Chapter IV: The Link Between the Level and Distribution of Output: The Case of Increasing Returns with Time-Reversibility
In the previous chapter we analysed the link between distribution of income and its level through exogenous variations in the profit margin/share. The main purpose of the model is to show how exogenous changes in the profit margin/share (distribution), through its influence on both consumption and investment in opposite directions, might have the ambiguous effect on aggregate demand. In this chapter a different route is considered to analyse the interaction between distribution of income and its level, by examining the implications of increasing returns to scale. To set the argument in terms of a formal model, we assume labour productivity to increase with the level of output/capacity utilisation, which implies that, given the price equation (III.4 in the previous chapter), the profit share also increases with the level of output/capacity utilisation. In this model, therefore, the distributive shares are endogenously determined by the level of output/capacity utilisation due to economies of scale.¹

Note that increasing returns to scale is treated here as 'time-reversible', where there is an endogenous self-reinforcing interaction between decreasing cost due to rising labour productivity (distribution of income) and the level of output, with the caveat that lack of aggregate demand could constrain output from expanding indefinitely.²

¹ The objective of this model, which is a simple extension of the previous model, is to examine whether endogenously determined distributive shares make a difference to the nature of the interrelation between distribution of income and its level i.e., whether the ambiguous effect of distribution of income on its level remains unaltered or not, even in this case.

² The possible limit to the process of self-reinforcing, cumulative interaction between distribution of income and its level being discussed here purely from the demand side. But models which assume demand to be a passive variable might be incompatible to work with under the assumption of increasing returns to scale. For instance, the laws of supply and demand of the Neo-classical theory state that in any competitive market, say for the jth commodity, there is a market clearing price, characterized by
In the literature, the study of increasing returns finds an important place. Many authors incorporated Adam Smith's idea of division of labour as the source of increasing returns in their analysis and examined the consequences of such a phenomenon on the working of the economy. For instance, Marx links the phenomenon of increasing returns to recurrent overproduction crises in the capitalist system. He links the increasing market size to increase in production roundaboutness (or the division of labour). This generates two contradictory tendencies: on the one hand, efficiency in terms of reduced cost per unit of production increases due to the increase in market size, and the resulting increase in concentration (or centralization) allow for fuller exploitation of scale economies. On the other hand, this higher concentration in market structure, a critical element in Steindl's theory, hampers efficiency by increasing the distortionary effects associated with non-price taking behavior or restricting competition. Hence as market size, which determines the degree of division of labour, increases it reduces the profit rate by increasing the organic composition.

\[ D_j = S_j \]

Where \( D_j \) and \( S_j \) respectively are the maximum quantities that buyers are willing to buy or sellers to sell, at those prices. It is the assumption of diminishing returns, in the form of rising cost/supply curve, these laws give a unique market clearing price-output configuration. However the existence of increasing returns, translated in the form of falling cost/supply curve, would seriously undermine the stability of the neo-classical models. In other words, multiple equilibrium may emerge under increasing returns making at least some equilibrium constellations unstable depending on the exact specification of the out of equilibrium adjustment.

\(^3\) by sharing fixed costs with other buyers instead of bearing them unilaterally. See Marx (1861, Vol. I, Ch. IV).

\(^4\) see Steindl (1952).
of capital and this case i.e., increasing returns case is one version or variant of Marx’s law of falling rate of profit.\footnote{see Marx (1894, vol. III, Part III)} The problem with Marx’s vision and other economists following him is that without a theory of the level of output, their main concern is limited exclusively to the effect of increasing returns on the distribution of income. As a result they fail to see that the same process can generate indefinite expansion in the level of output through a self-reinforcing mechanism of interaction. There are few authors starting with Young (1928) who visualize this process of increasing returns as self-reinforcing, circular interaction between economic variables, but they are unable to identify the limiting constraint of demand operating on this process at any given point of time.\footnote{see Myrdal (1955), Kaldor (1971)} Allyn Young (1928) tried to formalize Adam Smith’s famous proposition that “the division of labour is limited by the size of the market”. He attempts to show the circular interaction between increasing returns and the growth of the markets. He defines the growth of markets by a rise in the volume of production, which in turn is determined by a rise in efficiency on account of increasing returns, while the latter is determined by the growth of markets itself.\footnote{increased use of roundabout methods of production and progressive division and specialization of industries which result in the rising efficiency of production’ Young (1928, pp.530).} As he points out, the expansion of markets lead to a rise in efficiency through mechanization and structural transformation which opens up ‘new opportunities for further change which would not have existed otherwise’. In sum, Young’s analysis embodies the essence of the principle of cumulative causation, which later became a central theme of Myrdal’s writings, but seems to be based on the assumption of Say’s
Law in so far as the scale of production alone defines the extent of the market. In this scheme, demand always adjusts passively to increasing production, which both causes and is caused by rising productive efficiency in a manner of 'cumulative causation' or mutually reinforcing positive feedback.

Young saw clearly that the combination of Say's Law with Adam Smith's theorem is not enough in itself to ensure that change is progressive and propagates itself in cumulative way. Something more is needed in linking the effects of changes of production to demand. Without a theory of determination of output the necessary condition for the continuation of the process, in his analysis, rests on the assumption of unitary elasticity of demand for commodities.\(^8\)

In a more recent paper Weitzmann (1982) demonstrates how increasing returns is a necessary (but not sufficient) condition for involuntary unemployment. He argues this by showing how Say's Law might break down when economies of scale exist in the system. The upshot of his model is that involuntary unemployment, which is caused by increasing returns primarily, blocks the unemployed factor (i.e., labour) units from producing on their own by setting up small, divisible units. For him only constant returns to scale could validate Say's Law whereby if a worker is laid off from a 1000-man plant, then he could produce in his domestic workshop \(\frac{1}{1000}\)th of what the plant produces (using \(\frac{1}{1000}\)th of capital). However, this logic breaks down when there is increasing returns to scale because the small unit can no longer compete with the large. In short,

\(^8\) "in a special sense that a small increase in its (say commodity 'a') supply will be attended by increase in the amounts of other commodities which can be had in exchange for it" Young (1928, pp.534)
Weitzmann's model shows how scale economies constrain aggregate output exclusively from the supply side, while demand adjusts passively. Though Weitzmann's work is not directly related to our analysis, which is conducted in the Keynesian framework with a central role assigned to effective demand, his results create serious problems for the earlier works found in the literature in so far as it drives a wedge between increasing returns (division of labour) and Say's Law on the one hand and increasing returns regime and competition on the other hand.

However it was Kaldor working in the Keynesian tradition, who emphasised the role of effective demand in ensuring the coexistence of the increasing returns process which fosters an endless chain of circular and cumulative expansion in the level of output with demand-determined level of output at each step of the process. The model we develop in this chapter is an attempt at formalising some aspects of this argument. It builds on the model in the last chapter to show how effective demand might still operate as a constraint in a process where the distribution of income and the level of output influence each other in a self-reinforcing manner.

**The Model:**

National Income in money terms is

\[ pY = \pi + W \]  

\[(IV.1)\]

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Here we divide total labour (L) into two parts

\[ L = N + M \]  \hspace{1cm} (IV.2)

where \( N \) – number of operatives who vary with the level of output i.e.,

\[ N = \beta Y; \ Y \] – is the actual output.

\( M \) – number of non-operatives who vary with the level of potential output i.e.,

\[ M = \alpha Y^*; \ Y^* \] - is the potential output.

With these definitions (IV.2) becomes

\[ L = \beta Y + \alpha Y^* \]

\[ \frac{L}{Y} = \frac{\beta Y^*}{Y} \]

Dividing through \( Y \) we get,

\[ \beta + \alpha \frac{Y^*}{Y} = \beta + \alpha \frac{Y}{Y^*} \]

or

\[ \frac{Y}{x} = \beta + \alpha \frac{Y}{Y^*} \]

\[ \Rightarrow \quad x = \frac{z}{\alpha + \beta z} \]  \hspace{1cm} (IV.3)

where \( x \) is the labour productivity.
Here, in contrast to the previous model, labour productivity is an increasing function of capacity utilization \((Z)\). Hence the scale economies arise owing exclusively to fixed or overhead labour.\(^{10}\)

We work with the same price equation as in the previous model,

\[
p = m.b.w
\]

where \(m\) is given

but with one important difference. The profit share \((h)\) is no longer exogenously given but varies with the level of output/capacity utilization \((Z)\).

\[
\begin{align*}
\text{i.e.,} & \quad h = 1 - \frac{w}{p} \frac{\alpha + \beta z}{z}; \quad \frac{dh}{dz} > 0 \\
\text{(IV.5)}
\end{align*}
\]

Having defined the total labour as the sum of operatives and non-operatives, their share in the total income is defined as

\[
\begin{align*}
m &= \text{share of wages of operatives} = \frac{w\beta}{pY} \\
n &= \text{share of wages of non-operatives} = \frac{w\alpha}{pz}
\end{align*}
\]

As in chapter (III), the investment function in its simplest form relevant for our analysis is captured by

\[
I = I(h^{11}); \quad I_h > 0 \quad \text{(IV.6)}
\]

and we assume a constant fraction \(s \quad (1 > s > 0)\) of profit and no wage is saved.

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\(^{10}\) see Okun, A (1983, p.15-18).

\(^{11}\) the link between profit share \((h)\) here and profit margin \((m)\) in the previous chapter is definitionally given as \(h=\frac{m-1}{m}\), see also Bhaduri and Marglin (1990, pp.103)
Here the Saving function is $S = s \cdot \pi$, which can be written as

$$S = s \cdot \frac{\pi}{Y} \cdot Y^*$$

$$= s \cdot h \cdot z \quad \text{(normalizing } Y^* = 1)$$

The excess demand equation that drives capacity utilization is given by

$$\dot{z} = a \cdot [I(h) - s \cdot h \cdot z] \quad \text{(IV.7)}$$

and the stability condition is

$$\frac{\partial}{\partial z} [I_h - s \cdot z] - s \cdot h < 0 \quad \text{(IV.8)}$$

The analytics of the model could be interpreted in the following way: given the mark-up, a rise in capacity utilization unambiguously increases profit share (from equation IV.5). Here there are two possibilities or regimes depending on whether investment responds more or less strongly than saving with respect to changes in the profit share.\(^\text{12}\)

Case (i): In a regime where investment responds relatively weakly than saving to changes in profit share (i.e., $I_h < s \cdot z$), there is no ambiguity about the stability of this system. In other words the economic logic, that the decrease in consumption demand due to higher profit share is not compensated entirely by the increase in investment demand, seems to be obvious.

\(^{12}\) First defined by Bhaduri and Marglin (1990) as Stagnationist or Wage-led and Exhilarationist or Profit-led regimes depending on whether investment responds weakly or strongly than saving to changes in profit share respectively.
Case (ii): More interesting is the regime where investment responds relatively more strongly than saving to changes in profit share (i.e., $I_h > s_z$). Obviously this makes the first component in the stability condition positive, i.e., $(I_h - s_z)n/z > 0$. The dynamics of this model under this regime could be explained as follows: as capacity utilization increases the gains in productivity leads to a rise in profit share and this impacts more strongly on investment than on saving ($\therefore I_h > s_z$) to raise the effective demand and output further. However, in this model, a higher level of capacity utilization ($z$) implies a lower level of total share of wages, which in turn is due to a fall in the share of wages of non-operative labour,

$$1 - h = \frac{w_\beta}{p} + \frac{w_\alpha}{p.z} \quad \text{from equation (IV.5)}$$

It is this depressing effect on aggregate demand of this later component which restrains the magnitude $(I_h - s_z)$ and consequently output from expanding further. This comes out clearly in the stability condition (IV.8) P.33, where as capacity utilization increases the falling share of wages of non-operative labour ($n$), a component of total share of wages, restrains the magnitude $(I_h - s_z)$ from exploding out of proportions. Consequently, this implies that, even in this regime where investment responds more strongly than saving to changes in profit share, the negative effect of the higher profit share on consumption demand (the second term in IV.8) outweighs its positive effect on investment to restrain output from expanding further and makes this system locally stable. Note that the condition (IV.8) is a one variable stability condition i.e. Investment is a function of profit
share (h) only. As we see, this need not hold with more than one variable influencing either or both Investment and Saving.

It is interesting to note that this stability condition (IV.8) is similar to the condition (III.13, p.23), in the previous chapter, for negative multiplier. The similarity in these conditions highlight the common analytical mechanism involved in both these models i.e., the negative effect of a higher profit share on consumption demand outweighs the positive effect of the profit share on investment demand. However, the rise in profit share in this model is brought about endogenously by a rise in labour productivity, whereas in the previous model changes in profit share are exogenous. In this sense this model is a simple extension of the previous model, except for the fact that changes in distribution of income is considered to be endogenous through the operation of increasing returns. Note, however, that this extension of the model does not alter the nature of interrelation between distribution of income and its level established in the previous model or in other words, even in a regime where there is a self-reinforcing interaction between distribution of income and its level, the former through its contradictory influence on both the components of aggregate demand viz., consumption and investment restricts the latter from expanding indefinitely.