

## Chapter VI: Fiscal & Monetary Policy

17. As we set out to now explore more properties of a monetary economy and identify methods to eliminate the disequilibrium gap of the previous chapters, it would be important to note the various agents in this economy. As we had started this modeling exercise, we had assumed capitalists and workers. The capitalists were in charge of the banking system and also the production system was partly held by them; the remaining ownership of capital and hence means of production was of workers'. We explained in previous chapters that in such an economy, equilibrium is impossible; instead it leads to distorting an identity altogether. Not irrecoverable this predicament, we figured out that an important participant in the economic activity was purely missing. This agent is the government or any regulator that provides for the infrastructure and other allied requirements necessary for the economy. Towards the concluding parts of the previous chapter, we introduced the government and established its role in a monetary economy. It also led to achieving a desired monetary equilibrium. In that chapter, we had assumed that the government makes deficit financing without provision of a public good. In this chapter, we intend explain the motivation for provision of a public good by the government. The role of government in an actual economy may range from providing all the activities for economic sustenance to economic stabilities. The form of deficit financing introduced in the previous chapter would fit into the second category. However, the government may provide certain goods without any return or expectations (we hope!). In the process of providing such goods, it may resort to various options and each of these options has an implication on the economy as a whole. The government may resort to providing the public goods using financing options depending upon its budgetary specifications. Given a closed economy of the type we are discussing, it would be prudent to assume that without any external inflows, the government would maintain a balanced budget, if at all it is to commit any budgetary provisions towards the supply of public goods. In such a case, the production system would have two more equations: one for the provision of public good and the other for

the provision of funds for the public good. The important question to answer at the outset is this: why does the government provide for a public good? The simplest answer is that it has no other option but to provide for it. The public good can take any form- the amount of defence expenditure, infrastructure of the form of roads, railways, bridges and under-passes or even expenditures on uniforms of public servants and their salaries as well. The public good may take the form of, as negligible as, facilitation of economic resources to as varied an activity as provision of adequate infrastructure, roads, and economic infrastructure so as to enable the private sector conduct its functioning smoothly. The government may also extend its role (and normally it does) to providing defence services. This is an indicative list of the economic activities of the government. The merit of this discussion will be seen shortly. The present section shall introduce the provision of a public good and its implications in terms of the fiscal policies. The production of public goods involves several inputs. It could range from cement for the infrastructure development to uniforms and food items for those employed in the defence sector. Thus, the provisioning of a public good involves usage of capital inputs, consumption inputs and for this section; it could be assumed that the government does not rely on borrowings as a source of revenue. It should be noted that the government does not aim/ budget any profit rate on the capital used in the process of provisioning of the public good. The public good normally takes the form of budgetary outlays and is a pure expenditure. It takes the form of pure value. Thus, while introducing the public good, it must be noted that the production of public goods has two definite characteristics: one that the inputs do not yield any profits and two that the output is a pure value and hence, does not command a price for itself. The output is in the form of expenditures which are derived using the values of capital and labour employed in the production of the public good. As a result, the production equations would then take the following form:

$$\alpha \left( \Psi_i p_i B_i + \sum_{i=1}^{m+n} \sum_{j=1}^{m+n} S_{ij} p_j \right) r + (1-\alpha) \sum_{t=1}^b \left\langle \left[ \partial_t \left( \Psi_i p_i B_i + \sum_{i=1}^{m+n} \sum_{j=1}^{m+n} S_{ij} p_j \right) \right] i_t \right\rangle + \sum_{i=1}^{m+n} \sum_{j=1}^{m+n} A_{ij} p_j + w L_i = p_i B_i$$

$$\left( M_p + \sum_{i=1}^{m+n} \sum_{j=1}^{m+n} S_{ij} p_j \right) + \left( M_p + \sum_{i=1}^{m+n} \sum_{j=1}^{m+n} A_{ij} p_j \right) + w L_p = X_p$$

The first block is the system of regular production equations. Along with this block, we introduce the system of public good equations. It must be noted that the two features of zero profit rates and absence of price coefficients are recognized in the equation above. The government does not aim to make any profits in providing the public good and at the same time, it commands no price at all. In fact, public good is not quoted in value and quantity terms; it is in effect a total value- a total expenditure or the like. The public good production equation takes the following form

$$\alpha \left( \psi_i p_i B_i + \sum_{i=1}^{m+n} \sum_{j=1}^{m+n} S_{ij} p_j \right) + (1-\alpha) \sum_{t=1}^b \left\langle \left[ \delta_t \left( \psi_i p_i B_i + \sum_{i=1}^{m+n} \sum_{j=1}^{m+n} S_{ij} p_j \right) \right] i_t \right\rangle + \sum_{i=1}^{m+n} \sum_{j=1}^{m+n} A_{ij} p_j + w L_p = X_p$$

It can be observed from the above equation that the production of public goods uses capital and certain consumption goods as well. However, since public good does not enter the production of every or any other good, the public good cannot be classified as a *capital goods* commodity. Introducing the equations for production of public good alone in the model makes the model indeterminate: we have an extra equation now! As a result, we need to search for an additional equation to close this system and make this system determinate. We need not go too far to complete our search. The equation we are looking for is the budget equation which relates the expenditure on public goods to the sources of funds to provide for this expenditure.

$$X_p = \left( \tau \left( r^* E_k + I_b + \sum_{i=1}^t \sum_{i=1}^t \mu_t i_t D_t \right) + \left( r^* E_l + w^* L + \sum_{i=1}^t \sum_{i=1}^t (1-\mu)_t i_t D_t \right) \right)$$

Here,  $\tau$  is the tax rate and it shall be assumed through the above equation that the government uses a balanced budget policy. It is more important, in the passing, to understand this role of government as a provider of public goods on the grounds of welfare considerations. It becomes important to understand that the

government performs this welfare function and it in essence, through taxes also achieves a redistribution of incomes. Incomes flow from the consuming agents to the government in form of taxes and from the government to the producers in form of public expenditure and hence back to the consumer class in form of factor incomes. The cycle continues! As the entire cycle is seen through its periodic phases, we may be able to understand this redistributive function of the government. As an alternative, the government may choose to provide the public good partly through the tax revenues and partly through deficit financing. In that case, the budget equation would necessarily look like:

$$X_p = \left( \tau \left( r^* E_k + I_b + \sum_{i=1}^t \sum_{i=1}^t \mu_i i_t D_i \right) \right) + \left( r^* E_l + w^* L + \sum_{i=1}^t \sum_{i=1}^t (1 - \mu)_i i_t D_i \right) + \left( \sum_{i=1}^{m+n} CG_i p_i \right)$$

However, we would assume that the government resorts to a balanced budget policy implying no deficit financing. Necessarily, since there is an income tax introduced in the system, it would be pivotal to understand the relationship between profit and growth under the conditions of a tax rate. The relation changes as under-

$$r = \frac{\left( (g * M_s) + \Delta Currency - (1 - \beta)(1 - \tau)(Y_{Labourer} - Su.Cons_{Labourer}) - (1 - \alpha)(1 - \tau)(Y_{Capitalist} - Su.Cons_{Capitalist}) \right)}{(1 - \tau) \left[ (1 - \beta) * Equity_{Labourer} + (1 - \alpha) * Equity_{Capitalist} \right]}$$

Two points here are worthy of discussion. Firstly, we need to understand that the commodity introduced in this chapter- the public good- is a commodity that uses every or almost every other commodity but is hardly used in the production of every other commodity. In that sense, the public good takes the form of consumption good, or what Sraffa calls a luxury commodity. Secondly, it would be important to notice the base of the tax computations. It could be seen that the tax that is applied on the economy is applied to the incomes in the economy. Necessarily, this is assumed that we are dealing with income taxes (for simplicity of the current situation). However, any other tax would just have similar implications. Continuing in the fashion adapted in the course of this work, we introduce a mathematical model of the previous chapters with the only

modification being the introduction a public good equation and the associated balanced budget equation.

$$\begin{aligned}
 &(0.25p_1 + 3p_1 + 2p_2 + 5p_3)r + (0.66p_1 + 0.40p_2 + 1.02p_3)(1 + i_1) + (0.66p_1 + 0.40p_2 + 1.02p_3)i_2 + \\
 &(0.66p_1 + 0.40p_2 + 1.02p_3)i_3 + (2p_1 + 5p_2 + 3p_3) + 5w = 40p_1 \\
 &(2p_1 + 0.5p_2 + 5p_2 + 3p_3)r + (0.40p_1 + 1.12p_2 + 0.61p_3)(1 + i_1) + (0.40p_1 + 1.12p_2 + 0.61p_3)i_2 + \\
 &(0.40p_1 + 1.12p_2 + 0.61p_3)i_3 + (5p_1 + 7p_2 + 5p_3) + 5w = 60p_2 \\
 &(2p_1 + 3p_2 + 1p_3 + 5p_3)r + (0.40p_1 + 0.61p_2 + 1.22p_3)(1 + i_1) + (0.40p_1 + 0.61p_2 + 1.22p_3)i_2 + \\
 &(0.40p_1 + 0.61p_2 + 1.22p_3)i_3 + (2p_1 + 5p_2 + 3p_3) + 10w = 50p_3 \\
 &(3p_1 + 5p_2 + 6p_3 + 1.5p_4)r + (0.61p_1 + 1.02p_2 + 1.22p_4)(1 + i_1) + (0.61p_1 + 1.02p_2 + 1.22p_4)i_2 + \\
 &(0.61p_1 + 1.02p_2 + 1.22p_4)i_3 + (3p_1 + 2p_2 + 5p_3) + 10w = 60p_4 \\
 &(2p_1 + 3p_2 + 5p_3 + 0.25p_5)r + (0.40p_1 + 0.61p_2 + 1.02p_5)(1 + i_1) + (0.40p_1 + 0.61p_2 + 1.02p_5)i_2 + \\
 &(0.40p_1 + 0.61p_2 + 1.02p_5)i_3 + (2p_1 + 5p_2 + 7p_3) + 10w = 50p_5 \\
 &p_1 + p_2 + p_3 + p_4 + p_5 + w = X_p \\
 &(15.31p_1 + 23.12p_2 + 31.25p_3 + 1.875p_4 + 0.312p_5) = 725 \\
 &104.275 + 47.5(1 + i_1) = 145(1 + i_1) \\
 &11.608 + 65(1 + i_1) + 80(1 + i_2)^2 = 145(1 + i_2)^2 \\
 &14.979 + 20(1 + i_2)^2 + 125(1 + i_2)^3 = 145(1 + i_2)^3 \\
 &853 = p_4(B_4 + Ap_4) \\
 &848 = p_5(B_4 + Ap_5) \\
 &(3.25q_1 + 2q_2 + 2q_3 + 5.73)g + (2q_1 + 5q_2 + 2q_3 + 5.73 + Ap_1) = 40q_1 \\
 &(2q_1 + 5.5q_2 + 3q_3 + 9.18)g + (5q_1 + 7q_2 + 5q_3 + 7.96 + Ap_2) = 60q_2 \\
 &(5q_1 + 3q_2 + 6q_3 + 12.59)g + (3q_1 + 5q_2 + 3q_3 + 13.68 + Ap_3) = 50q_3 \\
 &5q_1 + 5q_2 + 10q_3 = 20 \\
 &X_p = \tau(Y_k + Y_l)
 \end{aligned}$$

Let us understand the implications of the income tax thus introduced above. Since we have augmented the economy of the previous chapters, it would help us in understanding the features of this economy wide income tax.

We may proceed with understanding the implications of imposing an *income tax* as above through the solutions of the model introduced above.

Table VI-A: Price solutions with a tax imposition

r	g	P1	P2	P3	P4	P5	w
3.52	1.40	13.62	10.36	15.63	14.53	16.57	44.94

Table VI-B: Banking solutions with a tax imposition

i1	i2	i3	Loans	Deposits
5.59%	9.41%	17.19%	475.24	475.24

Table VI-C: Output solutions with a tax imposition

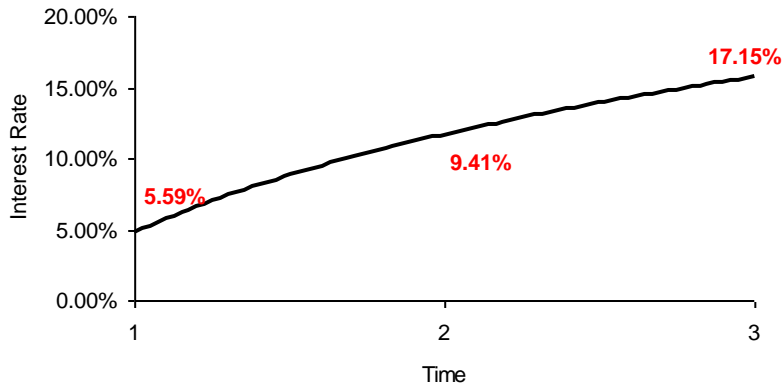
B1	B2	B3	B4	B5	NNP
31.90	50.16	59.16	58.58	51.18	2861

The above results are comparable to the results introduced in the previous chapter in equilibrium. It can be seen that the taxes have a relatively less evident impact on the prices in the economy<sup>57</sup>. However non evident this effect may be, it must be seen and evaluated that it has an upward pressure on prices. Taxes constrain incomes and hence constrain demand; however if the incomes are reallocated by the governments effectively, it has a lesser evident impact on the prices. Since, the taxes are so to say, non-inflationary (and we are not saying anything new here; taxes are non-inflationary), they have lesser impacts on the value of capital and hence flight of capital in terms of their equity and debt compositions as well. After all, an income tax alteration does not send a stock market crashing throughout; though it may happen that adverse tax changes may send the market crashing on the budget day or only the budget hour, but not the entire budget fiscal year! Thus, the government and its fiscal policy have minimal role in the omni-presence of inflation. Hence, it may well be said that these fiscal implications may not have any effects on the interest rates in the economy. The term structure remains unaltered more or less! Thus it will still look like this:

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<sup>57</sup> It should be noted here as pointed out by Prof. Omkarnath, G that this is a result of no-commodity taxes and is purely because of income taxes. The results of commodity taxes are not evaluated here if they are also non-inflationary

Term Structure of Interest Rate



The NNP in this economy and the one modeled in the previous chapter is more or less equal, implying that taxes may not have an income reducing effect, provided that the entire tax amount is returned back to the economy in form of some public expenditure, public good or even plain vanilla deficit financing. These taxes but of course have a redistributive effect on the incomes in the economy. It may be noted that the in economy presented in the previous chapter, the total income received by the workers and capitalists can be determined and that these values are Rs. 1895 and Rs. 922. This is the factor distribution of the total NNP of Rs. 2817 approximately. It can immediately be inferred that in the previous economy without taxes, the income shares were 32% and 68% respectively of the capitalists and the workers. Post the imposition of taxes, the workers and capitalists now share 60% and 40% respectively with incomes of Rs. 1739 and Rs. 1205 respectively. This implies that the taxes introduce a redistributive effect in the economy; the richer class (here workers) would now transfer their incomes to the relatively poorer (here, capitalists) through the monies imposed by the state. This income redistribution is attained by the state through impositions of income taxes; these are income altering effects. The tax rate in this economy is 3.91% and the total public expenditure or the provision of public good is worth Rs. 115.38. Various forms of redistributive effects could be explained in this respect. These could take form of allocative efficiency as above with respect to incomes, productive efficiency with respect to changes in production/ capital reallocation or

plain distribution based taxes to improve efficiencies in trade. The way this is done is fairly simple and depends on the type of tax the government chooses to levy on its subjects. There could be introduced capital input-based Value added taxes or product-based sales taxes. The incidence of taxation in respect of these two taxes has an impact on the pricing equations and hence on the balanced budget equation.

$$\alpha \left( \Psi_i p_i B_i + \sum_{i=1}^{m+n} \sum_{j=1}^{m+n} S_{ij} p_j \right) r + (1-\alpha) \sum_{i=1}^b \left\langle \left[ \partial_i \left( \Psi_i p_i B_i + \sum_{i=1}^{m+n} \sum_{j=1}^{m+n} S_{ij} p_j \right) \right] i_t \right\rangle + \sum_{i=1}^{m+n} \sum_{j=1}^{m+n} A_{ij} p_j + wL_i = p_i B_i$$

In the case of a sales tax, the right-hand side is altered to look like  $(p_i B_i) (1-\tau)$  and

$$\text{the budget equation would change similarly to } \left( 1 - \tau \sum_{i=1}^{m+n} (p_i B_i) \right) = X_p.$$

The government, as a provider of public goods, may resort to do so either entirely (through deficit financing) or either entirely through resource mobilization from the public (through taxation). It is already discussed that the taxation has wealth redistributive effects and efficiency effects. However, the government also has to manage the total economic balance in the system. It should however, leave the agents with just the right amount of money so as to meet their all primary, secondary and tertiary requirements. This would in-turn lead to social harmony and peace. Nevertheless, the discussion around the provision of public goods through resources mobilized by the government via two extremes can be taken forward. We would introduce a solution between these two extremes. The government has an option of providing a public good partly through taxes and partly through government debt. The borrowings done by the various ministries in-charge of providing the public goods are after-all done so that the common man is not burdened with heavy taxes. Therefore, the government borrowings would have fiscal implications; government debt is an important internal policy tool for the government. The form of contractual debt agreements of the government and the banks may be of various natures; we are planning to introduce government borrowings in the same spirit as private borrowings. The government borrows funds of various maturities, of which the immediate period loans are always repaid and renewed whilst the other loans are only renewed.



$$\left( M_p + \sum_{i=1}^{m+n} \sum_{j=1}^{m+n} S_{ij} P_j \right) + \left( M_p + \sum_{i=1}^{m+n} \sum_{j=1}^{m+n} A_{ij} P_j \right) + L_{p1}(1+i_1) + \sum_{s=2}^n L_{ps} i_s + wL_p = X_p$$

This is the public good production equation. The borrowings are introduced in the form of term loans of varying maturities. Since there is also an element of borrowings included in the analysis, the budget equation would be slightly different; an augmentation for the sum of loans will be introduced in the budget equation.

$$X_p = \left( \tau \left( r^* E_k + I_b + \sum_{i=1}^t \sum_{i=1}^t \mu_t i_t D_t \right) + \left( r^* E_l + w^* L + \sum_{i=1}^t \sum_{i=1}^t (1-\mu)_t i_t D_t \right) \right) + \left( \sum_{i=1}^{m+n} AG_i P_i \right) + \sum_{s=1}^n L_{ps}$$

Thus, the total public expenditure is financed through deficit financing, tax revenues and government debt. The net national product at factor costs would now also include the interest incomes that accrue to the banks on the government debt. However, under this case, the disequilibrium gap explained in the previous chapter takes a different form. The difference between the savings and the investment and between the NNP factor costs and NNP market prices are not equal to the disequilibrium wage gap. Instead, it is the following equation that holds at disequilibrium:

$$NNP_{fc} - NNP_{mp} = w(L - L_n) = \text{saving} - \text{investment} - \text{Net\_government\_debt}$$

In the other cases, the equation or the disequilibrium *identity* changes and does not carry the net government debt. It is imperative to explain here what is meant by new government debt. It is already explained that the government borrows term loans. Net debt in this regard would then be equal to the total debt less the debt (principal) repayments; thus it would be total debt less the immediate period debt since that is the only loan the government repays. Let us continue with the same economic example that we started off with.

$$\begin{aligned}
& (0.25p_1 + 3p_1 + 2p_2 + 5p_3)r + (0.66p_1 + 0.40p_2 + 1.02p_3)(1 + i_1) + (0.66p_1 + 0.40p_2 + 1.02p_3)i_2 + \\
& (0.66p_1 + 0.40p_2 + 1.02p_3)i_3 + (2p_1 + 5p_2 + 3p_3) + 5w = 40p_1 \\
& (2p_1 + 0.5p_2 + 5p_2 + 3p_3)r + (0.40p_1 + 1.12p_2 + 0.61p_3)(1 + i_1) + (0.40p_1 + 1.12p_2 + 0.61p_3)i_2 + \\
& (0.40p_1 + 1.12p_2 + 0.61p_3)i_3 + (5p_1 + 7p_2 + 5p_3) + 5w = 60p_2 \\
& (2p_1 + 3p_2 + 1p_3 + 5p_3)r + (0.40p_1 + 0.61p_2 + 1.22p_3)(1 + i_1) + (0.40p_1 + 0.61p_2 + 1.22p_3)i_2 + \\
& (0.40p_1 + 0.61p_2 + 1.22p_3)i_3 + (2p_1 + 5p_2 + 3p_3) + 10w = 50p_3 \\
& (3p_1 + 5p_2 + 6p_3 + 1.5p_4)r + (0.61p_1 + 1.02p_2 + 1.22p_4)(1 + i_1) + (0.61p_1 + 1.02p_2 + 1.22p_4)i_2 + \\
& (0.61p_1 + 1.02p_2 + 1.22p_4)i_3 + (3p_1 + 2p_2 + 5p_3) + 10w = 60p_4 \\
& (2p_1 + 3p_2 + 5p_3 + 0.25p_5)r + (0.40p_1 + 0.61p_2 + 1.02p_5)(1 + i_1) + (0.40p_1 + 0.61p_2 + 1.02p_5)i_2 + \\
& (0.40p_1 + 0.61p_2 + 1.02p_5)i_3 + (2p_1 + 5p_2 + 7p_3) + 10w = 50p_5 \\
& p_1 + p_2 + p_3 + p_4 + p_5 + 25(1 + i_1) + 25i_2 + 25i_3 + w = X_p \\
& (15.31p_1 + 23.12p_2 + 31.25p_3 + 1.875p_4 + 0.312p_5) = 725 \\
& 104.275 + 47.5(1 + i_1) = 145(1 + i_1) \\
& 11.608 + 65(1 + i_1) + 80(1 + i_2)^2 = 145(1 + i_2)^2 \\
& 14.979 + 20(1 + i_2)^2 + 125(1 + i_2)^3 = 145(1 + i_2)^3 \\
& 853 = p_4(B_4 + Ap_4) \\
& 848 = p_5(B_4 + Ap_5) \\
& (3.25q_1 + 2q_2 + 2q_3 + 5.73)g + (2q_1 + 5q_2 + 2q_3 + 5.73 + Ap_1) = 40q_1 \\
& (2q_1 + 5.5q_2 + 3q_3 + 9.18)g + (5q_1 + 7q_2 + 5q_3 + 7.96 + Ap_2) = 60q_2 \\
& (5q_1 + 3q_2 + 6q_3 + 12.59)g + (3q_1 + 5q_2 + 3q_3 + 13.68 + Ap_3) = 50q_3 \\
& 5q_1 + 5q_2 + 10q_3 = 20 \\
& X_p + 25(1 + i_1) + 25i_2 + 25i_3 = \tau(Y_k + Y_l) - 75 + \sum A_{ig}
\end{aligned}$$

The last equation above is important. It is the budget equation and it balances the total debt and the interest obligations on the same.

The price-wage-profit solution for this economy is presented below.

The prices in this economy may tend to fall due to an important aspect in a government debt situation. The borrowings by the government tend to reduce the taxes and as a result, may leave more incomes in the hands of the people.

Table VI-D: Price solutions in presence of government borrowings

r	g	P1	P2	P3	P4	P5	w
3.61	1.57	12.74	9.65	14.22	13.4	15.03	37.76

In this sense, since more incomes would induce more consumption and increased post tax incomes; this may lead to reduced prices and hence overall inflationary situations.

Table VI-E: Banking solutions in presence of government borrowings

i1	i2	i3	Loans	Deposits
5.70%	9.54%	17.07%	470.00	470.00

The level and the slope of term structure remains unaltered in this case, since it is assumed that the government borrows at the market rate of interest.

Table VI-F: Output solutions in presence of government borrowings

B1	B2	B3	B4	B5	NNP
31.32	50.12	59.54	54.11	47.82	2565

18. In a monetary theory of value, the role of monetary policy becomes even more important. In this chapter, we plan to introduce this role of monetary policy and assess its impacts on the overall values in the economy. In the process, we would introduce a central bank making these policy decisions. It would however, be assumed that the central bank would make its policy decisions at all times in the economy. Hence, it could well be said that in a monetary economy, government and monetary authorities have a prominent role to play; that they are always central to the functioning of the economy. To begin with, monetary policy can be defined as the measures taken by the monetary authorities to influence the quantity of money or the rate of interest with a view to achieving stable prices, full employment and economic growth. As mentioned, the Reserve Bank tries to influence the quantity of money and/or interest rates with a view to achieving price stability, full employment and economic growth. This implies that there must be some link (or links) between monetary variables (such as the quantity of money and interest rates) and macroeconomic variables (such as the price level, the level of employment and the gross domestic product (GDP)). These links are called the monetary transmission mechanism, that is, the way in which monetary changes affect the real economy. We would study these mechanisms in the view of our model in a short while. There are various views about the monetary transmission mechanism. Some economists, for example, see a direct link between changes in the quantity of money (M) and changes in the price level (P) but no link between changes in M and changes in real GDP. Other economists

emphasize the link between interest rates ( $i$ ) and investment spending ( $I$ ) in the economy. They regard interest rates as the outcome of the interaction between the money demand and the money supply. For example, if the money supply increases, interest rates will tend to fall. At the lower interest rates more investment projects will become profitable, therefore investment ( $I$ ) will increase. This, in turn, will result in an increase in GDP. That is why observers often call on the Reserve Bank to lower interest rates in an attempt to stimulate economic growth and employment. There is always a danger, however, that lower interest rates and a concomitant greater money supply will simply serve to increase the inflation rate. It would be a useful digression to begin our analysis with a survey of existing systems and instruments of leading central banks across the globe. The Eurosystem has a number of monetary policy instruments which it uses to achieve its monetary policy objectives. Here you will find information on the main components of this set of instruments: open market operations, standing facilities and minimum reserves. The main refinancing operations which are offered weekly and which run for one week are at the centre of these open market operations. In addition, the Eurosystem offers a longer-term refinancing operation once a month (which has a maturity of three months) and quick tenders. Each September the ECB publishes the dates for the open market operations in an indicative calendar for the following year. The two standing facilities - the marginal lending facility and the deposit facility - are designed to provide or absorb liquidity until the next business day. Furthermore, the Eurosystem prescribes the minimum reserves which the banks are required to hold in order to increase the structural liquidity requirements of the banking system. The Czech National Bank also does use similar instruments of monetary control. It mainly uses Open market operations, Automatic facilities and Minimum reserves. The Federal Reserve System has three main policy tools, as well as two additional tools, at its disposal. Each of these is listed and described below. However, the first instrument, open market operations, is by far the most commonly used. Open market operations are the most useful and important of the Fed's policy tools. Open market operations are the purchase or sale of government securities by the

Federal Reserve System. Each purchase or sale of securities directly affects the volume of reserves in the banking system, and therefore the whole economy. Purchases of government securities increase reserves and ease credit while sales decrease reserves and tighten credit. With a purchase of securities, the System pays for the purchase by crediting the reserve account of the seller's depository institution. The System can then loan out the reserves and increase the supply of money. Conversely, sales of securities reduce reserves and tighten credit because the System charges the reserve account of the buyer's bank, decreasing the reserves available for loans. Open market operations are either "dynamic" or "defensive." Dynamic operations are those taken to increase or decrease the volume of reserves to ease or tighten credit. Defensive operations are those taken to offset effects of other factors influencing reserves. Through their "discount windows," Reserve Banks act as a safety valve in relieving reserve market pressures. By lending funds against acceptable collateral, the System provides essential liquidity to financial institutions, while helping to assure the basic stability of money markets and the banking system. Commercial banks once borrowed from Reserve Banks by bringing bonds and other asset documents to a teller's cage or "window." The amount loaned was the face value of the asset, minus a "discount." Today, financial institutions still borrow from Reserve Banks. However, the term "discount window" is simply an expression for Fed loans that are repaid with interest at maturity, arranged by telephone, and secured by pledged collateral. The discount rate is the interest rate charged to depository institutions on loans from the Federal Reserve's credit facility, the discount window. Changes in the discount rate are initiated by the boards of directors of the individual Reserve Banks and must be approved by the Board of Governors. This coordination generally results in almost simultaneous changes at all Reserve Banks. The discount rate is changed infrequently, albeit some crisis in the economy and the current American sub-prime crisis has been an exception to this rule of infrequent discount rate changes. Changes in the discount rate affect credit conditions and therefore the economy. An increase in the discount rate, for example, makes it more costly for depository institutions to borrow from Reserve

Banks. The higher cost discourages depository institutions from using the discount privilege. It may force depository institutions to screen their customers' loan applications more carefully and slow the growth of their loan portfolios. Apart from these direct impacts, changes in the discount rate can affect expectations in financial markets. If, for example, the market interprets an increase in the rate as the beginning of a sustained program to tighten credit, lenders will cut back commitments, waiting for more attractive rates. Potential borrowers will try to borrow before the expected higher rates materialize. These actions by lenders and borrowers will produce the expected tight credit. Reserve requirements are the percentages of deposits that depository institutions must hold as cash in their institution or at the Fed. The reserve requirement affects monetary and financial conditions. For example, a reduction in the reserve requirement decreases the amount of reserves that banks must hold and therefore banks can make more loans. The larger volume of loans creates money and stimulates the economy. Raising the reserve requirement has the opposite effect. Although the reserve requirements are a potentially powerful tool, the Board of Governors seldom changes these requirements in the conduct of monetary policy. Reserve requirements are used more to regulate banks to provide security and stability in the banking system. In addition to these main tools, the Fed has two additional policy tools at its disposal. Margin requirements are the percentage of cash down payment a purchaser must make when borrowing to buy securities. In some instances, the Board of Governors establishes margin requirements. Although margin requirements could be used actively as a policy instrument, the Board rarely changes the requirements. The People's Bank of China applies instruments like the reserve requirement ratio, central bank base interest rate, rediscounting, central bank lending, open market operation and other policy instruments specified by the State Council. The South African Reserve Bank uses various instruments in its attempt to influence the quantity of money and/or interest rates in South Africa. In contrast to the direct measures applied in earlier decades, the emphasis nowadays is on market-oriented policy measures which seek to guide or encourage financial institutions to take certain actions on a voluntary basis. In

other words, the authorities create incentives to encourage private enterprise, and hence financial variables, to move in a desired direction. The monetary authorities create such incentives through their own buying and selling activities in the financial markets or by varying the terms on which they are prepared to offer credit. A good South African example of such a policy instrument is the repo rate established by the repurchase tender system of the Reserve Bank. The repo rate is the rate at which the Reserve Bank grants assistance to the banking sector and therefore represents a cost of credit to the banking sector. When the repo rate is changed, the interest rates on overdrafts and other loans extended by the banks also tend to change. In this way the Reserve Bank indirectly affects the interest rates in the economy. The repo rate forms part of the Reserve Bank's accommodation policy. Another instrument of monetary policy in South Africa is the Reserve Bank's open-market policy which consists of the sale or purchase of domestic financial assets (mainly Treasury bills and government securities) by the Reserve Bank in order to exert the desired influence on interest rates and the quantity of money. Open-market policy is based on the inverse relationship between interest rates and bond prices (see Section 48). For example, when the Reserve Bank wishes to increase the quantity of money, it buys government securities on the open market. To persuade market participants to sell the securities, the price of bonds has to be raised. This, in turn, will lead to lower effective interest rates, as explained earlier. When the Reserve Bank wishes to reduce the money supply, it will do exactly the opposite, that is, sell bonds at a cheaper price than the ruling price, thereby raising effective interest rates. An important element of the current monetary policy in South Africa is the use of inflation targets. In February 2000 the South African government and the South African Reserve Bank officially announced an inflation target as part of monetary and anti-inflation policy in South Africa. Supporters of inflation targeting argue that such an approach helps to reduce inflation by keeping the public informed about future inflation trends, providing an anchor for inflation expectations, increasing the transparency of monetary policy, improving the accountability of the monetary authorities, increasing stability in nominal interest rates, reducing

inflation expectations by reorienting them towards the future, reducing the degree of money illusion in the economy and providing stability in the value of money, which enhances growth prospects. A major theme of this discussion is that each central bank performs a set of monetary operations called as monetary policy using a set of defined instruments with a unified view- defined economic stability. However, all these effects are ex-post through a theoretical monetary transmission mechanism, though not to deny that it happens! However, it would be prudent to have a construct to analyze the effects of various monetary instruments at the beginning of the policy period instead at the end of it. This is the only motivation of introducing this chapter. In an appropriately articulated monetary system, it becomes easier to compare various scenarios and draw conclusions even without actually rolling out the policy. In such simulated environments, we propose to conduct our monetary policy using two important instruments of policy control, namely the reserve requirements and the Open Market Operations. Cash reserve ratio (CRR) is a tool more frequently used by the Reserve Bank of India to control liquidity and affect interest rates. We aim to demonstrate that our model of the economy can be generalized adequately to incorporate the impact of the CRR and thereby can be used for policy purposes as well. Imposition of CRR reduces the supply of available deposits and tightens the liquidity position. As a result, there are more loans now chasing lesser deposits and hence, interest rates in the economy rise. With key interest rates rising, there is more savings in the economy and consumption falls to that effect. This causes prices to fall. This is one side of the theory. On the other side, as key interest rates rise, producers' cost of borrowing increases which causes overall cost of production to increase. Prices increase in this case. The elasticity of consumption function and the elasticity of the production function together net each other out and ultimately, if prices fall, it should be said that consumption effect dominates the production effect; else the converse is true. All said, the imposition of CRR causes the level and at most of the times, the slope of the term structure to change. Real business cycle at the point of imposition of CRR also has an impact on the interest rate schedule. In case of a depressionary economy, the imposition of CRR may lead to inverting



the term structure. Bankers would feel safer to lend more in terms of current period and lend lesser in terms of future periods. Short term interest rate may rise. Hence, the use of this tool, though the cheapest to administer, should be used with caution in tandem with the level of economic activity and also certain fiscal control initiatives. We would demonstrate the same in a later chapter as we aim to bring this synthesis to an end. For the moment, we would return to our economy without public good and hence taxation. In this simple case economy, we would demonstrate the effect of CRR on interest rates and other real and monetary variables of interest. Consider the following model of the economy:

$$(0.25p_1 + 3p_1 + 2p_2 + 5p_3)r + (0.66p_1 + 0.40p_2 + 1.02p_3)(1 + i_1) + (0.66p_1 + 0.40p_2 + 1.02p_3)i_2 + (0.66p_1 + 0.40p_2 + 1.02p_3)i_3 + (2p_1 + 5p_2 + 3p_3) + 5w = 40p_1$$

$$(2p_1 + 0.5p_2 + 5p_2 + 3p_3)r + (0.40p_1 + 1.12p_2 + 0.61p_3)(1 + i_1) + (0.40p_1 + 1.12p_2 + 0.61p_3)i_2 + (0.40p_1 + 1.12p_2 + 0.61p_3)i_3 + (5p_1 + 7p_2 + 5p_3) + 5w = 60p_2$$

$$(2p_1 + 3p_2 + 1p_3 + 5p_3)r + (0.40p_1 + 0.61p_2 + 1.22p_3)(1 + i_1) + (0.40p_1 + 0.61p_2 + 1.22p_3)i_2 + (0.40p_1 + 0.61p_2 + 1.22p_3)i_3 + (2p_1 + 5p_2 + 3p_3) + 10w = 50p_3$$

$$(3p_1 + 5p_2 + 6p_3 + 1.5p_4)r + (0.61p_1 + 1.02p_2 + 1.22p_4)(1 + i_1) + (0.61p_1 + 1.02p_2 + 1.22p_4)i_2 + (0.61p_1 + 1.02p_2 + 1.22p_4)i_3 + (3p_1 + 2p_2 + 5p_3) + 10w = 60p_4$$

$$(2p_1 + 3p_2 + 5p_3 + 0.25p_5)r + (0.40p_1 + 0.61p_2 + 1.02p_5)(1 + i_1) + (0.40p_1 + 0.61p_2 + 1.02p_5)i_2 + (0.40p_1 + 0.61p_2 + 1.02p_5)i_3 + (2p_1 + 5p_2 + 7p_3) + 10w = 50p_5$$

$$(15.31p_1 + 23.12p_2 + 31.25p_3 + 1.875p_4 + 0.312p_5) = 725$$

$$104.275 + 47.5(1 + i_1) = 145(1 + i_1)$$

$$11.608 + 65(1 + i_1) + 80(1 + i_2)^2 = 145(1 + i_2)^2$$

$$14.979 + 20(1 + i_2)^2 + 125(1 + i_2)^3 = 145(1 + i_2)^3$$

$$853 = B_4p_4$$

$$848 = B_5p_5$$

$$(3.25q_1 + 2q_2 + 2q_3 + 5.73)g + (2q_1 + 5q_2 + 2q_3 + 5.73) = 40q_1$$

$$(2q_1 + 5.5q_2 + 3q_3 + 9.18)g + (5q_1 + 7q_2 + 5q_3 + 7.96) = 60q_2$$

$$(5q_1 + 3q_2 + 6q_3 + 12.59)g + (3q_1 + 5q_2 + 3q_3 + 13.68) = 50q_3$$

$$5q_1 + 5q_2 + 10q_3 = 20$$

In this case, let us first note down the solutions obtained from the previous chapter

Table VI-G: Banking solutions

i1	i2	i3	Loans	Deposits
5.57%	9.38%	17.09%	476	476

This is the solution to the banking system of equations. The real equations or the production-price equations and the solution to the output system is as under:

Table VI-H: Price solutions

R	g	P1	P2	P3	P4	P5	w
3.41	1.43	13.58	10.33	15.68	14.53	16.63	45.75

Table VI-I: Output Solutions

B1	B2	B3	B4	B5
31.71	50.12	59.29	58.78	51.01

These solutions hold in the case of a zero CRR in the economy. Let us begin by imposing a CRR of 5% in this economy. A 5% CRR implies that of the 475 of deposits, 23.75 worth of deposits will not be available for making loans. Interest rates in this economy would rise. Ultimately, only 452 worth of deposits are disbursed as loans. In effect, however, the amount of loans outstanding is however 476. This pushes the interest rates upwards. The new interest rates are per under:

Table VI-J: Banking solutions after CRR

i1	i2	i3	Loans	Deposits
5.61%	9.45%	17.27%	452	476

Due to the imposition of CRR, loans worth only 452 are disbursed and hence, interest rates of all maturities rise. The next line item happens to be the real sector. The prices are seen to fall here marginally. Imposition of CRR in this economy does not affect the real outputs as will also be presented here. Hence, the increment in interest rates causes prices to fall; with interest cost going up and producers unable to raise sales revenues, prices have to fall.

Table VI-K: Price solutions after CRR

R	g	P1	P2	P3	P4	P5	w
3.30	1.43	13.12	9.98	15.15	14.04	16.06	44.18

What remains to be commented upon is the level of real wages in the economy. It should be noted that the real wages,  $w/p_4$  and  $w/p_5$  remain unchanged. The level remains constant at 3.15 and 2.75. There are marginal variations in the values pre and post imposition of the CRR; however, monetary policy changes like these do not produce greater real impacts in the economy. The rate of profits also falls in the economy with a fall in prices. It should be noted that this fall is a result of increasing interest costs and relatively constant sales revenues. There are no significant changes in the outputs as can be observed from the following table:

Table VI-L: Output solutions after CRR

B1	B2	B3	B4	B5
31.70	50.13	59.29	58.77	51.01

With no changes in outputs, the growth rate in the economy remains relatively unchanged. In short, it can be concluded that imposition of CRR impacts only key interest rates in the economy and provides a tool for absolute price control. However, in terms of real wages or outputs, there is no impact of the CRR. CRR per-se therefore becomes a tool in the hand of the banking system for controlling discretionary price rises. However, if there have to be real effects accompanied by the fall in prices, or any other monetary impact that CRR generates, an adequate backing of fiscal policy is necessary. Similar results are seen when the conditions are reversed. A decrement in CRR causes a fall in interest rates, rise in prices and profit rates with no major real impacts. Assuming that the CRR is now reduced to 1%, comparisons of results can now be done to -case without CRR (in this case, the results will be akin to that of imposition of CRR) and secondly to the previous case where CRR was 5% (this presents and completes the case for a fall in CRR- we would do this comparison). Consider the following results for the monetary part- the interest rates.

Table VI-M: Banking solutions with new CRR

i1	i2	i3	Loans	Deposits
5.59%	9.41%	17.17%	470	476

Comparing the results with the case of 5% CRR, it can be seen that interest rates decline, prices rise (following table) however outputs and real wages remain constant.

Table VI-N: Price solutions with new CRR

R	g	P1	P2	P3	P4	P5	w
3.36	1.43	13.39	10.19	15.47	14.33	16.40	45.12

The following table summarizes the results of the output system

Table VI-O: Output solutions with new CRR

B1	B2	B3	B4	B5
31.70	50.13	59.29	58.77	51.01

Thus, monetary variable of CRR is able to produce greater monetary effects than *real* effects. Used mostly for control of liquidity, CRR is also at times used for inflationary control. There is yet another tool at the disposal of the banking system. This refers to the OMO- the open market operations. OMO or open market operations refers to purchase and sell of securities from the open markets for controlling important policy variables-at certain times it is used for price controls and at certain other times, it is used for liquidity and credit control. In terms of an established banking system, the banks sell or purchase securities to or from the government thereby reducing or increasing liquidity in the system. A sale of security by the GOI to the RBI is normally referred to as a debt- a public debt and the GOI repays its debt by repurchasing the securities back from the RBI or the banking system. Open Market Operations (OMO) imply that the RBI undertakes to buy and sell Government Securities from participants in the financial markets. The operations could be undertaken on an outright basis or repurchase agreements. The objective of OMO is to absorb or provide liquidity in the market. However, OMO are conducted as an instrument of monetary policy

and not with respect to considerations of changes in the portfolio. Nevertheless, OMO have an impact on the balance sheet of the RBI. On certain occasions, when there are capital inflows which need to be absorbed, larger OMO are warranted to sterilize such flows. There is a cost to OMO, but, since the objective is to achieve monetary control, they are not undertaken on consideration of profitability. Therefore, continuing our model, we would introduce the OMO through these purchase and sell of securities-any purchase by the government reducing the liquidity and hence increasing the interest rates and the converse being true for any sale of securities. As a result, we introduce two new parameters in the model:  $z_iG$  and  $z_iR$  where  $z_iG$  denotes a public debt financed by the government- in short a sale of government securities to the reserve bank and  $z_iR$  denotes a public debt financed by the Reserve bank-in short sale of government securities by the reserve bank to the government. While  $z_iG$  captures the phenomena of sale of securities by government to the RBI,  $z_iR$  captures the case of purchase of securities by the government from the RBI. All this activity to obtain the funding for a loan which is a pre-decided amount. We call this loan as  $L_iG$  - shorthand for loan taken by the government. What we demonstrate now can be put up in a single sentence: an increase of  $z_iG$  leads to decreasing liquidity in the banking system and hence, creating a shortage of funds. This would push the interest rates upwards and lead to similar results of that of imposition of CRR. What needs to be explored is whether this activity has any *real* effects. Let us begin so by introducing sale of securities by the government to the reserve bank. It would be prudent as always to study the results of this system with an OMO- in the form of sale of GOI securities to mop up excess liquidity in the system- from the solutions to the interest rate equations<sup>58</sup>.

Table VI-P: Banking solutions with OMO Case I

i1	i2	i3	Loans	Deposits
5.6%	9.42%	17.21%	476	476

<sup>58</sup> It should be remembered that each time a solution is presented, the level of deficit financing is adjusted so as the show the picture of *actual equilibrium* devoid of any *effortless freedom*.

It thus can be seen that with the sale of GOI securities, the interest rates in the economy are jacked up. The extent of the rate increases depends upon the level of monetary activity carried out by the government. In this case, we have assumed the level to be worth 15 (rupees, say) and the overall money supply is 525. Therefore, the extent of activity can be said to be approx. 3% of the level of free money supply. Assuming this level is increased to approx. 5%. In this case, the interest rates become 5.62%, 9.46% and 17.30% respectively for the three maturities. The elasticity of the loan demand and the refinancing requirement together determine the extent of rate hike or rate reduction. The following table summarizes the results of the production-price system.

Table VI-Q: Price solutions with OMO Case I

R	g	P1	P2	P3	P4	P5	w
3.32	1.43	13.28	10.10	15.34	14.21	16.28	44.91

It should be therefore seen that the results are per expected. But the level of real wages remains relatively unchanged at 3.15 and 2.75 approximately. In absolute terms, there can be seen an overall price reduction and this may be attributed to overall reduction in liquidity causing lesser demand patterns. However, again on the output side, the sales revenue fall; absolute outputs do not change to greater extent.

Table VI-R: Output solutions with OMO Case I

B1	B2	B3	B4	B5
31.70	50.13	59.29	58.77	51.01

Thus, the OMO also has no real effects. The striking difference between the CRR and OMO therefore is while CRR reduces/increases individual banks' reserves; OMO reduces/increases the overall liquidity in the system.

We would now consider the case of purchase of government securities by the GOI from the central bank, therefore providing liquidity in the system. As expected, the interest rate equations would indicate a reduction in the interest rates.

Table VI-S: Banking solutions with OMO Case II

i1	i2	i3	Loans	Deposits
5.45%	8.89%	14.08%	476	476

It thus can be seen that with the purchase of GOI securities, the interest rates in the economy are decreased. The extent of the rate decrement depends upon the level of monetary activity carried out by the government. In this case, as the previous case, we have assumed the level to be worth 15 (rupees, say) and the overall money supply is 525. Therefore, the extent of activity can be said to be approx. 3% of the level of free money supply. Assuming this level is increased to approx. 5%. In this case, the interest rates become 5.36%, 8.5% and 12.31% respectively for the three maturities. The elasticity of the loan demand and the refinancing requirement together determine the extent of rate hike or rate reduction. The following table summarizes the results of the production-price system. From the two results for the interest rate movements, it should be seen that upward movements of the interest rate schedule are slower whereas the downside movements are faster. Somehow, the modeled equations make the interest rate table inelastic for higher values and relatively elastic for lower values of interest rates. Convexity of the yield curve, and hence the level of economic activity therefore plays an important role in selecting a policy variable. Secondly, it may also turn out to be an important property of a monetary economy that interest rate movements on the upward side also have their limits which this exploration can only remark. Studying and detailing out those limits can be left for a better thesis. The results of the production-price system also yield expected results. In fact, it so turns out that there are insignificant changes in the absolute prices compared to the case of

Table VI-T: Price solutions with OMO Case II

R	g	P1	P2	P3	P4	P5	w
3.35	1.43	13.29	10.11	15.34	14.21	16.28	44.91

An OMO where there was a sale of securities. There is either a marginal increase or constancy of the level of absolute prices. In real economies, we expect the level

of absolute prices to increase. The scale of the problem presented here is minuscule to mimic the true operations of a full-blooded economy. The last part is the solution to the output system. Monetary activities have very insignificant impact on the level of absolute outputs or the level of growth. The result is validated even in the case of OMO.

Table VI-U: Output solutions with OMO Case II

B1	B2	B3	B4	B5
31.70	50.13	59.29	58.77	51.01

19. To conclude this chapter, it may therefore be added that CRR or OMO are devices aimed for price stabilities and control of inflation. In the case of deficit financing, we have already shown that it has more *real* effects than monetary effects.

A valid question that may pose us in the analysis could be the following: can there be interplay of monetary and fiscal activities and what mix of policies can be used to determine the macro-economic equilibrium/ stability of the whole economic system? The simple answer to the first part of this question is obviously in the affirmative. The interplay of real (fiscal) and monetary variables is often observed in the real world and most of the economies are susceptible to not recognizing this interplay. Take the classic case of the Zimbabwean economy where the inflation rate has hit stratospheric levels. Or the case of the American economy when the Fed rates were tumbling as if the interest rate was the only variable the US could think of. In fact, in economically strategic economies, a combination of monetary and fiscal policies is often resorted to improve the micro-economic (prices and inflation) or the macroeconomic (interest or growth) situations. In either case, the impact on employment, output and the level of government activity must be ascertained before hand. In this short note, we would demonstrate the impact of using a mix of these instruments- deficit financing (fiscal), borrowings (fiscal), CRR (monetary) and OMO (monetary) and hence, to illustrate the idea of monetary and fiscal mix. Let us start with the classic case economy where the CRR, the amount of government borrowings and level of OMO are all zero. In



this case, the only option the government has is to provide adequate levels of deficit financing as observed before to clear the disequilibrium gap.

Table VI-V: Deficit financing and interplay

DF	Tax	CRR	i1	i2	i3	Ms	P4	P5	W	W/P4	W/P5
103	3.87%	0%	6	9	17	526	15	17	45	3.08	2.70

In this hypothetical economy, the deficit financing volume (indicated by DF) is around 103 units of the currency (if the economy were Indian, it would have been rupees!). At this level, the tax rate on personal incomes is 3.87%. The rates of interest are indicated by i1, i2 and i3 above. The columns of interest are w/p4 and w/p5. These columns indicate the level of real price (wage) and hence, the real wages in terms of consumption goods. In isolation, these may not make much of a sense; however when we do a comparative analysis in a short while, these can be used as valuable benchmarks. Consider a juncture in the process of this economy where the government decides to decrease its level of deficit financing. In order to meet the conditions of economic equilibrium, it would be imperative for the monetary agents of the economy to behave in a fashion rational enough, so as to influence the economic equilibrium. Consider this: the decrease in deficit financing reduces the volume of economic activity in the system, further to this; it also reduces the amount of money supplied in the economy. As a consequence, there are more deposits in the economy than the money supplied and hence the savings rate in the economy is higher compared to the level of output. This pushes the monetary authorities to make projects attractive by initiating actions that reduce the rate of interest in the economy, thereby attracting (private) investments and hence bridging the disequilibrium gap. This can be attained by a hike in the CRR. This is exactly what the central bank would pursue, the moment it sees a shortfall in economic activity by the government.

Table VI-W: Deficit financing & interplay- II

DF	Tax	CRR	i1	i2	i3	Ms	P4	P5	W	W/P4	W/P5
90	3.81%	10%	5	8	9	518	12	14	38	3.04	2.67

One question worthwhile a pause is this: why would the government reduce the level of deficit financing? Two answers are available from the above solutions. Number one, have a look at the last two columns- w/p4 and w/p5. Each of these columns registers a decline if one compares with the previous “benchmark” table above. Well, to reduce real wage inflation could be one objective of the government; at the same instant, the government succeeds in raising its source of revenues as well through an increase in the tax rate. Thus, by depriving the economy by a stimulus, the government is able to send enough signals to the taxpayers that its kitty is declining and has to make up for it through increased tax collections. This way, through a decline in the level of deficit financing, the government alters the consumption behaviour- positively by making goods cheaper through decline in real wages, and adversely by increasing the tax rate. One the other side, it also influences the savings behavior by altering the interest rates directly. This activity obviously reduces liquidity in the system and the money supply (Ms in table above) falls to 518. One more solution providing full power in the hands of monetary authorities can be exercised. Assume a case where the central monetary authority intends to suck out the entire liquidity from the system, more than in the example above<sup>59</sup>.

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<sup>59</sup> One need to note the difference between the two examples- in the first case, the government initiates an action of reducing the level of deficit financing and the monetary authorities respond by reducing the CRR. In the second case, it is the central monetary authority that induces the reduction in CRR (significantly) and the fiscal authorities follow to bridge the gap as warranted. These two distinctions are important and press the need to understand the cooperation rather than competition between monetary and fiscal authorities.

Table VI-X: Deficit financing & interplay- III

DF	Tax	CRR	i1	i2	i3	Ms	P4	P5	W	W/P4	W/P5
57	3.71%	38%	5	6	6	503	8	9	25	3.04	2.66

In this example, the volume of deficit financing reduces to 57, which is significant as compared to 103 in the benchmark case. However, the government is able to achieve this and also reduce the tax rate in the economy due to a significant reduction in money supply ( $M_s=503$ ); what this does is this reduces the inflation in the economy as well through a reduction in real wages. This is why the monetary authorities reduce the CRR. Thus, equilibrium interplay can be used to create multiple policy prescriptions for the state and the central monetary authorities.