

Chapter III: Monetary Economy with Currency Money

8. Continuing the train of thought from the previous chapter where we provided for a theory with stock-flow in the Sraffian edifice, we now set to explore the role of money and interest in the theory of value. We would aim to attempt a closure to this perennial debate of monetary and value synthesis, starting this chapter. A capitalist economy which produces commodities by means of commodities has been the topic of discussion all this while in the previous chapters. In the last chapter, we augmented the standard stock-flow model of a capitalist economy to convert it into a system of a commodity money economy. However, many would argue that commodity money (or money commodity!) is not, or may be not, an accurate representation of a true monetary economy. After all, it is hard, even to think, that people carry stocks of commodities, however small or light-weighted this commodity is, for their daily trades ranging from buying securities to breads. As a result, we would also aim to move a little farther from this theoretical commodity standard towards a far more realistic form of money- money in the form of currency. By currency money, we mean any form of non-commodity standard, measure and medium of exchange. This may be purely cash provided by the government, say. Or currency money may be introduced through an ingenious method that is normally resorted to in fiscal activities-seignorage. Seignorage normally implies printing of currency notes or increasing the money supply through changes in the fiscal routines, so as to tackle inflation. Whichever method it may take, it would be important to note that as currency can exist in an economy searching for a standard and means of payments. The evolution of money also reached its epoch of plastic money through this stages as well-commodity (various from salt to gold to metals to mules). This provides a rationale and motivation to start the analysis of a monetary economy with a system of currency money. All contracts and offers of contracts are represented in terms of this currency money. Furthermore, it is peculiar characteristic of currency money that it is the state or community which enforces the delivery, but also it decides what it is that must be delivered as a lawful or a customary

discharge of a contract which has been concluded in terms of such currency money. Keynes in his Treatise provides an apt definition to currency or fiat money- *fiat money is representative (or token) Money (i.e. something the intrinsic value of the material substance of which is divorced form its monetary face value)- now generally made of paper except in case of small denominations- which is created and issued by the State, but is not convertible by law into anything other than itself, and has no fixed value in terms of an objective standard.* Important points worth a mention are that the intrinsic value of currency money is not equal to its monetary value- the intrinsic value is not equal to the value in circulation. Also, it is created by the state and is independent of a standard. As a result, when an economy moves away from commodity standard to a form of money that is not pegged to any standard, there would be necessarily certain effects on the economy as a whole. This chapter aims to analyze these effects to an extent. Currency money provides an improved convenience to the economic agents thorough an invariable measure of value and also a standard which can be used as a medium of exchange; its value in use and its value in exchange do not change much and often. Let us begin where we left in the previous chapter. In the previous chapter, we analyzed the properties of a commodity money economy. We aim to keep rest all the things unchanged in this chapter; but we intend to change the medium of exchange in this chapter. We would replace the commodity money by currency in the system of this chapter. The production system would be similar to the one detailed out in the chapter on commodity money. There would continue to be stocks of commodities, flow expenditures of commodities, wages, a commitment to profits, along with stocks and flows of money in terms of this new currency money. Hence, the commodity price-production relations would be augmented for these money stocks (or currency expenditures by the government).

$$\begin{aligned} & (S_{11}p_1 + S_{21}p_2 + \dots + k_1 p_1 B_1)r + (A_{11}p_1 + A_{21}p_2 + \dots) + wL_1 = p_1 B_1 \\ & (S_{12}p_1 + S_{22}p_2 + \dots + k_2 p_2 B_2)r + (A_{12}p_1 + A_{22}p_2 + \dots) + wL_2 = p_2 B_2 \\ & \dots\dots\dots \\ & (S_{1n+m}p_1 + S_{2n+m}p_2 + \dots + k_{n+m} p_{m+n} B_{n+m})r + (A_{1n+m}p_1 + A_{2n+m}p_2 + \dots) + wL_{n+m} = p_{n+m} B_{n+m} \end{aligned}$$

Currency money needs to be given a specific role in this economy. The role of currency money is to be a standard and a measure of value. Also, in so doing, it itself must not undergo a lot of change in value; invariably so the currency standard should be a store of value as well. With this functionality, we may now proceed to provide for an entry point of currency. All industries and business seek capital in form of illiquid assets and also in form of liquid money. Therefore, it can be safely assumed that capital includes money stocks. The money stocks would be assumed to be held in as a proportion of the total turnover the particular industry generates. This, we would call the money turnover ratios, k as before. The government provides for purchases of individual commodities and stocks of individual commodities. The volume of these purchases generates a flow of currency from the government to the industries. Thus, currency is introduced in the production-price system. The coefficients $k_i p_i B_i$ represent the money holdings of the capitalists. These money holdings to an extent are the capitalists money demands since these money holdings are necessary for smoother production runs and also an integral part of the otherwise illiquid capital. The government is assumed to know or at least collect information from all the entrepreneurs in the economy about their monetary requirements and accordingly provides every industry with its necessary *currency* (cash) requirement. The production price equations therefore have various components: capital stocks, flow variables, labour terms and finally the end output. The capital stocks are themselves composed of real stocks of commodities and monetary stocks of currency. The capital i.e. the total stocks including the money stocks,

$$\sum_{i=1}^{n+m} \sum_{j=1}^{n+m} S_{ij} p_j + \sum_{i=1}^{n+m} k_i p_i B_i$$

is assumed to be owned by both the capitalists and the workers. These individual equities of the workers can be represented by

$$e_x \left(\sum_{i=1}^{n+m} \sum_{j=1}^{n+m} S_{ij} p_j + \sum_{i=1}^{n+m} k_i p_i B_i \right) \forall x = k, w.$$

Here, the k refers to the capitalist and the w refers to the workers. Having depicted the production price relations, these would enable in determining the absolute prices, wages and profits. With these variables, we can determine the level of national income in the economy, and

hence the overall consumption and savings of the economy. The consumption technology is assumed to be governed by the familiar linear expenditure systems of Stone. As the individual commodity demands are determined for consumption goods industries, the outputs of capital goods industries will be determined using the output system. Along with determination of outputs, the growth rate of the system is also determined from this sub-system.

$$\alpha_i wL + \beta_i rK = p_m B_m$$

$$\left(S_{11}x_1 + S_{12}x_2 + \dots S_{1n}x_n + \sum_{j=1}^m S_{1j} \right) g + \left(A_{11}x_1 + A_{12}x_2 + \dots A_{1n}x_n + \sum_{j=1}^m A_{1j} \right) = B_1x_1$$

$$\left(S_{21}x_1 + S_{22}x_2 + \dots S_{2n}x_n + \sum_{j=1}^m S_{2j} \right) g + \left(A_{21}x_1 + A_{22}x_2 + \dots A_{2n}x_n + \sum_{j=1}^m A_{2j} \right) = B_2x_2$$

.....

$$\left(S_{n1}x_1 + S_{n2}x_2 + \dots S_{nn}x_n + \sum_{j=1}^m S_{nj} \right) g + \left(A_{n1}x_1 + A_{n2}x_2 + \dots A_{nn}x_n + \sum_{j=1}^m A_{nj} \right) = B_nx_n$$

$$L_1x_1 + L_2x_2 + \dots L_nx_n = L$$

It should be observed here that currency money, unlike commodity money of the previous chapter, does not appear in the output system. While only capital goods enter the output system, it should be noted that commodities which are used in *production* of every other commodity are regarded as capital goods. Currency money is *not produced* commodity in the system and is externally provided by the government. Hence, currency money finds no role in the system of output determination. This is an important property of real and monetary forces. Real outputs are unaffected by the presence or absence of money. Yet again, for the closure of this system, we rely on Sraffa's labour conservation equation.

Consumption, as described in the first equation above, is carried out of incomes by both, capitalists and workers. While consumption technologies are explained, savings and investment become an integral part of the discussion. Additions to savings are done by both, the capitalist and workers. Similar to industrial money holdings, households (or workers) also keep a certain fraction of their wealth in terms of currency. Further, all consumptions and savings are represented in terms of this currency money. Workers add to their savings, which is only in the form of

industrial capital. Capitalists also save in the form of industrial capital. Depending on the individual propensities, both the agents may decide to allocate their savings to capital and currency. The total amount of currency in the system has to therefore, incorporate these savings and thereby additions to capital. Additions to capital and the existing capital stocks together are defined as the total currency in the system. Technically,

$$\begin{aligned} \text{Currency} &= \left(e_w \left(\sum_{i=1}^{n+m} \sum_{j=1}^{n+m} S_{ij} p_j + \sum_{i=1}^{n+m} k_i p_i B_i \right) + e_k \left(\sum_{i=1}^{n+m} \sum_{j=1}^{n+m} S_{ij} p_j + \sum_{i=1}^{n+m} k_i p_i B_i \right) \right) + \\ &\Delta \left(e_w \left(\sum_{i=1}^{n+m} \sum_{j=1}^{n+m} S_{ij} p_j + \sum_{i=1}^{n+m} k_i p_i B_i \right) + e_k \left(\sum_{i=1}^{n+m} \sum_{j=1}^{n+m} S_{ij} p_j + \sum_{i=1}^{n+m} k_i p_i B_i \right) \right) \end{aligned}$$

An important equation in this relationship in this analysis is the growth-profit relationship, which is derived from the simple saving-investment relationships in the economy. This relationship takes the following form:

$$r = \frac{g \left((e_w + e_k) \left(\sum_{i=1}^{n+m} \sum_{j=1}^{n+m} S_{ij} p_j + \sum_{i=1}^{n+m} k_i p_i B_i \right) \right) - (k_e^w (1 - \beta) w L)}{\left(k_e^w (1 - \beta) e_w \left(\sum_{i=1}^{n+m} \sum_{j=1}^{n+m} S_{ij} p_j + \sum_{i=1}^{n+m} k_i p_i B_i \right) + k_e^k (1 - \beta) e_k \left(\sum_{i=1}^{n+m} \sum_{j=1}^{n+m} S_{ij} p_j + \sum_{i=1}^{n+m} k_i p_i B_i \right) \right)}$$

This relationship is developed using the principle of growth rate⁴². In a currency money economy, yet again using the quantity theory equation leads to providing no solution or meaningless solutions to the system. We, after inspecting and appreciating the invalidity of quantity theory to this system as well would propose a different and a simpler closing equation for the above system. This equation may take the following form:

$$\left((e_w + e_k) \left(\sum_{i=1}^{n+m} \sum_{j=1}^{n+m} S_{ij} p_j + \sum_{i=1}^{n+m} k_i p_i B_i \right) \right) (1 + g) = \text{Currency}$$

Necessarily, it is important that the term in the parenthesis following the Δ in the equation for currency would be equal to the total savings in the economy. This would be always true because in this economy, the only medium of savings is through equities. Thus, all the incomes in the economy which are unconsumed

⁴² In any economy, growth rate, $g=S/K$, where S =Savings and K =Capital

would be translated into equities through savings. The closing equation thus introduced implies that the total currency, defined as equities plus the additional capital, would be equal to the current level of capital plus an additional to the capital stock. Both the sides of this equation are similar, one written in terms of current values and the left hand side written in terms of equilibrium values. Our model of currency money is now complete. The model incorporating currency money involves $m+n$ absolute prices and outputs, wage rate, rate of profits and rate of growth. Hence, this model involves $2m+2n+3$; a step ahead of the commodity money system, which had two lesser variables to determine- one the absolute prices and secondly the currency in the system. We would now describe some more economic properties of an economy with pure currency money. The conclusions that we aim to draw from here become more explicit and intelligible with the use of a hypothetical numerical (economy). We would use similar model of the previous chapter with the following exception- the money commodity producing economy of the previous chapter would be eliminated; we would continue to have five industries in the model. Of these, three would be capital goods industries, those commodities which enter the production of every other commodity. The last two equations in the production system would be the consumption good industries. The closing equation for this set of production relationships would be the monetary closing equation as discussed above.

9. Let us explore the system in greater details with a numerical example. However, we would like to provide a rough sketch of the algorithm used to arrive at the solutions.
 - a. Start the price equations with an arbitrary value of the rate of profits, r^* . This would make the price system determinate and hence, solve for the $n+m$ prices and the wage rate
 - b. Determine the demands for the consumption goods industries using the demand equations
 - c. Adjust the consumption goods industries to the new demand by scaling the commodity inputs up/down as required

- d. Proceed with the dual and solve for the outputs and the growth rate of the capital goods variables
- e. Readjust the price equations to reflect the new capital industry outputs akin to the adjustments done to the consumption goods industries
- f. Calculate the excess demands, $X_{d_new} - X_d$
- g. Use the growth profit frontier to determine the new rate of profits, r^{**}
- h. Repeat the process from Step a till all excess demands, $X_{d_new} - X_d = 0$

In current context of currency money, we have the following relations:

$$\begin{aligned}
(3p_1 + 0.4p_1 + 2p_2 + 5p_3)r + (2p_1 + 5p_2 + 3p_3) + 5w &= 40p_1 \\
(2p_1 + 5p_2 + 1.5p_2 + 3p_3)r + (5p_1 + 7p_2 + 5p_3) + 5w &= 60p_2 \\
(2p_1 + 3p_2 + 6p_3 + 5p_3)r + (2p_1 + 5p_2 + 3p_3) + 10w &= 50p_3 \\
(3p_1 + 5p_2 + 6p_3 + 0.6p_4)r + (3p_1 + 2p_2 + 5p_3) + 10w &= 60p_4 \\
(2p_1 + 3p_2 + 5p_3 + 2.5p_5)r + (2p_1 + 5p_2 + 7p_3) + 10w &= 50p_5 \\
(12.4p_1 + 19.5p_2 + 30p_3 + 0.6p_4 + 2.5p_5)(1 + g) &= 1493 \\
0.45(40w + 20r) &= 60p_4 \\
0.45(40w + 20r) &= 50p_5 \\
(3q_1 + 2q_2 + 2q_3 + 5)g + (2q_1 + 5q_2 + 2q_3 + 5) &= 40q_1 \\
(2q_1 + 5q_2 + 3q_3 + 8)g + (5q_1 + 7q_2 + 5q_3 + 7) &= 60q_2 \\
(5q_1 + 3q_2 + 5q_3 + 11)g + (3q_1 + 5q_2 + 3q_3 + 12) &= 50q_3 \\
5q_1 + 5q_2 + 10q_3 &= 20 \\
321r &= 660g - 2w
\end{aligned}$$

We would now begin analyzing the properties of this economy with currency money. Production price relationships and the closing monetary equation provide the solution to the prices and the wage rates. These are absolute prices and absolute wage rates measured in terms of the currency issued by the state. In the process, it is discovered that commodity 1 and commodity 2 are excess supply industries with initial outputs greater than the desired/demanded levels by the economic agents. Necessarily, therefore, these industries shrink in size. An example of this reallocation can be given. Assume that we obtain the following results at iteration 1.

$$p_1 = 10$$

$$p_2 = 7$$

$$p_3 = 12$$

$$p_4 = 10$$

$$p_5 = 12$$

$$r^* = 0.25$$

$$w = 5$$

With these, we can determine the level of excess demands as under using the

$$\text{demand equations- } 0.45(40w + 20r) = 60p_4$$

$$0.45(40w + 20r) = 50p_5$$

The excess demands would be determined as

$$0.45(40 * 5 + 20 * 0.25) = X_{d4_new} * 10$$

$$0.45(40 * 5 + 20 * 0.25) = X_{d5_new} * 12$$

$$X_{d4_new} = 9.225$$

$$X_{d5_new} = 7.6875$$

Accordingly, we would multiply equation 4 in price equations by $\frac{9.225}{60}$ and equation 5 by $\frac{7.6875}{50}$ throughout to reflect the new demands.

The volume of employment of labour and other resources in these industries reduces and as such, therefore, the prices in this industries fall. A reallocation of these resources and labour happens is seen in other industries. Similar adjustments happen to the labour resources as well. Finally, prices and wage rate along with labour are determined. Equilibrium is determined only when demands match supplies- necessarily when markets clear. The solution of the production-price system after clearing for all excess demands is presented here

Table III-A: Nature of currency money disequilibrium- Prices

r	P1	P2	P3	P4	P5	w
1.69	9.65	7.44	12.16	9.46	11.64	21.71

More importantly, we can also evaluate the real wage rate in terms of prices of the consumption goods industries. Thus, the real wage rates are 2.29 and 1.86. Along with these levels of prices, the absolute levels of outputs are determined through

the demand equations. Excess demands in consumption goods industries determine the new levels of demand, depending upon the income levels earned by the agents in the economy. The capitalists own only the capital and hence the capitalist income includes profits. The labourers earn wages and a share in profits as well. This determines the workers' incomes. The capitalists and workers incomes are 951 and 885 respectively. The propensity to consume along with the respective incomes determines the consumption demands. Therefore, the outputs and the growth rates are as under

Table III-B: Nature of currency money disequilibrium- Outputs

B1	B2	B3	B4	B5	g
29	47.04	62.27	60.29	49.83	2.68

The functional distribution of the income is the ratio between the income earned by the capitalists and the workers. It is important to note that the prices determine the level of aggregate demand and hence the national income. In the process, the volume of employment is also determined for every industry. Depending on the marginal propensities to consume, the respective savings in the economy are determined. The net value of capital determines the rate of profits in the economy. As capital reduces, the profit rate increases in the industries. This value of capital and the value of national product are determined simultaneously in this system along with prices and wages. At the outset, there are excess demands in industry 3, 4, and 5. These excess demands are greater than the excess supplies in the system and hence, the net value of excess demands is positive. The overall positive excess demands in the economy drive the prices downwards, till a point where the value of excess demand is equal to zero. Those commodities where there is excess demand individually would tend to decrease in size and hence the value. The economic equilibrium in the economy is attained in this manner. The economy is dynamically stable in the sense that the economic equilibrium is independent of the initial conditions or as to where one starts analyzing the properties of this economy with. The total currency in this economy given by the sum of equity and addition to capital is 1470. The total capital, given by the value

of stocks at equilibrium, is 479. An important property of this system needs to be analyzed in the light of the volume of employment in the current economy and the value of net national product, or the national output it generates. It should be noted that equilibrium is defined in this system in terms of commodity market clearing. There is no explicit equation, or representation of a labour market. Currency is simply addition to purchases of the commodities by the government. Thus, the current economy as described by the results above can be stated to have attained equilibrium. The total amount of labour in this system at the outset is 40 (sum of the labour terms). However, the demands of the individual commodities dictate that the volume of employment in the economy happens to be only 34. More so, there is a big blunder that is committed in the process by the economy (or someone!). Looking at the production relations, one can tell that 40 resources would have been employed in the economy; they are employed as well but the economy pays salary/ wage incomes only to 34 resources. This is weird! In effect, it can be seen that there is an unemployment gap in the economy. The value of this unemployment gap can be evaluated at the specified wage rate. The volume of this gap is 133. In terms of the net national product, it can be evaluated in terms of market prices and factor costs. The NNP at factor costs is 1836 and the NNP at market prices is 1703. The gap between the two NNP valuations is (always) exactly equal to the value of (un)employment gap i.e. 133. An important characteristic worth noting is that this gap in terms of unemployment and national income valuations is not seen in the system with commodity money. This is only seen to be a characteristic of currency money so far. We would investigate this property in other monetary economic systems as well. This unemployment gap is a crucial characteristic of the currency money system therefore. We would come back to this system later when we explore more properties of the monetary system. For the purposes of the current chapter, it is important to highlight the important property of a currency money system: In such a system, an unemployment gap leading to the distortion of an identity (NNP market prices and factor costs). As surprising an idea this may be, but this would remain a property of the currency money system. Necessarily, this gap is not the Keynesian gap in

its exact sense, where the deviation between the employment levels, full and actual, is the Keynesian gap due to involuntary unemployment. In the sense of the current context, this gap may be thought of as a similar distortion. However, since we do not have an explicit labour market, it may not be prudent to appropriate this gap to the involuntary participation of the labour force. However, this gap can be surely corrected or eliminated from the system through provisions of public expenditures or more so by creating more demand (again of the type Keynes advocated- the gap of effective demand). We would explore this through provisions of public expenditures, where the government would purchase additional commodities, generate deficit based financing and provide these expenditures without any returns. Naturally so, this gap is bound to exist. Whilst we have closed every single sub-system through its respective closing counterpart, the currency money that is introduced by government purchases of individual commodities is yet to find a counter-part. The missing link is the fact that since the government purchases represent expenditure by the government, it should also be represented as regular flow expenditure for the businesses. In short, the government is required to create currency money through deficit financing. Deficit financing refers to provision of expenditures or money without resorting to any collections from the economic agents via taxes or duties. Having said so, it therefore is evident that without deficit financing, this model of currency economy is incomplete. A valid question or argument is this: why is deficit financing not required in a system with commodity money? An important point here is that commodity money is internal money to the system and rightfully so is *a produced means of exchange*. However, with currency money, as it enters the system, it is bound to create disturbances which should then be resolved from within the system. The government is assumed to provide this external *currency* to the system through purchasing of commodities from the industries and households. This way, deficit financing is introduced in this economy. A point worth noting is the fact that in a pure currency money economy, deficit financing would only be the appropriate medium of balancing the economy. The solutions and the process of equilibrating this currency money economy would be deferred

to the annexure. More importantly, in the actual monetary economy, often we come across other forms of money like deposits & loans. We would attempt to present cases for a deposit money economy. However, as deposits enter the system, it would be prudent to lay the foundations for such an entry. In the next chapter, therefore, we would present a theory of interest rates- an important foundation for the entire monetary economy.