2

The Principle of Effective Demand

A Saving-Investment Balance and Realisation of Profits: a Two-Department Scheme

Commodities, by definition, are produced for the market. Therefore, *how much* commodities to produce (or *which* commodities to produce) are primarily decided in a capitalist economy by what 'the market will take'. In an aggregative sense, the *size* of the market then determines the *level* (i.e. 'how much') of commodity production. The principle of effective demand provides the theory by which the size of the market is determined in a capitalist economy in the *short period*.

The term 'short period' has a specific analytical connotation: it is not a length of calendar time, i.e., so many days or months, but a certain period of time analytically defined by Marshall with respect to the supply conditions in an economy. Very roughly, the short period may be imagined to be that length of calendar time within which the level of *potential* supply of commodities in an economy remains unchanged. Since capital goods usually take considerable length of time to be constructed, installed and put into operation, expansion of capacities to increase potential supply is also time-consuming. Hence it is reasonable to assume that *within the short period the stock of capital goods is given*. This means that installed capacities are roughly given in the short period, whereas the maximum *degree of capacity utilisation* (or what engineers often call 'rated' capacities) on the existing capital stock define the *potential* supply of commodities in the short period. However, this also requires that sufficient labour force is available to operate those installed capacities at the maximum level of utilisation.

Ignoring complications such as import of raw materials, availability of skilled labour or limited non-renewable resources, there are two major constraints – existing capacities and available labour – that would broadly define the *short period potential output* of a sector j ($\bar{X}_j$).

In symbols, this can be written as,

$$\bar{X}_j = \text{Minimum of } (q_j\bar{N}_j x_j\bar{L}_j) \equiv \text{Min } (q_j\bar{N}_j x_j\bar{L}_j) \qquad (2.1)$$

where, q_j is the capacity-output per machine and $\bar{N}_j$ = the given number of machines in the short period in sector j; hence, $q_j\bar{N}_j$ represents the *full-capacity* output of sector j. Similarly, assuming output per worker to be constant at x_j (irrespective of the degree of capacity utilisation) and $\bar{L}_j$ = the (maximum) available number of workers in sector j, $x_j\bar{L}_j$ represents the *full-employment* output of sector j. The short period potential output $\bar{X}_j$ is the minimum of the full-capacity ($q_j\bar{N}_j$) and the full-employment ($x_j\bar{L}_j$) output shown in (2.1).

The logic of commodity production leads us to an important question. How do we know that the size of the market would be such as to ensure that the actual level of output in any sector j (X_j) will coincide with the *potential* level of output ($\bar{X}_j$) that is producible by sector j in the short period in accordance with (2.1). For whatever reason if the *potential* level of output ($\bar{X}_j$) exceeds the actual output level (X_j), i.e.,

$$X_j < \bar{X}_j \qquad (2.2)$$

then, from (2.1), it will mean that,

$$X_j < \text{Min } (q_j\bar{N}_j' x_j\bar{L}_j) \qquad (2.3)$$

However, the fact that actual output (X_j) is lower than *both* full-capacity ($q_j\bar{N}_j$) and full employment output ($x_j\bar{L}_j$) in (2.3) must also imply that *excess capacity* and *unemployment* of labour *coexist* simultaneously. In other words, condition (2.3) describes a situation where under-utilisation of existing capacities and unemployment of labour appear *simultaneously* in a capitalist economy. How can such a situation arise?

In order to analyse this important problem of coexistence of excess capacity and unemployment, we must have a theory of how the size of the market gets determined. Because, it is the *limited* size of the market which can account for actual output (X_j) being lower than the potential output ($\bar{X}_j$). *The theory of effective demand* proposed by Keynes as well as the problem of realisation of profit formulated by Marx and developed into a theory of profit by Kalecki precisely deal with this issue. All these three important trends of thought revolve around the central issue of why no such synchronisation between the size of the market and the potential level of output need take place in the capitalist economy.

To discuss the essence of this problem it will be convenient to start with two simplifying assumptions namely, (a) there is negligible participation of the government in economic activity and, (b) no engagement of the country in foreign trade.

For the purposes of subsequent analysis this *free enterprise* capitalist economy *closed* to foreign trade may be imagined to consist of only *two departments* or *sectors* – Department I producing investment goods and Department II producing consumption goods. To abstract from the problem of raw materials at this stage, we may assume that each department is *vertically integrated*. This means that all required raw materials needed for the production of either the final consumption good in Department II or final investment good in Department I is produced by the respective department.

There are some essential distinctions between consumption good and investment good, which make this two departmental scheme of analysis, originally proposed by Marx, exceedingly fruitful. First, investment expenditure on long-lived capital equipment involves uncertain expectations regarding the future, simply because, these investment goods are going to be used over a number of years in the future. In contrast, consumption expenditure is primarily related to current needs; in this sense, consumption expenditure is less influenced by future uncertainties. Since investment decision must involve an uncertain future, it is far more difficult to judge the economic motives and expectations that govern the expenditure level on investment goods. In contrast, these complications are less serious in the case of consumption goods. Therefore, as a simplifying device – it only demarcates the zone of our ignorance – we *assume that the level of investment expenditure is autonomously given, within the short period* under consideration.

A second crucial difference between consumption and investment goods follows from their obvious physical characteristics. Investment goods, say machines, are by definition non-consumable. Consequently, workers engaged in the production of investment goods in Department I cannot be physically supported out of their own production; instead they have to be supported out of the production of consumption goods in Department II. Thus, some *surplus has to be produced by workers in the consumption sector over their own consumption in order to support workers in the investment sector*. In addition, whatever the capitalists consume must also be provided from the output of the consumption sector.

This physical distinction between consumption and investment goods leads to a *fundamental condition for macroeconomic balance between the two departments*. Assuming workers consume all their wages and save nothing, the balancing condition emerges as:

Output of consumption sector (Department II)
– Wage bill of consumption sector (Department II)
= Surplus of consumption goods (Department II),

which supports everybody else's consumption in the economy. Hence surplus consumption good = wage bill of investment sector (Department I) + consumption by capitalists (of Departments I and II). In symbols,

$$C - W_{II} = S_{II} = W_I + C_P \quad (2.4)$$

or,

$$(S_{II} - C_P) = W_I \quad (2.5)$$

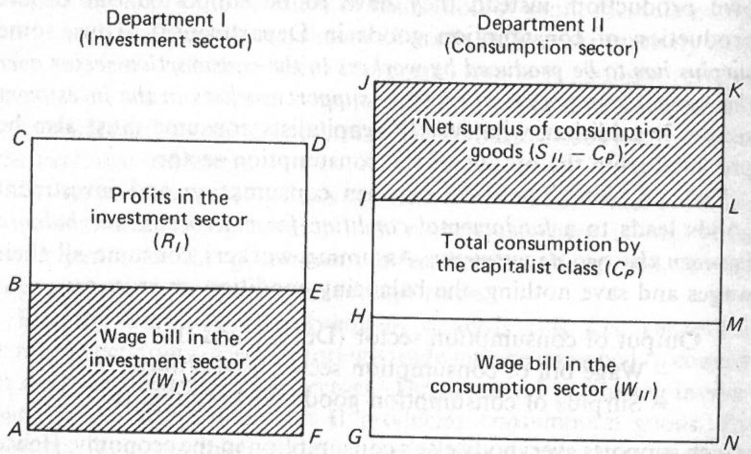
where C is the output of *final* consumption goods, which is the same as the value added (see Chapter 1, Section C for definition) by the consumption sector or Department II; W_{II} is the wage bill of the consumption sector or Department II; S_{II} is the surplus of consumption goods over the wage bill of Department II (i.e., consumption sector); W_I is the wage bill of investment sector or Department I and C_P is the consumption by the entire capitalist class operating in both Departments I and II.

It is instructive to visualise this crucial balance condition (2.5) in terms of a 'box diagram' of the sort shown in Figure 2.1.

The balancing condition (2.5) simply means that the investment sector generates a wage bill, $W_I = ABEF$, which exactly matches the surplus of consumption goods $(S_{II} - C_P) = IJKL$, that remains after paying, (a) the wage bill in the consumption sector, $W_{II} = GHMN$ and, (b) the consumption by the entire capitalist class, $C_P = HILM$.

What is the significance of calling this the crucial condition for balance in a capitalist economy? It is a fundamental condition for

Figure 2.1 *Shaded areas ABEF and IJKL are equal.*



balance in so far as it shows that the *autonomous* expenditure decisions in the investment sector in the form of payment of wages to workers in that sector (i.e., *ABEF* in Figure 2.1) exactly matches the remaining 'surplus' (i.e., *IJKL* in Figure 2.1) after capitalists' consumption (C_P), which was algebraically described by (2.5). That condition (2.5) can now be seen to mean that the *size of the market generated by the wage bill of the investment sector is just large enough to dispose of the entire surplus of consumption goods.* However, if autonomous investment expenditure was smaller and consequently, the investment sector was somewhat smaller in size, with a smaller wage bill than *ABEF*, then part of the surplus of the consumption sector could not be disposed of. This would have resulted in *unplanned accumulation of inventories* ($+A$) of consumption goods. In a reverse case, the size of the investment sector could be too large with the wage bill of the investment sector larger than *ABEF* in Figure 2.1. In that case, the market created by that wage bill could not be met from the surplus of consumption goods. This might in turn lead to *unplanned decumulation of inventories* ($-A$) of final consumption goods, if they were already held in stock. This implies an *accounting identity* which is always satisfied in the form:

Surplus of consumption goods net of capitalists' consumption

$(S_{II} - C_p) -$ wage bill of investment sector (W_I)
$=$ unplanned changes, i.e., accumulation $(+)$ or decumulation $(-)$ of inventories of final consumption goods $(\pm A)$

i.e.,

$$(S_{II} - C_p) \equiv W_I \pm A \tag{2.6}$$

The difference between the balancing or an equilibrium condition like (2.5) and the statistical identity (2.6) is obvious by comparison. The equilibrium relationship (2.5) simply implies that there are no unexpected or *unplanned* changes in inventories, i.e. $A = 0$ in (2.6). On the other hand, a statistical identity of the form of (2.6) means that expectations regarding the sale of consumption goods are *not* satisfied and A in (2.6) has some non-zero value. However, unexpected or unplanned accumulation of inventories (i.e. $A > 0$) would simply mean that the capitalists in Department II are unable to satisfy their plans regarding the volume of sales of consumption goods. As a result, a part of their output of consumption good remains unsold in the form unplanned inventory accumulation. An inadequate size of the market resulting from insufficient wage bill of the investment sector could then cause such failure of expectations regarding sales of consumption goods by the capitalists. The important point to note is that *irrespective of whether economic expectations* regarding sales of consumption goods *are fulfilled or not, the statistical identity* (2.6) *holds.* But an equilibrium condition like (2.5) is altogether different. Because, equilibrium obtained through the balancing condition (2.5) implies that sales expectations of the capitalists are precisely satisfied. Consequently in (2.5) there is no change in the unplanned stock of inventories and $A = 0$. In other words, the statistical identity (2.6) is *always* true irrespective of whether expectations of the sellers of consumption goods are satisfied or not; in contrast, the equilibrium relation (2.5) is true *only when* those expectations are satisfied.[1]

Since unplanned accumulation of inventories would mean that firms in the consumption sector cannot sell the volume of consumption goods they expected to sell, part of the surplus of Department II, i.e., S_{II} would fail to satisfy the 'commodity character' of production. Consumption goods are produced as commodity for the market but the market is not large enough to absorb the entire amount of surplus. This, in turn, means that the entire *surplus* of consumption goods cannot be *realised into* profit. Instead, unplanned accumulation of inventories implies that firms producing consumption goods are forced to hold part of their production as inventories that they were unable to sell. Thus, the commodities which were produced and planned to be sold but could not be sold due to lack of market become unplanned inventory accumulation to create a corresponding discrepancy between the *expected* profit of the capitalists and the *realised* profit.[2] Marxist writers describe this as the *realisation problem* of surplus into profit, which was reinstated at the centre of macroeconomic theory through the concept of 'effective demand' by Keynes.

In equilibrium, where such unplanned accumulation of inventories is zero, there is no divergence between the level of planned or expected profit on the one hand and the level of profit actually realised on the other. The total surplus of consumption goods generated by Department II is then fully realised into profit. The total surplus, simply as the excess of production over the wage bill of Department II (represented by the area of the rectangle $HMKJ$ i Figure 2.1) is realised as profit by finding a market both through capitalists' consumption (C_p) (represented by $HMLI$ in Figure 2.1) and through the wage bill of the workers in the investment sector (w_I) (represented by area $ABEF$, which is equal to $IJKL$ in Figure 2.1). This indeed, is the economic meaning of the balance condition (2.4): it shows how the entire surplus S_{II} of Department II is being realised into profits R_{II}, of that Department i.e.,

$$S_{II} = W_I + C_P = R_{II} \tag{2.7}$$

where R_{II} is the profit of the consumption sector (Department II) Equation (2.7) explicitly shows the profit realisation condition of the consumption sector. It shows how the conversion of surplus consumption goods (S_{II}) into profit (R_{II}) of that sector becomes possible through market created by the wage bill of the investment sector (W_I) and the total consumption by the capitalists (C_P).

A formally equivalent condition to (2.7) can be obtained by adding the *realised* profit of Department I,[3] i.e., R_I (represented by rectangle $BCDE$ in Figure 2.1) on both sides of (2.7) which yields,

$$R_I + W_I + C_P = R_I + R_{II} = R$$

However, $(R_I + W_I)$ is, by definition, the value added of the investment sector (I) which is also the final expenditure on investment goods, i.e. $R_I + W_I = I$[4]. Further, $R = R_I + R_{II}$, represents the total profit realised in the economy. Therefore, the preceding equation can be rewritten as:

$$\text{Investment } (I) + \text{capitalists, consumption } (C_P) = \text{total profit } (R) \tag{2.8}$$

or, by rearranging terms,

$$\text{Investment } (I) = \text{total profit } (R) - \text{capitalists' consumption } (C_P) \tag{2.9}$$

However, by our assumption made earlier, workers consume their entire wage income and capitalists are the only savers in the economy. Since profits are the total income of the capitalists, deducting capitalists' consumption from their total income, i.e. $(R - C_P)$ we obtain capitalists' saving which is also the total saving of the economy (S) (because, capitalists are the only savers by assumption made earlier). So the preceding equation takes the more familiar form:

$$\text{Investment } (I) = \text{savings } (S) \tag{2.10}$$

Preceding conditions (2.8) to (2.10) describe the same basic macroeconomic balance of the economy in different ways. However, it needs emphasis that they all are derived from the underlying profit realisation equation (2.7) of the consumption sector.

The realisation of profit as an equilibrium condition can be contrasted with the corresponding accounting identity for profits in (2.6). By adding profit of Department I, i.e. R_I on both sides of (2.6) we obtain,

$$R_I + S_{II} - C_P \equiv (W_I + R_I) \pm A \equiv I + A, \tag{2.11}$$

where $W_I + R_I = I$, by definition.

On the extreme left-hand side of (2.11) we have an *accounting definition of savings* which includes unplanned inventory change, because S_{II} is total surplus of the consumption sector, whether or not realised into profit. Similarly, on the extreme right-hand side of (2.11), the *accounting definition of investment* includes expenditure on final investment goods (I) as well as on inventory change ($+A$). If we use such accounting or *ex post* definitions of savings and investment, then they would be always equal. Because they treat unplanned inventory accumulation ($+A$) both as part of 'profit' and as part of investment, on the extreme left and right-hand sides of (2.11). However, this should not be confused with the equilibrium condition (2.10). Investment equals savings in the equilibrium configuration of (2.10) precisely when unplanned inventory change ($+A$) is zero. Hence, neither the definition of investment nor that of savings include unplanned inventory change in equilibrium. This distinguishes planned or *ex ante* (e.g. in (2.10)) as opposed to accounting or *ex post* (e.g., in (2.11)) equality between investment and savings. It is only the planned or *ex ante* equality which can be seen to define the condition of macroeconomic equilibrium. Being planned or *ex ante* magnitudes, they would naturally exclude all possibilities of *unplanned* changes in inventories shown by (2.11). Consequently, equilibrium means the exact matching of plans of sales with those of purchases so that, unplanned inventory change must be zero at equilibrium.

B Restoring Balance through Quantity- and Price-Adjustment: The Multiplier Analysis

The basic condition of macroeconomic balance elaborated in the preceding section, emphasises a central point of paramount importance: whether stated as a profit realisation equation (in (2.7) or (2.8)) or equivalently, as saving-investment balance condition (in (2.9) or (2.10)), it shows how the total surplus of consumption goods, represented by the area of the rectangle $HJKM$ in Figure 2.1 is realised into profit through the market created by capitalists' consumption, represented by the area of the rectangle $HILM$ and by consumption of workers in the investment sector represented by the area of the rectangle $ABEF$ (i.e., wage bill of Department I). In other words, this macroeconomic balance ensures that the surplus of consumption goods finds a market just large enough to be sold as commodities.

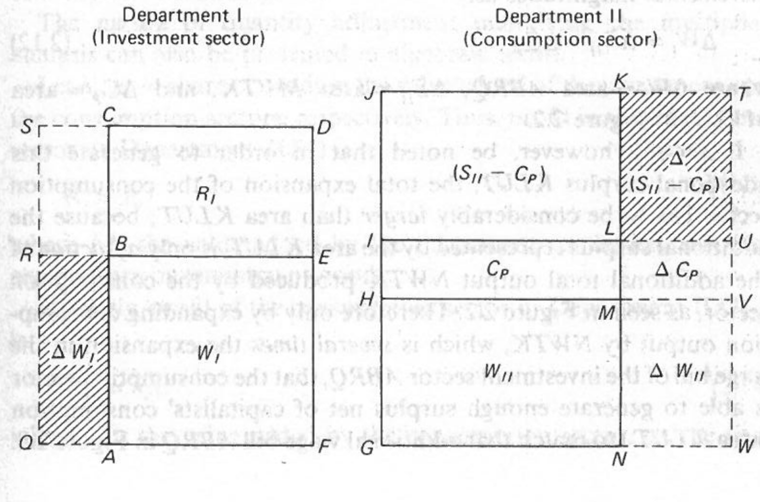
A macroeconomic imbalance would arise if the market for selling surplus consumption goods is too small (or large) resulting in unplanned accumulation (or decumulation) of inventories of final consumption goods. Such an *imbalance* between the level of *commodity production* and the *size of the market* arises because *investment decisions are autonomous in the short period*. Thus, for an arbitrarily given level of investment expenditure, the size of the wage bill of the investment sector (i.e. rectangle $ABEF$ in Figure 2.1) may turn out to be either too large or too small in relation to the surplus produced by the consumption sector. This could be clearly visualised by considering a 'disturbance' of the initial balance between the two departments through an autonomous increase in investment expenditure. On the original position of balance, as shown in our earlier Figure 2.1 (where surplus consumption goods, $HMKJ$ = capitalists' consumption,

$HMLI$ + wage bill of investment sector, $ABEF$), we superimpose some arbitrary increase in the expenditure on final investment goods. This is shown in Figure 2.2, where the original size of the 'investment box' represented by the same rectangle $ACDF$ in Figure 2.1, is increased arbitrarily by dotted lines, constituting another rectangle of size $AQSC$. As can be seen from Figure 2.2, this immediately results in an expansion of the wage bill of Department I (ΔW_I), represented by the shaded area of the rectangle, $ABRQ$, i.e., $\Delta W_I = ABRQ$.

The *autonomous* expansion in the wage bill of the investment sector (shaded area $ABRQ$ in Figure 2.2) means in effect an autonomous increase in the size of the market for consumption goods. How the consumption sector would respond to this increase in its market size is the central problem to be analysed.

There are two distinct routes, either through *adjustment in the quantity* of consumption goods produced or through *adjustment in the price* of consumption goods, so that the consumption sector could respond to such an increase in the size of its market.[5] If there is unutilised capacity in the consumption sector as well as unemployed

Figure 2.2 *Multiplier based on quantity adjustment for restoring macroeconomic balance. Areas ABEF and IJKL are equal, as in Figure 2.1, showing initial macroeconomic balance. Shaded areas ABRQ, and KLUT are equal, showing final macroeconomic balance.*



persons, as postulated, for example, in our earlier relation (2.3), it is reasonable to suppose that the quantity of consumption goods produced will tend to expand in response to its increased market; quantity adjustment will then take place by drawing on existing unutilised capacity and unemployment. Thus, with the expansion of demand, *quantity adjustment* would ordinarily predominate in situations of economic depression or recession. On the other hand, with more or less full employment or full capacity utilisation, significant expansion in output is not feasible in the short period. Consequently, *price adjustment* is likely to be more important in response to increased demand in situations of full capacity utilisation or full employment.

However, even if quantity adjustment is made possible in the short period through the coexistence of unutilised capacity and unemployment on a significant scale, the *extent* of quantity adjustment in the consumption sector would be limited to restoring balance. Thus, the output of the consumption sector will expand only up to the point where, the surplus of the consumption sector, net of capitalists' consumption, exactly matches the additional wage bill of the investment sector. In terms of Figure 2.2, this means that the additional wage bill of the investment sector, represented by the area of the shaded rectangle $ABRQ$ has to exactly equal the *additional* surplus net of capitalists' consumption in the consumption sector, represented by the shaded rectangle $KLUT$. Algebraically, this corresponds to the earlier condition for balance (2.5), which can now be rewritten for *incremental* magnitudes as,

$$\Delta W_I = \Delta S_{II} - \Delta C_P \qquad (2.12)$$

where ΔW_I = area $ABRQ$, ΔS_{II} = area $MVTK$, and ΔC_P = area $MVUL$ in Figure 2.2.

It should, however, be noted that in order to generate this additional surplus $KLUT$, the total expansion of the consumption sector has to be considerably *larger* than area $KLUT$; because the additional surplus represented by the area $KLUT$, is only *a fraction* of the additional total output $NWTK$ produced by the consumption sector, as seen in Figure 2.2. Therefore only by expanding consumption output by $NWTK$, which is *several times* the expansion in the wage bill of the investment sector $ABRQ$, that the consumption sector is able to generate enough surplus net of capitalists' consumption (area $KLUT$) to match that additional wage bill $ABRQ$ in Figure 2.2.

This several-fold increase in the demand for consumption goods ($NWTK$) resulting from an initial increase in demand from the wage bill of the investment sector ($ABRQ$), means that the demand for consumption goods ultimately gets 'multiplied' several times the initial autonomous increase in demand. The name '*multiplier analysis*' was given to emphasise this fact.

According to the multiplier analysis, expansion of output in the consumption sector takes place until it generates just enough surplus net of capitalists' consumption represented by rectangle $IUTJ$ in Figure 2.2 to match the wage bill of the investment sector represented by $QFER$ in the same figure, to attain a new position of macro-economic balance between the two departments. Because investment decisions and consequently the wage bill of the investment sector are treated as autonomous, the *adjusting variable is the surplus of the consumption sector*. In other words, *investment governs savings* (surplus). The Marxist writers often stress the same point by emphasising that Department I is the 'leading' sector to which Department II has to adjust under commodity production. This leading role of the investment sector stems from its being the creator of market for consumption goods. And, since commodity production, by definition, is only for the market, investment as the determinant of the size of the market for surplus consumption goods governs the level of commodity production in the consumption sector. Thus, the Keynesian proposition of investment governing savings is only a technical statement emphasising the commodity producing character of a capitalist economy.

The nature of quantity adjustment underlying the multiplier analysis can also be presented in algebraic terms.

Let h_i, h_c = share of profit in the value added of the investment and the consumption sectors, respectively. Thus, profit in the investment sector or Department $I(R_I)$ is,

$$R_I = h_i I \qquad (2.13)$$

where I is the value added by the investment sector, i.e., the *final* expenditure on investment goods.

Similarly, profit of the consumption sector or Department II (R_{II}) is,

$$R_{II} = h_c C \qquad (2.14)$$

where C is the value added by the consumption sector, i.e. the *final* expenditure on consumption goods.[6] We assume that no wage and a constant fraction, $s_p(1 > s_p > 0)$ of profit is saved; hence, $(1-s_p)$ is the (marginal as well as average) propensity to consume by the capitalists out of their profit; consequently, total capitalists' consumption out of profit is given as,

$$C_p = (1-s_p)(R_I + R_{II}) = (1-s_p).(h_i I + h_c C) \tag{2.15}$$

Using (2.13), (2.14) and (2.15) in the basic condition for macroeconomic balance (2.8) or (2.9), we obtain on simplification,

$$I = s_p(h_i I + h_c . C) \tag{2.16}$$

As expected, investment on the left-hand side equals savings on the right-hand side of (2.16) in correspondence with (2.10).

The macroeconomic balance equation (2.16) could be rewritten as,

$$(1 - s_p h_i)I = s_p h_c C \tag{2.17}$$

which has an interesting economic interpretation. For every unit of value added by the investment sector, the corresponding *wage* income $(1-h_i)$ is entirely consumed; further, out of the *profit* income h_i, $(1-s_p)h_i$ is consumed. Hence, *the demand for consumption goods per unit of value added by the investment sector* is represented by the coefficient: $(1-h_i)+(1-s_p)h_i = (1-s_p h_i)$, which appears on the left-hand side of (2.17). Similarly, total demand for consumption goods generated per unit of value added by the consumption sector is $(1-s_p h_c)$; hence *surplus generated by the consumption sector per unit of its value added* is simply the coefficient: $1-(1-s_p h_c) = s_p h_c$, which appears on the right-hand side of (2.17). Thus, the left-hand side of equation (2.17) merely exhibits the demand for consumption goods generated by the investment sector which must balance the surplus generated by the consumption sector which is represented on the right-hand side of the same equation.

To elaborate the multiplier analysis through quantity adjustment, we assume that the distribution of value added between profit and wages remain unaltered in either sector, i.e. h_i and h_c are constants; in addition $s_p(1 > s_p > 0)$ is also assumed to remain constant throughout the analysis. With h_i, h_c and s_p assumed constants, the extent of expansion in the output of the consumption sector required to restore macroeconomic balance as a result of an arbitrary increase ΔI in final investment expenditure is given from (2.17) as,

$$\Delta C = \frac{(1-s_p h_i)}{s_p h_c}\Delta I \tag{2.18}$$

The above can be interpreted in terms of our earlier Figure 2.2; if the increment in investment ΔI in (2.18) is represented by the rectangle area $AQSC$, then the required increment in the output of the consumption sector ΔC that will restore back macroeconomic balance is a rectangle of area $NKTW$ which is determined by formula (2.18).

It may be recalled that by adding up the value added of both the sectors (i.e., $C+I$) we obtain the estimate of the gross domestic product (GDP) in the economy. This estimate also coincides with the estimate of national income (Y) if we ignore depreciation in a strictly free-enterprise economy closed to foreign trade.[7] This yields national income, Y = domestic product = $C + I$ or

$$\Delta Y = \Delta C + \Delta I$$

Using condition (2.18) in the above definition of increment in national income we obtain the multiplier formula as,

$$\frac{\Delta Y}{\Delta I} = \frac{1 + s_p(h_c - h_i)}{s_p h_c} \tag{2.19}$$

Formula (2.19) represents the traditional multiplier in the context of our two department analysis. It shows the extent by which national income (ΔY) will increase due to an autonomous increase in final investment expenditure (ΔI). When both the sectors have the *same* share of profit in value added, i.e., $h_c = h_i$, (2.19) reduces to a simpler form,

$$\frac{\Delta Y}{\Delta I} = \frac{1}{s_p h}, \; h_c = h_i = h \tag{2.20}$$

Since s_p is the constant (marginal as well as average) propensity to save out of profit, h is the share of profit in national income and no wage is saved, $s_p h = s_p(R/Y)$ represents the (average and marginal) propensity to save in the economy. Hence, (2.20) exhibits the *multiplier formula in a one-sector model as the inverse of the (marginal) propensity to save.*

The multiplier formula (2.19) set in a two department scheme, shows that the value of the multiplier, $\Delta Y/\Delta I$ would be *lower* for a *higher* share of profit in *either* department (i.e., h_i or h_c higher). However, the underlying argument is somewhat different in the two cases. A higher h_i reduces the value of the multiplier by *lowering the demand* generated per unit of value added by the investment sector; whereas a higher h_c reduces the same multiplier value through *increasing the surplus* generated per unit of value added by the consumption sector (see (2.17)). Thus, the value of the multiplier may get reduced through two alternative economic routes – a lower demand for consumption goods per unit of investment (as h_i is increased) or through higher surplus generated per unit of expansion in the consumption sector (as h_c is increased). The distinction between these two routes becomes obscure in the simpler, one sector version of the multiplier given in (2.20).

It will be noted that the ultimately required quantity adjustment in the consumption sector (ΔC) in response to an arbitrary increase in investment (ΔI) is stated as the condition of macroeconomic balance for the incremental magnitudes in (2.18). This is called a '*comparative static*' representation. It shows the *final position* of macroeconomic balance resulting from higher investment after all the required quantity adjustment has been completed in the consumption sector to restore balance. However, it would be useful to have some idea about how this *quantity adjustment can take place in successive rounds* through time until the final position of balance depicted in (2.18) is reached. In other words, we need to examine how the demand for consumption goods increases step by step due to a once-for-all increase in investment (ΔI). As we already saw in equation (2.17), every unit of value added of the investment sector leads to increase in demand for consumption goods by $(1-s_p h_i)$. Hence, at the very *initial round*, the resulting increase in the demand for consumption goods will be,

$$\Delta C_0 = (1-s_p h_i)\Delta I,$$

where ΔC_0 represents the initial or 0th round increase in demand for consumption goods. This leads to quantity adjustment, i.e., increase in output of the consumption sector by ΔC_0. Consequently, wage and profit of the consumption sector would also increase. And out of that increased wage and profit of the consumption sector, further demand for consumption goods is generated in the *first round* (ΔC_1). This can

be written as,

$$\Delta C_1 = \underbrace{(1-h_c)\Delta C_0}_{\substack{\text{Consumption out}\\ \text{of increased wages}\\ \text{in the consump-}\\ \text{tion sector from}\\ \text{0th round}}} + \underbrace{(1-s_p)h_c\Delta C_0}_{\substack{\text{Consumption out}\\ \text{of increased pro-}\\ \text{fits of the con-}\\ \text{sumption sector}\\ \text{from 0th round}}} = (1-s_p h_c)\Delta C_0$$

The quantity-adjustment by ΔC_1 in the consumption sector in the first round leads in turn to further demand for consumption goods in the next round,

$$\Delta C_2 = (1-h_c)\Delta C_1 + (1-s_p)h_c\Delta C_1 = (1-s_p h_c)\Delta C_1;$$

or, by substituting for the expression for ΔC_1 in terms of ΔC_0 from above,

$$\Delta C_2 = (1-s_p h_c)^2 \cdot \Delta C_0$$

Again, at the next round, the expansion in the demand for consumption goods will be,

$$\Delta C_3 = (1-s_p h_c)^3 \Delta C_0$$

and, in general, for the nth round,

$$\Delta C_n = (1-s_p h_c)^n \Delta C_0$$

The total expansion in the consumption sector can then be obtained by summing all the rounds of a convergent, infinite geometric series in the form:

$$\Delta C = (\Delta C_0 + \Delta C_1 + \Delta C_2 + \ldots)$$
$$= [1 + (1-s_p h_c) + (1-s_p h_c)^2 + \ldots]\Delta C_0$$

which sums to[8]

$$\Delta C = \left[\frac{1}{1-(1-s_p h_c)}\right](1-s_p h_i)\Delta I, \quad \text{for } 1 > (1-s_p h_c) > 0$$
$$= \frac{(1-s_p h_i)}{s_p h_c}\Delta I, \tag{2.16}$$

which is exactly the same as (2.16) above.

Undoubtedly there are substantial difficulties in visualising the above geometric series as an actual process through time. For example, the time lag between income receipts and expenditure varies from group to group. Thus, the lag between income and expenditure can be only two calendar months in a particular round, while it can take say a year in the next round. Thus, the elements of the geometric series cannot in general be assumed as uniformly spaced in time. As a result we cannot exactly say how long it takes in calendar time for this process of demand creation to more or less approximate to its ultimate value given by summing the series. Similarly, our analysis maintains its simple character only by assuming that uniform consumption propensities exist for all groups of capitalists and for all groups of workers. When consumption propensities as well as expenditure lags vary from group to group, one would require a more elaborate computational scheme using disaggregate information on consumption propensities and expenditure lags for the different groups. However, despite such computational difficulties, the basic idea of successive rounds of demand triggered off by an autonomous increase in investment remains one of the most powerful ideas in macroeconomic theory.

So long as the multiplier anaysis is based on *quantity adjustment*, the expansion in the consumption sector in response to increased demand from the investment sector takes place in physical quantities. Thus more consumption goods are produced to generate enough surplus and restore balance between the two sectors. Nevertheless such quantity adjustment is not feasible in a situation of full employment or full capacity utilisation in the consumption sector (see equation (2.1) above). Under these conditions, the multiplier mechanism must be based on price and not on quantity adjustments. Referring back to our previous Figure 2.2, we must now clearly distinguish between nominal magnitudes and physical quantities. Let GN in Figure 2.2 represent the number of workers employed at the level of full capacity utilisation in the consumption sector. If GJ represents the nominal or money *value* of final output (i.e. value added) per worker in the consumption sector, then writing explicitly, final output per worker in the consumption sector,

$$GJ \text{ (in Figure 2.2)} = x_c P_c$$

where x_c is the physical output per worker in the consumption sector and P_c is the price level of consumption goods.

Similarly, productivity per worker in the investment sector *in nominal terms* is shown in Figure 2.2 as AC, i.e.,

$$AC = x_i P_i$$

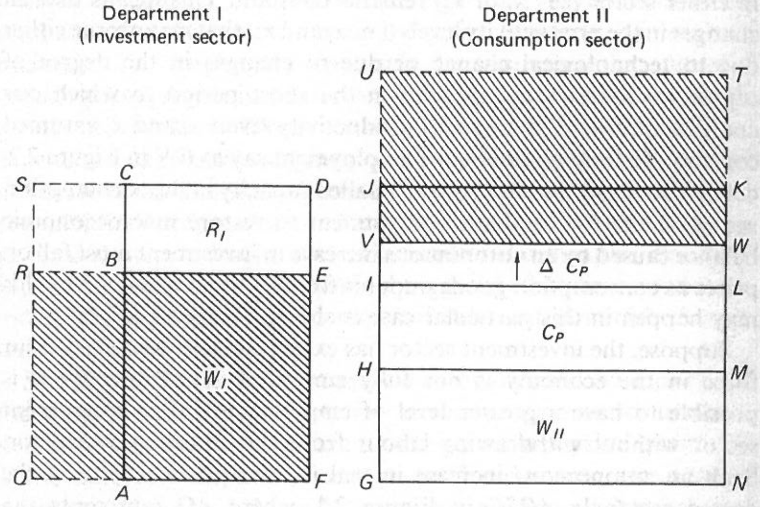
where x_i is the physical output per worker in the investment sector and P_i is the price level of investment goods.

To analyse the working of the multiplier based on price rather than quantity adjustment, we assume that *physical* productivity per worker in either sector (i.e., x_i or x_c) remains constant. This means that all changes in the productivity levels (i.e., x_i and x_c) that may accrue either due to technological change or due to changes in the degree of capacity utilisation are ignored in the short period to which our analysis applies. With physical productivity levels x_i and x_c assumed constant, for any given level of employment say at GN in Figure 2.2, determined by full utilisation of installed capacity in the consumption sector, the entire burden of adjustment to restore macroeconomic balance caused by an autonomous increase in investment must fall on prices as consumption goods ouput is fixed by assumption. How this may happen in this particular case is shown in Figure 2.3 below.

Suppose, the investment sector has excess capacity and the labour force in the economy is not fully employed. Consequently, it is possible to have a greater level of employment in the investment sector without withdrawing labour from the consumption sector. Such an autonomous increase in real investment is shown by the dotted rectangle $AQSC$ in Figure 2.3, where AQ represents the *additional* number of workers employed in the investment sector and QS (= AC) shows constant productivity per worker in the investment sector. In order to meet the *additional* (money) wage bill $ABRQ$ of the investment sector, the consumption sector would now have to generate a larger surplus ($S_{II} - C_p$) that would match that additional wage bill $ABRQ$. However, by our assumption the consumption sector is already working at full capacity and it employs GN amount of labour at constant labour productivity in money terms, $GJ = x_c P_c$.

A *multiplier theory based on price adjustment* would require the price level P_c of consumption goods to rise for generating the additional surplus. This is shown in Figure 2.3 by *vertical* and *not horizontal* (in contrast to Figure 2.2) expansion from the original size of the consumption sector from $GNKJ$ and $GNTU$. Note that this expansion takes place only in nominal terms as labour productivity in the consumption sector rises in money value from GJ to GU. A higher price level for consumption goods, assuming the *money* wage rate to

Figure 2.3 *Multiplier based on price adjustment for restoring macroeconomic balance. As in Figures 2.1 and 2.2, areas ABEF and IJKL are equal, showing initial macroeconomic balance. Money wage GH and employment GN in the consumption sector are assumed fixed throughout. Nominal labour productivity in the consumption sector increases from initial GJ to GU as the price level of consumption goods increases. In the final macroeconomic balance shaded areas EFQR and UVWT are equal.*



be constant at GH in the consumption sector, must also imply that the *share of wages* $(1-h_c)$ in the consumption sector falls from the ratio GH/GJ to GH/GU. Conversely, the share of profit h_c in the consumption sector rises from JH/GJ to UH/GU, leading to higher profits earned by the capitalists. As profits expand both in the consumption sector from $HMKJ$ to $HMTU$ and in the investment sector from $BCDE$ to $REDS$ in Figure 2.3, capitalists consume more out of their higher profit in a proportional manner by virtue of relation (2.15) postulated earlier.[9] This additional consumption ΔC_p by the capitalists due to a higher share of profit in the consumption sector is shown in Figure 2.3 by an upward shift of the line IL to VW so that, $ILWV$ represents the *additional* consumption out of the higher profits earned by the capitalists. With $GNMH$ representing the wage bill W_{II} of the consumption sector at the constant *money* wage rate GH, and

$HMWV$ representing capitalists' new level of consumption, the *surplus* $(S_{II}-C_p)$ of the consumption sector net of capitalists' consumption at the increased price level of *consumption goods* becomes the rectangle $UVWT$ in Figure 2.3. When this total net surplus of the consumption sector $UVWT$ equals the total wage bill $EFQR$ of the investment sector, the basic macroeconomic balance between the two departments given by earlier condition (2.5) is restored again. However, the restoring mechanism depends exclusively on increase in the price level of consumption goods (by JU) with a constant *money* wage rate GH.

A higher price level of consumption goods (by JU) at a constant *money* wage rate GH in Figure 2.3 entails a correspondingly lower *real* wage rate in terms of consumption goods. Consequently the multiplier mechanism based on price adjustment forces a reduction of the real wage rate in terms of consumption goods to generate the required level of surplus. And, so long as the per cent rise in the price level of consumption goods $(\Delta P/P_c \times 100)$ exceeds the per cent rise in the *money* wage rate $(\Delta w/w \times 100)$, the *real* wage rate in terms of consumption goods becomes flexible downwards to allow for such an adjustment mechanism. Therefore, even without any possibility of quantity adjustment in the consumption sector, there exists an alternative version of the multiplier theory: it is based on adjustment between consumption goods' prices and *money* wages leading to a reduction in the *real* wage rate in terms of consumption goods.

A more general algebraic analysis of the multiplier mechanism based upon such price adjustment in the context of our two-department scheme can now be developed. With L_i, L_c = number of workers employed in the investment and in the consumption sector respectively, and x_i and x_c the labour productivity levels in physical terms and, P_i and P_c = the respective price levels in the two sectors, we have from definition

$$I = P_i x_i L_i \tag{2.21}$$

and

$$C = P_c x_c L_c \tag{2.22}$$

Further, the *money* wage rate in a sector is by definition, the share of wage in the value of final output per worker, i.e.,

$$w_i = (1-h_i)P_i x_i$$

and,

$$w_c = (1-h_c)P_c x_c$$

where w_i and w_c are the money wage rates in the investment sector and in the consumption sector respectively.

The preceding relations can be rewritten as,

$$P_i = \frac{w_i}{(1-h_i)x_i} \tag{2.23}$$

and,

$$P_c = \frac{w_c}{(1-h_c)x_c} \tag{2.24}$$

showing that the price level in a sector (P_i or P_c) is proportional to the money wage rate (w_i or w_c), so long as physical labour productivity (x_i or x_c) and the distributional parameter (h_i or h_c) remains constant in that sector.[10]

Using (2.21) to (2.24) in the basic condition for macroeconomic balance (2.17), we obtain on simplification:

$$\frac{L_c}{L_i} = \frac{(1-h_c)}{(1-h_i)} \cdot \frac{(1-s_p h_i)}{s_p h_c} \cdot \left(\frac{w_i}{w_c}\right) \tag{2.25}$$

Condition (2.25) shows that the employment in the two sectors must be in a certain *proportion*, if the surplus of the consumption sector is to be exactly realised into profit without any unplanned accumulation or decumulation of inventories of consumption goods.

The proportionality of employment between the two sectors, depicted by condition (2.25) is of crucial importance in analysing the *general multiplier mechanism*, both under quantity- and under price-adjustments. In so far as quantity adjustment is concerned, it now explicitly shows the *employment multiplier*, i.e., the additional employment in the consumption sector (ΔL_c) that would be required to support an autonomous increase in employment in the investment section (ΔL_i), when all the money wages and prices remain constant (implying h_i and h_c as well as w_i and w_c are constant in (2.25)). In this case, (2.25) yields,

$$\Delta L_c = \frac{(1-h_c)}{(1-h_i)} \cdot \frac{(1-s_p h_i)}{s_p h_c} \cdot \left(\frac{w_i}{w_c}\right) \cdot \Delta L_i \tag{2.26}$$

Thus, corresponding to the quantity-adjustment multiplier described earlier, for an autonomous increase in employment in the investment sector by $QA = \Delta L_i$ in Figure 2.2, the *required* expansion of employment in the consumption sector has to be $NW = \Delta L_c$ in the same Figure 2.2, which can now be solved from (2.26) above.

However, in the case of the multiplier based on price adjustment such expansion in the level of employment and output of the consumption sector is not feasible by assumption (as in Figure 2.3). Consequently, distributional parameters like h_i and h_c or the relative wage structure (w_i/w_c) must vary on the right-hand side of (2.25) in response to an autonomously increased employment in the investment sector (ΔL_i). In other words, the proportionality between the employment levels of the two sectors, given by the right-hand side of (2.25), must become *flexible* through suitable changes in the parameter values (like h_i, h_c, w_i and w_c) when the multiplier mechanism is based on price adjustment.

Since a variety of such adjustments in the parameter values are possible under alternative assumptions, several types of multiplier mechanism based on price adjustment can be described. However, the essential point is already emphasised by Figure 2.3 – the *real* wage in terms of consumption goods has to be depressed to generate enough surplus to accommodate a higher level of investment in terms of higher employment in the investment sector (L_i). Thus, an increase in the *share* of *real* investment in the economy means that the proportional L_c/L_i falls as L_i increases. And, the essential point is to consider how the parameters on the right-hand side of (2.25) change by depressing real wage rate so as to restore back the equality shown in (2.25).

The argument can be formally pursued by taking logarithmic differences on both sides of (2.25) to obtain,[11]

$$\left(\frac{\Delta L_i}{L_i} - \frac{\Delta L_c}{L_c}\right) = \frac{1}{h_c} \cdot \left(\frac{\Delta h_c}{1-h_c}\right) - \frac{(1-s_p)}{(1-s_p h_i)}\left(\frac{\Delta h_i}{1-h_i}\right) + \left(\frac{\Delta w_c}{w_c} - \frac{\Delta w_i}{w_i}\right) \tag{2.27}$$

However, under the assumption of constant physical labour productivity x_i and x_c in the short period, logarithmic differentiation of (2.23) and (2.24) yields,

$$\left.\begin{aligned} \frac{\Delta h_i}{(1-h_i)} &= \left(\frac{\Delta P_i}{P_i} - \frac{\Delta w_i}{w_i}\right) \\ \text{and} \\ \frac{\Delta h_c}{(1-h_c)} &= \left(\frac{\Delta P_c}{P_c} - \frac{\Delta w_c}{w_c}\right) \end{aligned}\right\} \tag{2.28}$$

Substituting (2.28) in (2.27), we obtain a general representation of the *multiplier analysis based the price-wage adjustment in both the sectors* in the form:

$$\frac{\Delta L_i}{L_i} - \frac{\Delta L_c}{L_c} = \frac{1}{h_c}\left(\frac{\Delta P_c}{P_c} - \frac{\Delta w_c}{w_c}\right) - \frac{(1-s_p)}{(1-s_p h_i)}\left(\frac{\Delta P_i}{P_i} - \frac{\Delta w_i}{w_i}\right) + \left(\frac{\Delta w_c}{w_c} - \frac{\Delta w_i}{w_i}\right) \tag{2.29}$$

The general equation (2.29) exhibiting the multiplier mechanism based on price-wage adjustment can be used to discuss various *special cases*. For instance, in conformity with Figure 2.3, if we assume money wages to be constant in both the sectors (i.e., $\Delta w_i = \Delta w_c = 0$), constant full capacity level of employment in the consumption sector (i.e. $\Delta L_c = 0$) and a constant price level for investment goods (i.e., $\Delta P_i = 0$), then (2.29) reduces to,

$$\frac{\Delta P_c}{P_c} = h_c\left(\frac{\Delta L_i}{L_i}\right) \tag{2.29a}$$

Thus, in Figure 2.3, the proportional increase in the price level of consumption goods, i.e.

$$\frac{\Delta P_c}{P_c} = \frac{UJ}{GJ}$$

required to restore macroeconomic balance must equal

$$\frac{JH}{GJ} \cdot \frac{AQ}{AF}$$

where $JH/GJ = h_c$ and $AQ/AF = \Delta L_i/L_i$, to satisfy (2.29a). To elaborate with an arithmetical illustration, if $h_c = 0.3$ initially, then a 10 per cent increase in investment (i.e. $\Delta L_i/L_i = 0.1$) requires the price level of consumption goods to increase, i.e., the real wage rate in terms of consumption goods to decrease by 3 per cent according to formula (2.29a).

Alternatively, as another special case not so far discussed, we could assume that *relative* prices as well as relative *money* wages remain constant implying, all prices rise in a uniform proportion, i.e.

$$\frac{\Delta P_i}{P_i} = \frac{\Delta P_c}{P_c} = \frac{\Delta P}{P}$$

and, so do all money wage rates, i.e.,

$$\frac{\Delta w_i}{w_i} = \frac{\Delta w_c}{w_c} = \frac{\Delta w}{w}$$

If the level of employment in the consumption sector is constrained by full capacity and $\Delta L_c = 0$, (2.29) under the above assumption of constant *relative* prices and money wage rates simplifies to,

$$\left(\frac{\Delta P}{P} - \frac{\Delta w}{w}\right) = \left(\frac{\Delta L_i}{L_i}\right) \cdot \left[\frac{h_c(1-s_p h_i)}{(1-h_c)+s_p(h_c-h_i)}\right] \tag{2.29b}$$

With the values of the parameters $h_i = 0.25$, $h_c = 0.30$, $s_p = 0.60$, a 10 per cent increase in the employment of the investment sector will now require almost 3.5 per cent decrease in the *real* wage rate in accordance with (2.29b). However, a 3.5 per cent decrease in *real* wage rate may require much larger increase the price level if money wage rate also increases in the meantime. Thus, 20 per cent increase in money wages would require 23.5 per cent increase in the price level to restore balance according to (2.29b).

It should be noted that both in (2.29a) and in (2.29b) quantity adjustment in the consumption sector was assumed to be restricted by full utilisation of capacity in that sector. Alternatively, one could also analyse the working of the multiplier based on price adjustment by assuming full employment of the labour force. However, strict full employment would require labour to be withdrawn from the consumption sector, *reducing* the level of consumption output in order to increase employment in the investment sector. This would imply quantity adjustment *in reverse* in the consumption sector, as the withdrawal of labour would reduce the level of consumption goods output. Consequently, the extent of price rise of consumption goods and the fall in the real wage rate in terms of consumption goods must be greater under the postulate of full employment. However, such an assumption of withdrawal of labour from the consumption sector, even when demand for its output is expanded (because, L_i is higher) does not conform to typical situations and need not be pursued in greater detail here.[12]

Having seen how quantities (see (2.26)) or prices and money wages (see (2.29)) adjust under the multiplier mechanism in the more general two department scheme, we are now in a position to consider an important special case to summarise the analysis. This corresponds to the case where both sectors have uniform values of the parameters, i.e.

$h_i = h_c = h$ (uniform share of profit)
$w_i = w_c = w$ (uniform money wage rate) and
$P_i x_i = P_c x_c = Px$ (uniform labour productivity)

Under these assumptions, the basic condition for macroeconomic balance, represented by the proportionality of employment between the two sectors in (2.25) reduces to the simpler form,

$$\frac{L_c}{L_i} = \frac{(1-s_p h)}{s_p h}$$

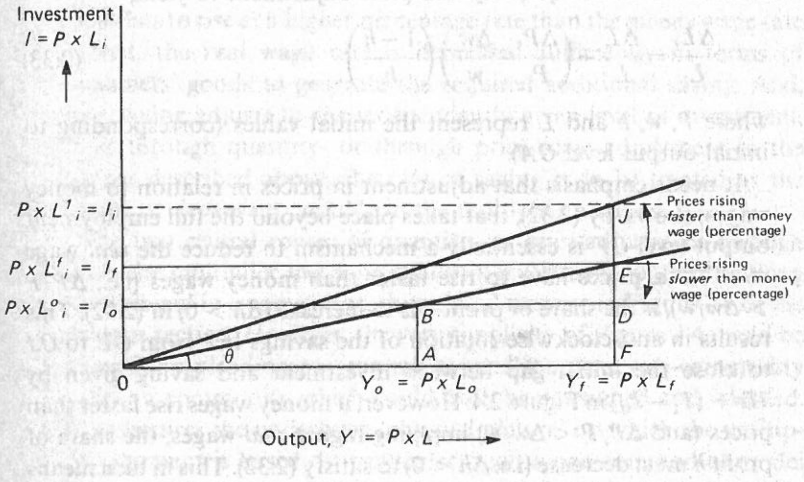
or,

$$\frac{L_i}{(L_c + L_i)} = \frac{L_i}{L} = s_p h = \frac{I}{Y} \qquad (2.30)$$

because $I = xPL_i$ and $Y = xPL$ in this case. The nature of quantity- or price-adjustment under the multiplier mechanism that would be required to achieve macroeconomic balance, depicted by (2.30), is captured by means of the simple Figure 2.4.

In Figure 2.4, at some initial, base-year price P, output is measured on the horizontal and investment on the vertical axis. In accordance with (2.30), the slope of the ray OBE passing through the origin, measures the marginal and average propensity to save, i.e. $\tan\theta = s_p h$. At the initial (base year) investment level $I_0 = AB = PxL_i^0$, the economy is operating below the full employment output level $PxL_f = OF$. Consequently, any increase in investment, say from AB to EF, leads to a corresponding quantity adjustment, resulting in additional output $AF = \Delta Y$, which can be calculated from the quantity-adjustment multiplier formula (2.20). However, investment beyond the full-employment level, e.g. $I_1 = JF = pxL_i^1$, cannot lead to further increase in output, measured at the base year price level, P. In such a case, the distribution of income has to change in favour of profit to raise the value of the parameter h. This increases $\tan\theta$ and rotates the line OE anti-clockwise, until at OJ macroeconomic balance between investment and saving is restored again through increased share of profit, h. This rotation of the original savings-line

Figure 2.4 *Restoration of macroeconomic balance through quantity and price-adjustment. Slope of the savings line OE, i.e. $\tan EOF = s_p h$ from (2.30). Anti-clockwise rotation of the savings line from OE to OJ shows redistribution in favour of profit as h increases to make the slope larger from EOF to JOF.*



from OE to OJ geometrically represents the price-adjustment multiplier.

The extent of rotation of the savings line from its initial position OBE required for the restoration of macroeconomic balance can be computed from equation (2.30). Logarithmic differentiation of that equation yields,

$$\frac{\Delta L_i}{L_i} = \frac{\Delta L}{L} + \frac{\Delta h}{h} \qquad (2.31)$$

where the first term, $\Delta L/L = AF/AO$ shows quantity adjustment, while the second term, $\Delta h/h = \tan EOJ/EOF$ shows price adjustment induced by the multiplier mechanism as the level of investment is autonomously raised from I_0 to I_1, i.e., by a proportion $\Delta L_i/L_i = JD/DF$, from its initial level DF in Figure 2.4.

Further, in view of (2.28), in this special case (of $w_i = w_c = w$; $h_c = h_i = h$; and $P_i x_i = P_c x_c = Px$) we have,

$$\frac{\Delta h}{(1-h)} = \left(\frac{\Delta P}{P} - \frac{\Delta w}{w}\right)$$

or,

$$\frac{\Delta h}{h} = \left(\frac{\Delta P}{P} - \frac{\Delta w}{w}\right)\left(\frac{1-h}{h}\right) \tag{2.32}$$

Thus, (2.31) and (2.32) may be combined to show the multiplier mechanism under quantity and price adjustment to yield,

$$\frac{\Delta L_i}{L_i} = \frac{\Delta L}{L} + \left(\frac{\Delta P}{P} - \frac{\Delta w}{w}\right)\left(\frac{1-h}{h}\right) \tag{2.33}$$

where P, w, h and L represent the initial values (corresponding to initial output level OA).

It needs emphasis that adjustment in prices in relation to money wages, shown by (2.32), that takes place beyond the full employment output level OF is essentially a mechanism to reduce the *real* wage rate. Thus, prices have to rise faster than money wages (i.e., $\Delta P/P > \Delta w/w$), if the share of profit h is to increase ($\Delta h > 0$) in (2.32). This results in anti-clockwise rotation of the savings line from OE to OJ to close the initial gap between investment and saving given by $JD = (I_1 - I_0)$ in Figure 2.4. However, if money wages rise faster than prices (and $\Delta P/P < \Delta w/w$) implying higher *real* wages, the share of profit h must decrease (i.e. $\Delta h < 0$) to satisfy (2.32). This in turn means that the savings line OE rotates clockwise and the initial gap between investment and saving JD *increases* over time in Figure 2.4. In other words, unless the *real* wage rate can be sufficiently depressed, the free enterprise capitalist economy is left without any viable mechanism to restore the macroeconomic balance between investment and saving at full employment.

C Significance of the Principle of Effective Demand

The basic idea underlying the principle of effective demand is simple: since commodities are necessarily produced for a market, the size of the market must *regulate* the level of commodity production. This regulating role of the market is embodied in the proposition that investment *governs* saving, because it is the wage bill of the investment sector that creates the market for 'surplus' consumers' goods to be sold and realised into profit. This basic insight is further formalised by the *multiplier analysis*. Treating investment as the autonomous or *independent variable* in the short period, the analysis shows how a higher level of investment is matched by a correspondingly higher level of saving. That additional saving to match the additional investment is generated in the economy either through a higher level of production (i.e. quantity-adjustment) or through a redistribution of income among the economic classes (i.e., price-adjustment). In the latter case the price level of consumers' goods has to rise at a higher percentage rate than the *money* wage rate so that, the *real* wage rate is depressed sufficiently in terms of consumers' goods to generate the required additional saving. And, since saving adjusts to the independently given level of investment, either through quantity- or through price-wage adjustment in the manner described above, the rate of saving is to be treated as the passive or *dependent variable* in the multiplier analysis.

The two central routes of quantity- or price-adjustment through which the multiplier mechanism allows investment to *govern* saving are exhibited in a convenient, short-hand manner in Figure 2.4 of the previous section. However, the very simplicity of Figure 2.4 could be somewhat misleading, as it resembles an all-purpose, one-commodity model – a commodity which could both be consumed and invested. This obscures the underlying 'physical picture' on which the multiplier argument is based. In particular, such a one-commodity model obscures the obvious fact that, by its definition investment goods consist of *non-consumables*; hence, any expansion in the level of employment in the investment sector results in an expansion in the wage bill of Department I (investment sector) which can only be met by generating additional surplus of *consumables* that are produced by Department II (consumption sector). Consequently, *additional 'saving' or surplus has to be, generated in terms of consumables* or wage-goods so that, more workers can be supported in the investment sector.

The fact that saving has to be generated in terms of consumables to sustain workers engaged in producing non-consumable investment goods, has a deeper implication. By the very nature of capitalism, capitalists enjoy the power to decide how much to invest, i.e., the level of employment in the investment sector. But the corresponding saving in wage-goods has to be generated to match this independent decision of the capitalists. Under the traditional multiplier analysis based on quantity-adjustment, this places no additional burden on the workers when more saving in terms of wage goods is generated out of a greater production of wage-goods, made possible by the existence of unemployment and excess capacity in the consumption, i.e., the wage-goods sector. However, in case the multiplier operates through price adjustment, the burden of sustaining the additional investment falls on the workers; they are *forced* to generate the matching additional saving in terms of consumables through a reduction in their *real* wage rate in terms of wage-goods. In this later case although the capitalists have the unilateral power to decide how much to invest, the workers are obliged to generate the matching amount of additional saving through a reduction in their *real* wage rate. And yet, the national income statistics would simply report it as higher investment financed by higher saving out of higher profit earned by the capitalists!

The physical distinction, departmentalised into production of consumables (or, more exactly, wage-goods) and non-consumables also enables us to see how the essential *principle of effective demand is readily extendable* to several other situations. So long as we maintain the working hypothesis of one sector exclusively producing wage-goods, all other sectors in the economy must be linked to it through *a fundamental principle of macroeconomic balance* (as explained in Section A of this chapter): *the surplus over the wage bill in the wage-goods sector must sustain consumption by workers elsewhere in the economy*. Thus, whether it is a *'luxury' consumption sector* producing exclusively for capitalists or an *export sector* producing for foreigners, the workers employed in all such sectors would have to be supported out of the surplus generated by the wage-goods sector. Consequently, *an autonomous increase in the wage bill of any one of the non-wage-goods sector would bring into operation the multiplier mechanism* by creating additional demand for wage goods. However, whether the resulting mechanism would be based on quantity-adjustment or on price-adjustment (or a combination of both) in the wage-goods sector depends on further specification of the problem, in a manner summarised by means of the preceding Figure 2.4. In principle then, a wide *variety of multipliers* can be associated with different types of *autonomous* increases in expenditures on non-wage-goods. There would be a multiplier associated with increased 'luxury' consumption by capitalists; a multiplier associated with increase in expenditure on armaments or government's spending in general; similarly, a multiplier mechanism would also be associated with an autonomous increase in export, called the *foreign trade multiplier*.[13]

The preceding argument that even an autonomous increase in 'luxury' consumption by a landlord or capitalist class can expand the market for wage-goods could be used in defence of 'conspicuous

consumption' by a leisure class (as Malthus, in effect, had argued over the 'glut controversy' with Ricardo). Similarly, it could be validly argued that increased armament expenditure helps to counter the immediate problem of insufficient effective demand in a capitalist economy. If all this sounds rather absurd, the source of such absurdity is to be found in the very logic of commodity production itself: every autonomous increase in expenditure on workers' non-consumables becomes justified, so long as it creates a market for commodities! Keynes' argument that even a public work programme consisting entirely of digging holes to fill them up again can be used to reduce unemployment dramatised this very point.

The fuller implication of the argument that every autonomous increase in the demand for wage-goods would create its own additional supply through the multiplier mechanism based either on quantity- or on price-adjustment, can perhaps be better understood by reversing it. Thus, an imagined expansion in the output of the consumption goods sector itself (say, in Figure 2.2) results in additional surplus in terms of consumables. However, under commodity production, there is no guarantee whatsoever that this additional surplus would be either consumed by the capitalist class or invested, i.e., paid in wage bill to employ more workers in the investment sector. In other words, the surplus of commodities in Department II would not necessarily find a market where it can be realised into profit if the autonomous expenditure on non-consumables happens to be too small. Once this is seen, it is easy to understand what was essentially wrong with the usual formulation of *Say's law* which maintained that 'supply creates its own demand'. The additional supply or surplus of the consumption sector need not, under conditions of commodity production, create its own demand which originates in autonomous investment. From this point of view, Say's law fails to recognise the basic character of commodity production where demand originating in the investment sector regulates the level of supply coming from the consumption sector. Hence, it is by *inverting Say's law*, and letting autonomous increase in the demand for consumption goods create its own additional supply, that we are able to understand the economic law which rules commodity production in a capitalist economy.

In this reversal of Say's law lies the deeper ideological impact of the principle of effective demand. Because, it also implies an *inversion of causation between the micro-level at which an individual* (or a 'household') *operates and the macro-level at which the capitalist economy as a whole operates.* For an individual without the possibility of borrowing or running down assets, his income governs expenditure during a given period. Consequently, an individual's investment decisions will be broadly limited by his saving. By arguing that causation runs in precisely the opposite direction for the capitalist economy *as a whole*, where aggregate demand (expenditure) governs aggregate supply (income), the principle of effective demand succeeded in breaking the old analogy between the individual and the society.

However, such an analogy is deeply rooted in the liberal ideological tradition which has been accustomed to look upon the society as a mere collection of individuals. Such a tradition presupposes that by suitably magnifying (or aggregating) the behaviours of individuals, one could arrive at laws governing capitalist commodity production. The principle of effective demand teaches us that this is misleading. Indeed, the Victorian virtue of thrift at the level of an individual household could turn into a *social* vice under the logic of commodity production in times of economic depression. Yet another example based upon this false analogy was the 'Treasury View' propounded to counter policies of increased public investment during the 1930s:

> There was heavy unemployment in England even before the world slump set in. In 1929, Lloyd George was campaigning for a programme of public works. In reply, British officials propounded the 'Treasury View' that if the Government borrowed, say, a hundred million pounds to set men to work on road building and so forth, *foreign investment would be reduced by an equal sum* and no overall increase in employment would occur.[14]

The 'Treasury View' implicitly accepted the analogy between the individual and the society by assuming that if the government spends more in one direction (e.g. road-building), then it would be forced to spend less in another direction (e.g. foreign investment). Because it wrongly assumed that total income and saving are *given* for the economy, just as it is given in the case of an individual. In a similar way, it is argued even today that a higher level of public investment or government budget deficit will 'crowd out' private investment by an equal amount. A real contribution of the principle of effective demand was to point out exactly why such arguments based on an explicit or implicit analogy between the individual household and the capitalist economy, can turn out to be thoroughly misleading in understanding the logic of commodity production.

Notes on Chapter 2

1. More formally, an equilibrium condition is like the solution to an equation which is true only for a *particular* value of the variable e.g., $x+3 = 7$ holds only if, $x = 4$. Similarly, (2.5) is an equilibrium condition because it holds only when there is no unplanned change in the level of inventories, i.e., $A = 0$. In contrast, (2.6) is true for *all* values of A; hence it is an identity. In passing, the reader may also note that there may be systems with multiple equilibria just as an equation can have multiple solutions e.g., $x^2-6x+8 = (x-4)\ (x-2) = 0$, has two solutions at $x = 4$ and $x = 2$.
2. In the accountants' definition of profit, accumulation of inventories evaluated at imputed market prices is treated as part of gross profit; see definition (1.18) of Chapter 1. However, such a definition avoids the realisation problem, which is usually of central importance to the firms in maintaining comfortable 'cash-flow' positions.
3. The question of how profit is realised in the investment sector (R_I) is left open in our discussion. Since investment expenditure is treated as autonomous, we may assume that it is just sufficient so as not to lead to any unplanned change in the level of inventories of final investment goods, i.e., there is no realisation problem of selling investment goods in the market. This simplifying assumption will be dropped only when an explicit demand function for investment goods is introduced in Chapters 6 or 7.
4. See definitions (1.16) and (1.17) of gross value added in Chapter 1 (rent has been excluded from our present analysis for simplicity). The total income received by the investment sector as profit (R_I) and wage (W_I) must add up to the total *final* expenditure on investment goods (net of raw material cost, etc.), by the circular flow of national income mentioned at the end of Chapter 1.
5. There could also be decumulation of inventories held from earlier periods. Nevertheless such inventory decumulation could not be a general method of adjustment because it requires us to assume that past history was such that it allowed a sufficient level of inventory to be held. This need not be the case and we simplify the analysis by assuming that there are no inventories held from the past.
6. See previous note 4 of this chapter explaining why the *final* expenditure on a sector equals the value added by that sector.
7. In a free-enterprise economy with no economic role for the government, there are no indirect taxes or subsides; hence, estimates at market prices and at factor cost must coincide (see relation (1.22) of Chapter 1). Further in a strictly closed economy, there is neither any income earned nor paid

abroad (see relation (1.20) of Chapter 1); nor is there any export or import (see (1.15) of Chapter 1). Hence, gross domestic product = net national product at factor cost ≡ national income, under the simplifying assumptions made above.

8. $1+a+a^2+\ldots+a^n$ is a geometric series. If $1>a>0$, each higher-ordered term becomes smaller and the series is convergent. The sum of the series is easily obtained as, $S=1+a+a^2+a^3\ldots+a^n$. or, multiplying both sides by 'a', $aS=a+a^2+a^3\ldots+a^{n+1}$. Now, deducting aS from S and cancelling all the possible terms, $S-aS=(1-a)S=1-a^{n+1}$; or, $S=(1-a^{n+1})/(1-a)$. However, for large n, a^{n+1} is small if $1>a>0$ and can be ignored to yield, $S=1/1-a$. This formula for summing a convergent, geometric series is used in the text where, $a=(1-s_p h_c)$.
9. For the sake of expositional simplicity, we ignore the problem of realisation of surplus into profits and conduct the analysis (in comparative static terms) as if, all surplus has been realised into profit.
10. The full implication of this proposition is discussed in Chapter 3.
11. The derivation of equations (2.27) to (2.29) involves the use of logarithms and calculus and may be skipped by the less mathematical reader. He should concentrate on Figure 2.4 which explains the argument geometrically.
12. It shows the weakness of the assumption of strict full employment. However, with such strict full employment of labour, $L_i+L_c=L_f$ is a constant so that, $\Delta L_i=-\Delta L_c$; when this is substituted and the algebra is simplified, the right-hand side of (2.29) becomes $(L_f/L_c).(\Delta L_i/L_i)$ where, $L_f/L_c=(L_i+L_c)/L_c=1+(L_i/L_c)$, can be calculated from (2.25) for the initial situation (before additional labour ΔL_i is employed in the investment sector). This procedure enables us to calculate the extent of decrease in *real* wage for given percentage increase in employment in the investment sector $(\Delta L_i/L_i)$ under conditions of full employment.
13. Analysed in greater detail in Chapter 5, Section A.
14. Quoted from Joan Robinson (1965), 'Kalecki and Keynes', *Collected Economic Papers*, vol. 3, p. 92.

Further Reading

Kalecki's (1971) essay (no. 7) 'The determinants of profits' as well as his essay (no. 13), 'The problem of effective demand with Tugan-Baranovski and Rosa Luxemburg' in his *Selected Essay on the Dynamics of the Capitalist Economy* provide modern discussions on the problem of realisation of profit.

Kahn's (1972) article 'The relation of home investment to unemployment' in his *Selected Essays in Employment and Growth* first formulated the multiplier analysis in 1931. Samuelson's 'The simple mathematics of income determination', in *Income, Employment and Public Policy* (1948) shows how to extend the multiplier analysis, particularly taking into account government budget. Similarly, Lange's 'On the theory of the multiplier' in his *Papers in Economics and Sociology* (Lange, 1970) discusses possible extensions of the

multiplier analysis in a mathematically slightly more advanced manner. It contains, in particular, interesting discussions of the 'foreign trade multiplier' (to which we return in Chapter 5, Section A) and of the multiplier in a more dynamic setting. Goodwin's 'The multiplier as a matrix' (Goodwin, 1949) provides an interesting extension, but requires some background in linear algebra.

The price-adjustment multiplier was formulated in Kaldor's (1960) 'Alternative theories of distribution' reprinted in his *Essays on Value and Distribution*. Joan Robinson's (1965) article 'Kalecki and Keynes' in her *Collected Economic Papers*, Vol. 3 provides a highly readable account of the connection between the theories of profit realisation and of effective demand, independently formulated by the two authors. Indeed, this chapter shows how these two formulations can be integrated in the Marxian two department scheme under quantity- and price-adjustment.