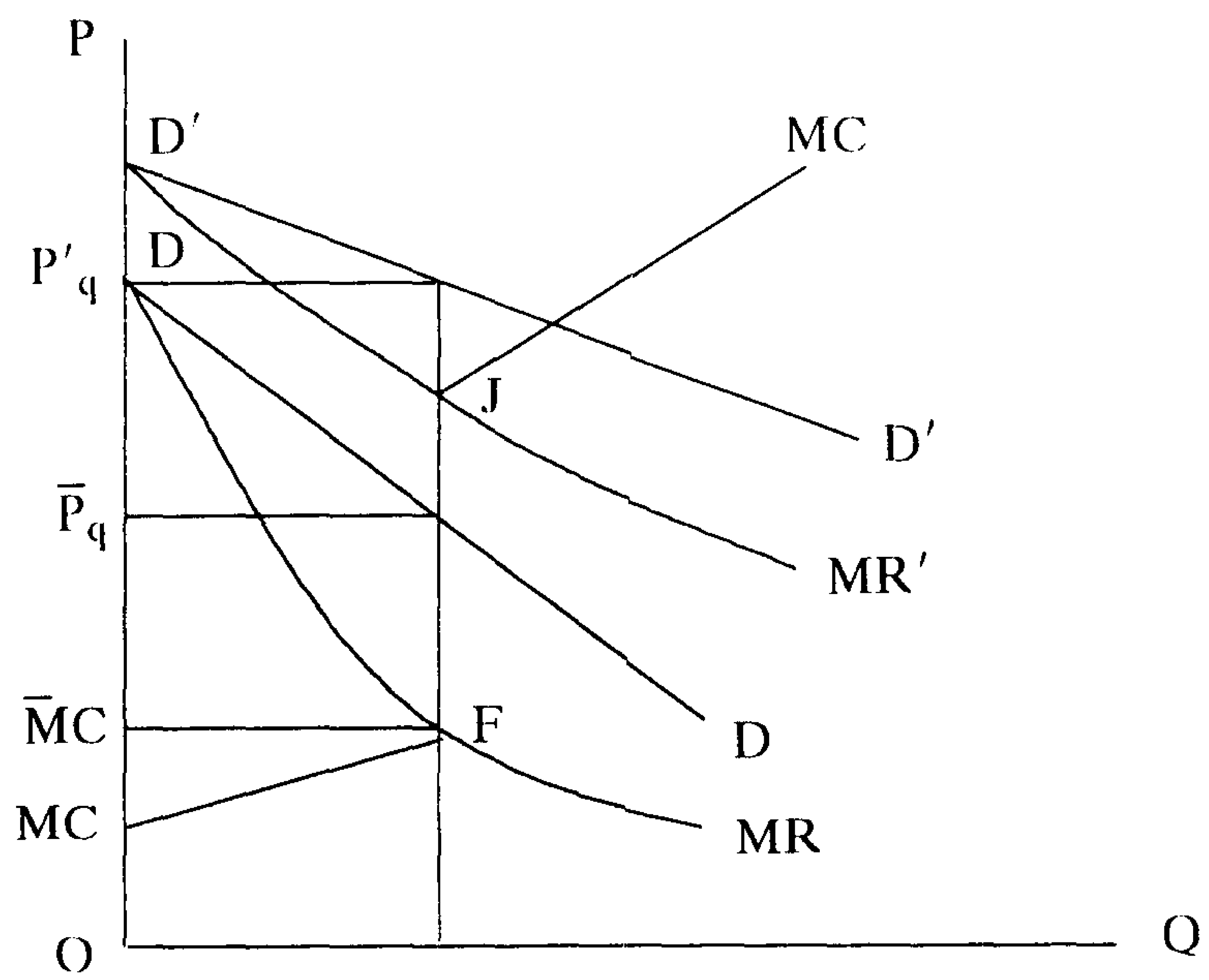
It is obvious that ΔMR- the minimum increase in the marginal revenue- needed to increase the output is given by:

$$\Delta MR = FJ = d/dQ \quad Q.f_2(Q)_{\bar{Q}} - d/dQ \quad Q.f_1(Q)_{\bar{Q}}$$

or $$\Delta MR = f_2(\bar{Q})\bar{L}[1 + 1/\bar{e}_1] - f_1(\bar{Q})[1 + 1/\bar{e}_2] \qquad (12)$$

where $\bar{e}_1 = (1/df_1)/(dQ).\bar{Q}/f_1(\bar{Q}) =$ Price elasticity for quantity $\bar{Q}$ on f_1 and $\bar{e}_2 = 1/df_2/dQ.\bar{Q}/f_1(\bar{Q}) =$ Price elasticity for quantity $\bar{Q}$ on f_2.

Figure II: Product Market



Using (3), one calculates the marginal labor outlay at point Y as follows:

$$\overline{LY} = (L.dH/dL - L + H(\bar{L}) \qquad (13)$$

However, we know that the value of the marginal outlay at point X is:

$$\overline{LX} = H(\bar{L}) \qquad (14)$$

From (13) and (14) we obtain the value of the gap XY as follows:

$$XY = (L.dH/dL)\bar{L} \qquad (15)$$

Dividing (15) by $\partial F/\partial L$ gives the value of the gap FJ

$$FJ = \Delta MR = XY/\partial F/\partial L = (L.dH/dL)\bar{L}/(\partial F/\partial L)\bar{L}$$

$$= 1/\bar{e}_w.\bar{W}/(\partial F/\partial L)\bar{L}. \text{ Where } e_w = \bar{W}/\bar{L}.1/(dH/dL)\bar{L}$$

$$= 1/\bar{e}_w.\overline{MC} \qquad (16)$$

Equating (12) and (16) we obtain

$$f(\overline{Q})(1+\frac{1}{e_2}) - f(\overline{Q})(1+\frac{1}{e_1}) = 1/\bar{e}_w . \overline{MC} \quad (17)$$

Equation (17) can be rewritten as follows:

$$[f_2(\overline{Q}) - f_1(\overline{Q})]/f_1(\overline{Q})$$
$$= 1/f_1(\overline{Q}).1/\bar{e}_w.\overline{MC}.1/(1+\frac{1}{e_2}) + (1+\frac{1}{e_1})/(1+\frac{1}{e_2}) - 1 \quad (17)$$

Equation (17) implies that the relative demand - pull inflation rate due to imperfect markets depends upon: (i) the initial price of the product, (ii) the initial marginal cost of production, (iii) the supply elasticity of labor, and (iv) the price elasticities of the two demand curves - before and after a shift. The following possible cases are of interest: (a) If both the labor and product markets are under perfect competition, then from (17) it is clear that the relative demand - pull inflation rate - will be zero. (b) If the labor market is under perfect competition and the commodity market is under imperfect competition, then the relative demand - pull inflation rate - equals:

$$[f_2(\overline{Q}) - f_1(Q)]/f_1(Q) = [(1+\frac{1}{e_1})/(1+1/\bar{e}_2)] - 1 \quad (18)$$

(c) If the product market is under perfect competition and labor is under imperfect competition, then the relative demand - pull inflation rate - is calculated as follows:

$$[f_2(\overline{Q}) - f_1(\overline{Q})]/f_1(\overline{Q}) = 1/\bar{e}_w \quad (\text{Since } f_1(\overline{Q}) = \overline{MR} = MC) \quad (19)$$

(d) In general, the greater the imperfection (measured by elasticity) in the commodity and resource markets, the higher will be the rate of demand - pull inflation - for the commodity in question.

III. Conclusions

We have shown that when the resources and or the commodity markets are under imperfect condition, there is an incentive in profit maximization behaviour not to increase production until demand curve shifts above the discontinuity in the marginal cost function. This implies that the increase in the price of the product does not give any incentive to increasing the production, which explains partly the underlying mechanism for the upward trends in prices of commodities in market economies. Of course, in an inflationary period, this adds fuel to the problem of inflation. The rate of increase in the price of a commodity is directly proportionate to the degree of imperfection (measured by elasticity).

Footnotes

1. This wage rate $\overline{OW}$ is assumed for simplicity, however, the wage rate, in general, may be fixed anywhere between TS and the same overall results will emerge.

2. This analysis could also help partly in explaining the difference between inflation rates between various economies.

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