Study Material for B.A (H) Economics IInd Sem.
Paper - Introductory Macroeconomics
Session : 2019-20

Teacher Name: Dr. JITENDER KUMAR
College - Deshbandhu College

Unit-4 (The closed Economy in the Short run)
Topic - (Income and Spending, chapter - 9)
Reference Book: (R. Dornbusch, S. Fischer and R. Startz, macroeconomics (11th edition), chapter - 9)

one of the central question in macroeconomics is why output fluctuates around its potential level. This chapter offers a first theory of these fluctuations in real output relative to trend. The cornerstone of this model is the mutual ~~attraction~~ interaction b/w output and spending. spending determine output and Income, but output and Income also determine Spending. we develop keynesian model of Income determination in this chapter. This chapter develops the theory of the aggregate demand schedule.

9.1 Aggregate demand and equilibrium output

Aggregate demand is the total amount of goods demanded in the economy —

$$AD = C + I + G + NX \quad \text{———} \quad (1)$$

output is at its equilibrium level when the quantity of output produced is equal to the quantity demanded. Thus an economy is at equilibrium when $Y = AD = C + I + G + NX$ ——— (2)

C = Consumption
I = Investment
G = Govt. expenditure
NX = NET exports

when $AD \neq Y$ — unplanned inventory investment

we summarize this as

$$\boxed{IU = Y - AD} \quad \text{———} \quad (3)$$

9.2 The consumption function and AD

we now focus on the determinants of AD, and particularly on Consumption functions. For Simplicity

G and NX = 0

The Relationship b/w Consumption and Income is described by the consumption function.

The consumption function

$$C = \bar{C} + cY \qquad \bar{C} > 0 \qquad 0 < c < 1 \qquad (4)$$

$\bar{C}$ = intercept
c = marginal Propensity to consume

This consumption function is shown in Figure 9.1. For every dollar of ~~income~~ increase in income the level of consumption increases by $c. The MPC is the increase in consumption per unit increase in income. In our case MPC < 1 which implies that out of a dollar increase in income, only a fraction, c, is spent on consumption.

Consumption and Saving

what happens to the rest of the dollar of income, the fraction (1-c), that is not spent on consumption? if it is not spent, it must be saved.

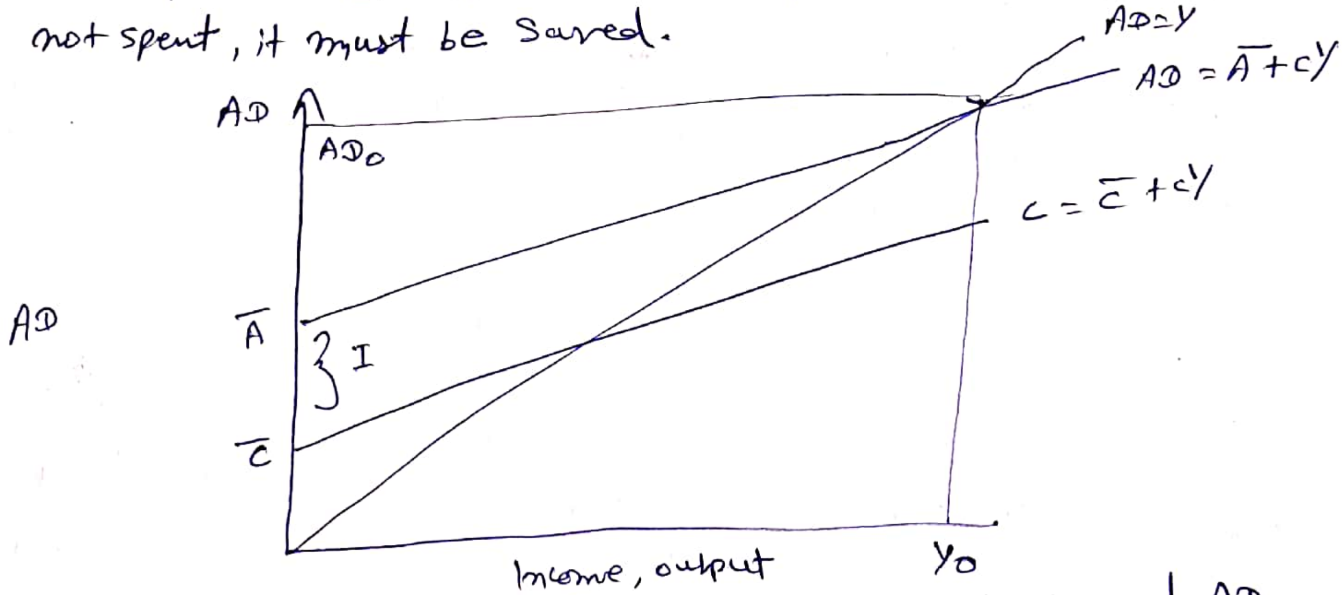

Figure 9.1 The consumption function and AD

thus $$S = Y - C \qquad (5)$$

S = Saving
C = consumption

The ~~cons~~ equation (4) and (5) together implies a Saving function

$$S = Y - C = Y - \bar{C} - cY = -\bar{C} + (1-c)Y \qquad (6)$$

equation (6) tells ~~it~~ us that Saving is an increasing function of the level of income because MPS, s = 1-c, is Positive. In other words, Saving increases as income increase/rises.

MPS = marginal prasperssity to save

Consumption, AD and Autonomous Spending

We have specified one component of aggregate demand, consumption demand, and its link to Income. Now we add I, G and T (taxes) and foreign trade to our model assuming each is autonomous. Here, we just assume that $\bar{I}$, $\bar{G}$, $\bar{TA}$, $\bar{TR}$ and $\bar{NX}$. Consumption now depends on disposable Income (Y_D)

$$Y_D = Y - TA + TR \quad \text{——— (7)}$$

$$C = \bar{C} + cY_D = \bar{C} + c(Y + TR - TA) \quad \text{——— (8)}$$

we know $\quad AD = C + I + G + NX \quad$ $\boxed{G \text{ and } NX \text{ are exogenous}}$

$$= \bar{C} + c(Y - \bar{TA} + \bar{TR}) + \bar{I} + \bar{G} + \bar{NX}$$

$$= [\bar{C} - c(\bar{TA} - \bar{TR}) + \bar{I} + \bar{G} + \bar{NX}] + cY$$

$$= \bar{A} + cY \quad \text{——— (9)}$$

Autonomous $\quad \boxed{\bar{A} = \bar{C} - c(\bar{TA} - \bar{TR}) + \bar{I} + \bar{G} + \bar{NX}}$

equation (9) is shown in Figure 9.2

The AD schedule is obtained by adding (vertically) the demands for C, I, G, NX at each level of Income. At the income level Y_0 in figure 9.2 the level of AD is AD_0.

Equilibrium Income and output

The next step is to use the AD function from figure 9.2 and equation (9) to determine the equilibrium level of output and income.

Equilibrium level of Income

$AD = Y$ ——— at point E in figure 9.2

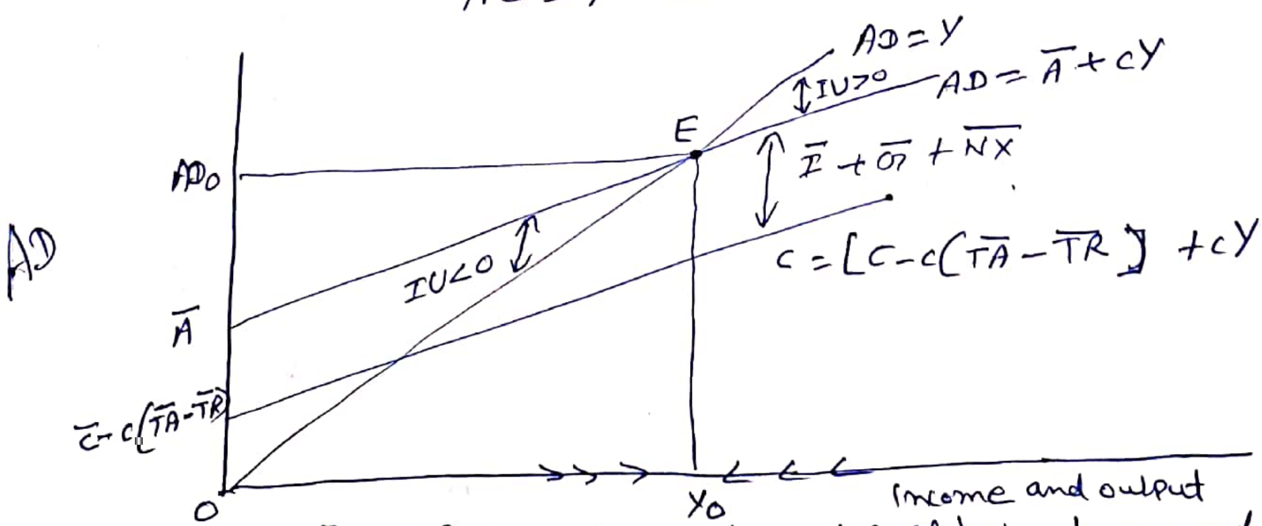

Figure 9.2 Determination of equilibrium Income and output

As the arrow ~~shows~~, show, this process leads to the output level Y_0, at which current production exactly matches planned aggregate spending and unintended inventory changes (IU) are therefore equal to zero.

The formula for equilibrium output

$$Y = AD \quad \text{------} \quad (10)$$

$$Y = \bar{A} + cY \quad (\text{from equation } 9) \quad \text{------} \quad (11)$$

equilibrium level of Income and output

$$\boxed{Y_0 = \frac{1}{1-c}\bar{A}} \quad \text{------} \quad (12)$$

The equilibrium level of output is higher the larger the marginal ~~propensity~~ propensity to consume, c, and the higher the level of autonomous spending, $\bar{A}$.

Further we can relate changes in output to changes in autonomous spending through

$$\boxed{\Delta Y = \frac{1}{1-c}\Delta\bar{A}} \quad \text{------} \quad (13)$$

Saving and Investment

In equilibrium, planned Investment equals Saving. This condition is applies only when there is no government and no foreign Trade in the economy.

To understand this relationship, return to figure 9.2. above the equilibrium level of income, Y_0 Saving exceeds planned investment, while below, Y_0 planned investment exceeds Saving.

without G and NX $\longrightarrow$ $AD = C + I$

thus $C + S = C + I$.

$$\boxed{S = I}$$

Include G and NX $\longrightarrow$ now Income can either be spent or paid in taxes, So

$$Y = C + S + TA - TR$$

and Complete AD is

$$Y = C + I + G + NX \text{ therefore}$$

$$C + I + G + NX = C + S + TA - TR$$

$$I = S + (TA - TR - G) - NX \qquad (14)$$

That is, investment equals private savings (S) plus the government budget surplus (TA − TR − G) minus net exports (NX), or plus net imports if you prefer

9.3 The multiplier

In this section we develop an answer to the following question – By how much does a \$1 increase in autonomous spending raise the equilibrium level of income.

If we write out the successive rounds of increased spending, starting with the initial increase in autonomous demand we obtain

$$\Delta AD = \Delta\bar{A} + c\Delta\bar{A} + c^2\Delta\bar{A} + c^3\Delta\bar{A} + \cdots \qquad (15)$$

$$= \Delta\bar{A}\,(1 + c + c^2 + c^3 + \cdots)$$

$\boxed{\bar{A} = \text{Autonomous Spending}}$

If value of $c < 1$, the successive terms in the series become progressively smaller. In fact, we are dealing with a geometric series, so the equation simplifies to

$$\boxed{\Delta AD = \frac{1}{1-c}\,\Delta\bar{A} = \Delta Y_0} \qquad (16)$$

From equation (16), therefore, we find that the cumulative change in Aggregate Spending is equal to a multiple of the increase in autonomous spending – Just as equation (12). The multiple is called the multiplier.

The Concept of multiplier is sufficiently important to create new notation. In this specific case, omitting the government sector and foreign Trade we define the multiplier as α, where

$$\boxed{\alpha = \frac{1}{1-c}} \qquad (17)$$

equation (17) shows that the larger the MPC, the larger the multiplier.

The Multiplier in Pictures

Figure 9.3 Provides a graphical interpretation of a effects of an increase in autonomous spending on the equilibrium level of income

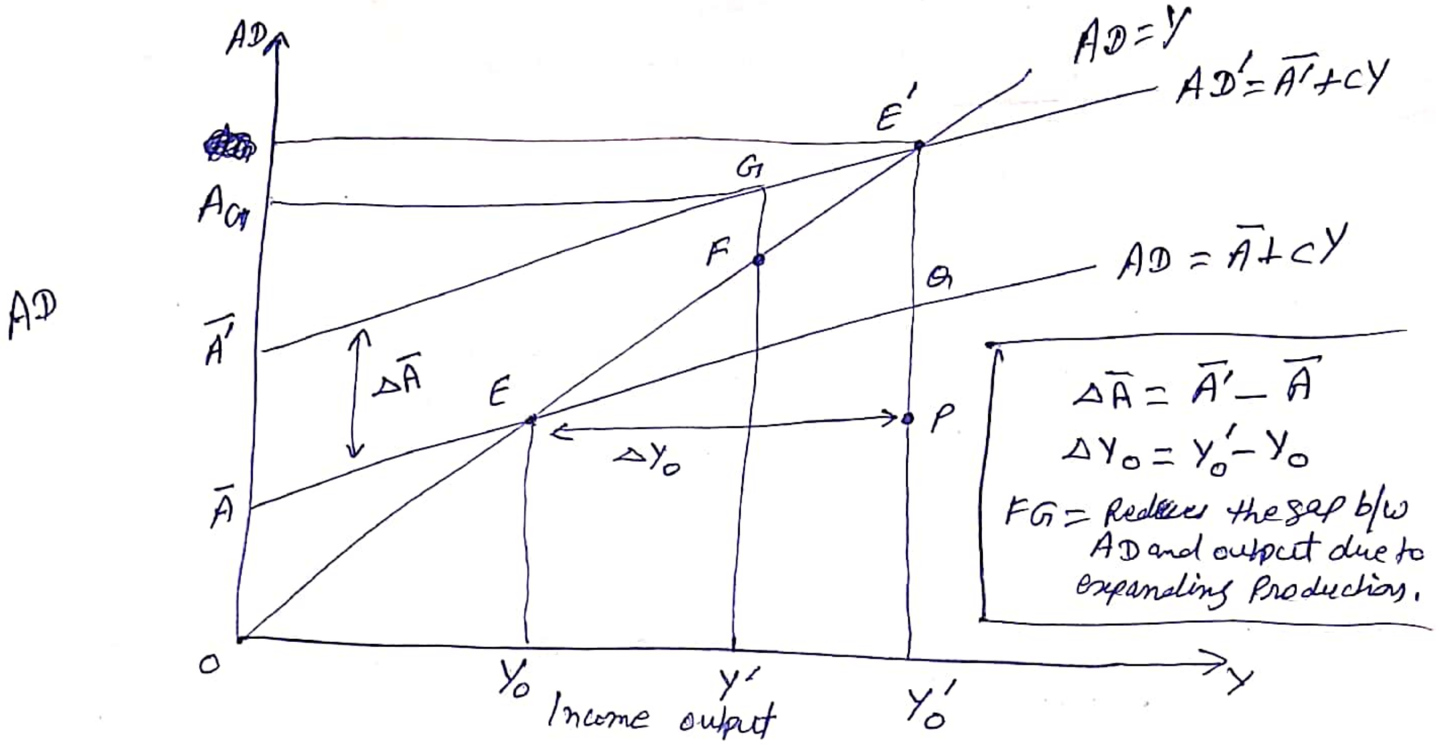

Figure 9.3 Derivation of the multiplier

9.4 The Government sector

In this section we are concerned with the way in which government purchases, taxes, and transfers affect the equilibrium level of Income.

We assume that the government purchases a Constant amount, G, that it makes a Constant amount of transfers, $\overline{TR}$, and that it imposes a proportional income tax, Collecting a fraction, t, of income in the form of taxes:

$$G = \bar{G}, \quad TR = \overline{TR}, \quad TA = tY \qquad (18)$$

Thus we can rewrite the Consumption function, after Substituting from equation (18) for TR and TA in

$\boxed{YD, C, AD \text{ depends on } t}$

equation (8), as

$$C = \bar{C} + c(Y + \overline{TR} - tY)$$
$$= \bar{C} + c\overline{TR} + c(1-t)Y \quad \text{——— (19)}$$

Equation (19) that the presence of transfers raises autonomous consumption spending by the MPC ~~of~~ out of disposable income, c, times the amount of transfers

"Income taxes reduces consumption spending"
or
Disposable Income

While the MPC out of YD remains c, the MPC out of income is now $c(1-t)$, where $1-t$ is the fraction of income left after taxes.

Combining equations (18) and (19) we have

$$AD = C + I + G + NX$$
$$= [\bar{C} + c\overline{TR} + c(1-t)Y] + \bar{I} + \bar{G} + \overline{NX}$$
$$= (\bar{C} + c\overline{TR} + \bar{I} + \bar{G} + \overline{NX}) + c(1-t)Y \quad (20)$$
$$= \bar{A} + c(1-t)Y$$

$\boxed{\text{where } \bar{A} = \bar{C} + c\overline{TR} + \bar{I} + \bar{G} + \overline{NX}}$

The slope of AD schedule is flatter. Thus, as equation (20) shows, the marginal propensity to consume out of income is now $c(1-t)$ instead of c.

Equilibrium Income

Goods market equilibrium $Y = AD$

using equation (20) $\quad Y = \bar{A} + c(1-t)Y$

we can solve this equation for Y_0, the equilibrium level of income, by collecting terms in Y:

$$Y_0 = \frac{1}{1-c(1-t)}\underbrace{(\bar{C} + c\overline{TR} + \bar{I} + \bar{G} + \overline{NX})}_{\bar{A}}$$

$$Y_0 = \frac{\overline{A}}{1 - c(1-t)} \qquad (21)$$

In comparing equation (21) and (12) we can see that the govt. sector makes a substantial, difference. It raises autonomous spending by the amount of govt. purchases, $\overline{G}$, and by the amount of induced spending out of net transfers, ~~cTR~~ $c\overline{TR}$; in addition, the presence of the income tax lowers the multiplier.

Income Taxes and the multiplier

Income taxes lower the multiplier, as can be seen from equation (21) because they reduce the induced increase of consumption out of changes in income. The inclusion of taxes flattens the aggregate demand curve and hence reduces the multiplier.

Income Taxes as Automatic Stabilizers

Automatic stabilizer is any mechanism in the economy that automatically – that is, without case by case government intervention – reduces the amount by which output changes in response to a change in autonomous demand. The proportional income tax is one example of the important concept of automatic stabilizers.

Effects of a change in fiscal policy

We now consider the effects of changes in fiscal policy on the equilibrium level of income. An increase in govt. purchases is a change in autonomous spending shift the aggregate demand schedule upward side. At the initial level of output and income, the demand for goods exceeds output and accordingly, firms expands production until the new equilibrium, at point E', is reached that is illustrated in figure 9.4.

By how much does income expand?

"change in equilibrium Income will equal the change in aggregate demand"

$$\Delta Y_0 = \Delta \bar{G} + \bar{c}(1-t)\Delta Y_0$$

Here $\bar{C}, \bar{TR}, \bar{I}, \bar{NX}$ is constant

thus the change in equilibrium income is:

$$\Delta Y_0 = \frac{1}{1-c(1-t)}\Delta \bar{G} = \alpha_G \Delta \bar{G} \quad \text{—— (22)}$$

$$\text{Here } \alpha_G = \frac{1}{1-c(1-t)} \quad \text{—— (23)}$$

Thus, a \$1 increase in govt. purchases will lead to an increase in excess of a dollar.

Similarly if Govt. increases transfer payments, $\bar{TR}$. Autonomous spending, $\bar{A}$ will increase by only $c\Delta \bar{TR}$, so output will rise by $\alpha_G \times c\Delta \bar{TR}$.

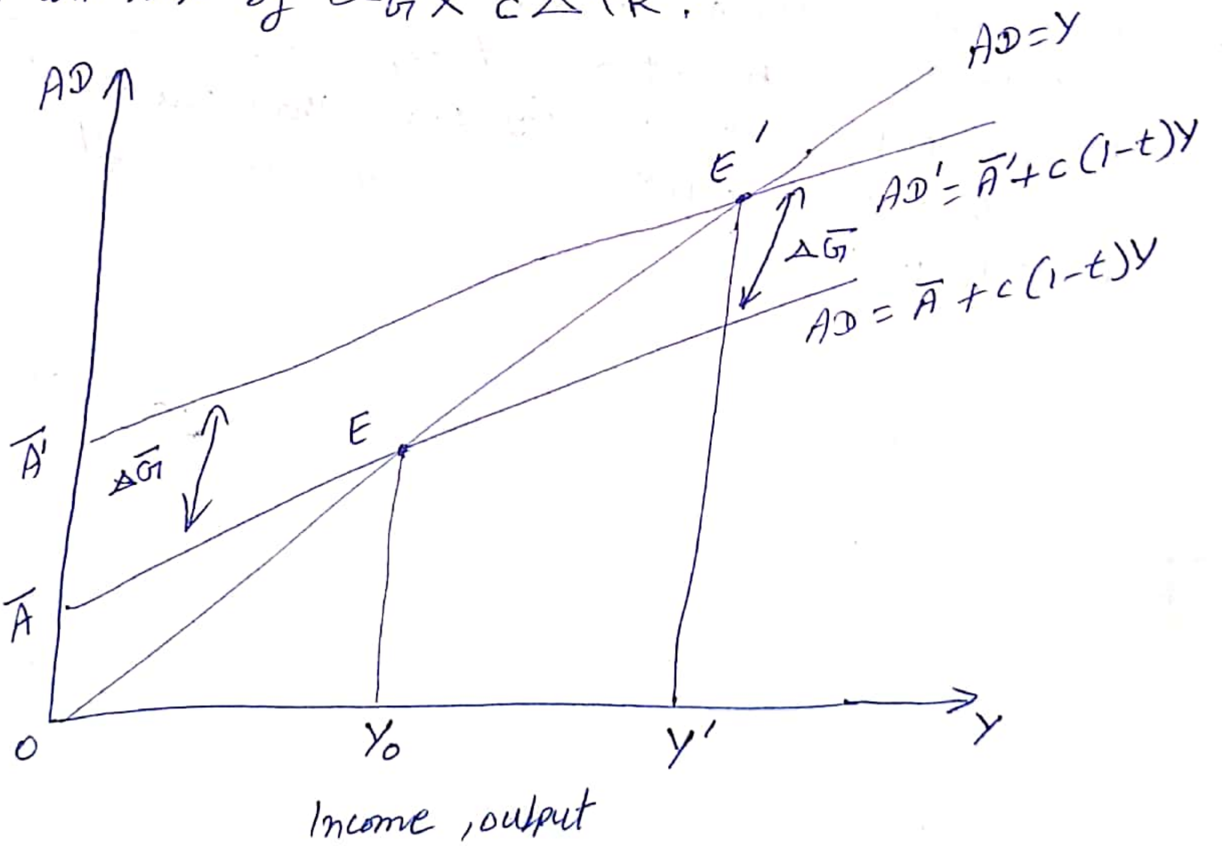

Figure 9.4 The effects of an increase in Govt. Purchases.

9.5 The Budget

This Section Serves as an introduction, dealing with the Govt. budget, its effects on output, and the effects of output on the budget.

So, First Component is Budget surplus (BS):

$$\boxed{BS = TA - \overline{G} - \overline{TR}} \quad \text{——} \quad (24)$$

A negative BS, an excess of expenditure over Revenues is a Budget Deficit.

Substituting in equation (24) the assumptions of a Proportional income tax that yields tax revenues $TA = tY$ gives us:

$$\boxed{BS = tY - \overline{G} - \overline{TR}} \quad \text{——} \quad (24a)$$

Figure 9.6 Plots the BS as a function of a level of Income for given $\overline{G}$, $\overline{TR}$ and Income tax rate, t. It also shows Budget deficit depends not only govt. policies but also on anything else that shifts the level of Income like increase in Investment — reduces Budget deficit.

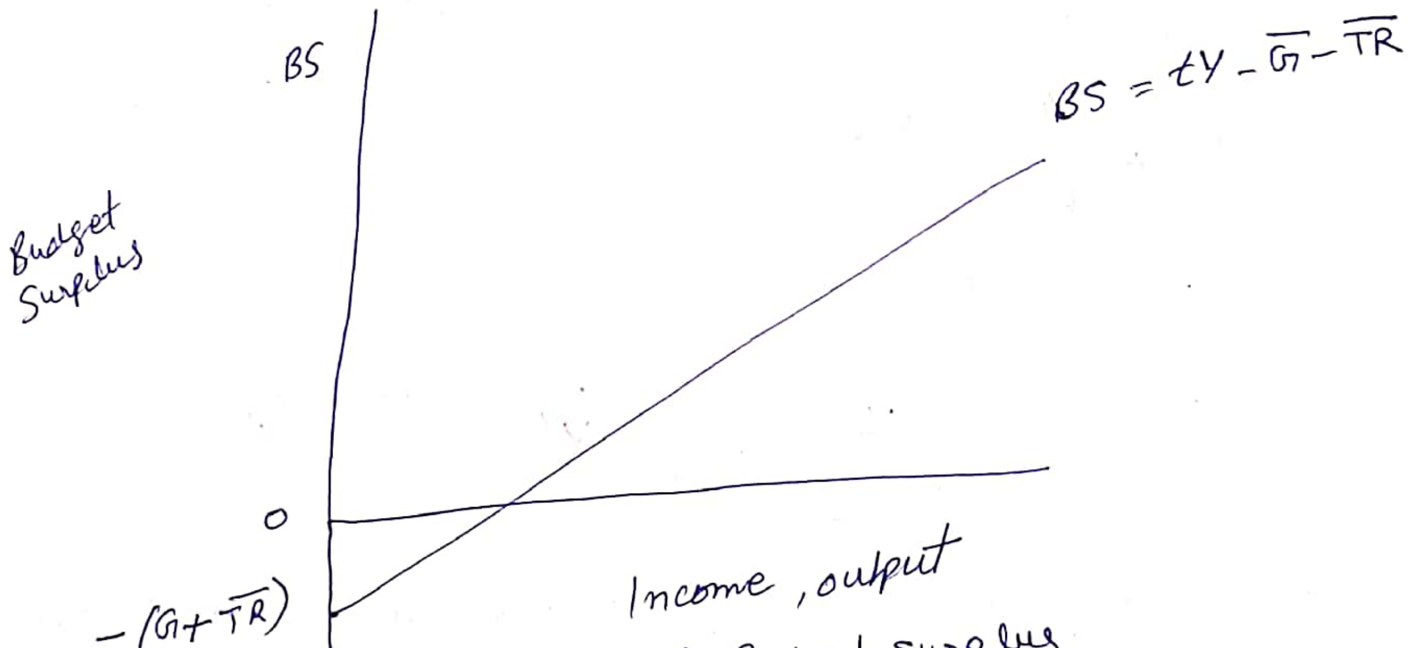

Figure 9.6 Budget surplus

E

Effects of Govt. Purchases and tax changes on the Budget Surplus

From equation (22) we see that

$\Delta Y_0 = \alpha_G \Delta \overline{G}$ A fraction of that increase in Income is collected in the form of taxes, so tax revenue increases by $t\alpha_G \Delta \overline{G}$. The change in the budget surplus, using equation (23) to substitute for α_G is therefore

$$\Delta BS = \Delta TA - \Delta \overline{G}$$
$$= t\alpha_G \Delta \overline{G} - \Delta \overline{G}$$
$$= \left[\frac{t}{1-c(1-t)} - 1\right] \Delta \overline{G} \qquad (25)$$
$$= -\frac{(1-c)(1-t)}{1-c(1-t)} \Delta \overline{G}$$

which is unambiguously negative. we have therefore shown that an increase in govt. purchases will reduce the Budget Surplus.

9.6 The full employment Budget Surplus

The full employment budget surplus measures the budget surplus at the full-employment level of Income or at Potential output. Using Y^* to denote the full employment level of Income, we can write

$$BS^* = tY^* - \overline{G} - TR \qquad (26)$$

To see the difference ~~arises from Income tax~~ between the actual and the full employment budgets, we substract the actual budget surplus in equation (24a) from the full employment budget surplus in equation (26) to obtain:

$$BS^* - BS = t(Y^* - Y) \qquad (27)$$

The only difference arises from Income tax collection. Specifically, if output is below full employment, the full-employment surplus exceeds the actual surplus. Conversely, if actual output exceeds full employment (or potential) output, the full employment surplus is less than the actual surplus. The difference between the actual and the full employment budget is the cyclical component of the Budget. In a recession the cyclical component tends to show a deficit, and in a boom there may even be a surplus.