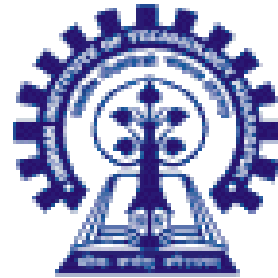


EXPENDITURE MULTIPLIER

Macroeconomics



Change in Autonomous Investment and Equilibrium Income

- Following the simple Keynesian model, we take the following assumptions:
 - ✓ The volume of investment expenditure is autonomous.
 - ✓ Consumption is a function of Income and consumption function is linear.
 - ✓ MPC is positive but less than unity.
 - ✓ The economy is a closed one.

What is Investment Multiplier?

- If there is increase in autonomous investment, the rise in income is multiplier times the original change in autonomous investment.
- Deriving the value of the multiplier

$$\begin{aligned}C &= a + bY \\ I &= I_0\end{aligned}$$

At equilibrium

$$\begin{aligned}Y &= C + I = a + bY + I_0 \\ Y - bY &= a + I_0 \\ Y &= \frac{a+I_0}{1-b}\end{aligned}$$

Suppose now investment changes $I = I_0 + \Delta I$

New Equilibrium Income becomes $Y_1 = a + bY + I_0 + \Delta I$

Solving it we get $Y_1 = \frac{a+I_0+\Delta I}{1-b}$

Hence, the change in equilibrium income $\Delta Y = Y_1 - Y = \frac{a+I_0+\Delta I}{1-b} - \frac{a+I_0}{1-b} = \frac{\Delta I}{1-b}$

Hence, $\Delta Y = \frac{1}{1-b} \Delta I$ or $\Delta Y = K \Delta I$ where K is the value of the multiplier.

The multiplier is the amount by which equilibrium output changes when autonomous investment increases by 1 unit.

- Larger the MPC, the larger is the multiplier

Operation of Multiplier

By how much does a \$1 increase in autonomous investment raise the equilibrium level of income?

- The first round starts with an increase in autonomous spending, ΔI .
- Next, we allow an expansion in production to meet exactly that increase in demand --- Production expands by ΔI --- increase in production gives rise to an equal increase in income.
- Via MPC ($=c$), gives rise in the second round to increased expenditures of size --- $b\Delta I$.

For a value of $b < 1$, the successive terms in the series become progressively smaller. We are dealing with a geometric series, so the equation simplifies to

$$\Delta D = \frac{1}{1 - c} \Delta I = \Delta Y_0$$

Round	Increase in Demand	ΔY	$\sum \Delta Y$
1	ΔI	ΔI	ΔI
2	$b\Delta I$	$b\Delta I$	$\Delta I + b\Delta I = (1 + b) \Delta I$
3	$b^2\Delta I$	$b^2\Delta I$	$(1 + b + b^2) \Delta I$
4	$b^3\Delta I$	$b^3\Delta I$	$(1 + b + b^2 + b^3) \Delta I$
....
t	$b^{t-1}\Delta I$	$b^{t-1}\Delta I$	$\frac{1}{1 - b} \Delta I$

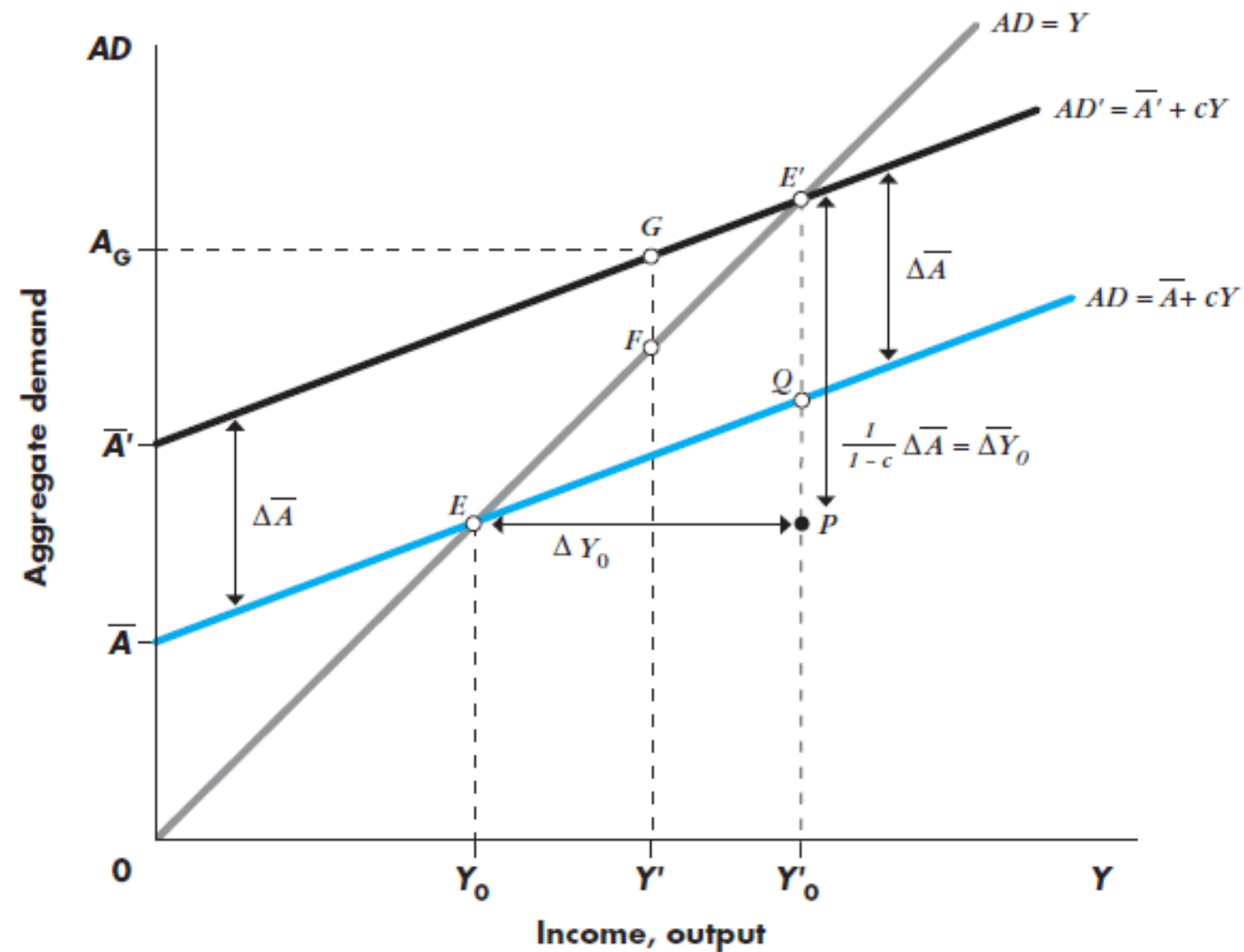
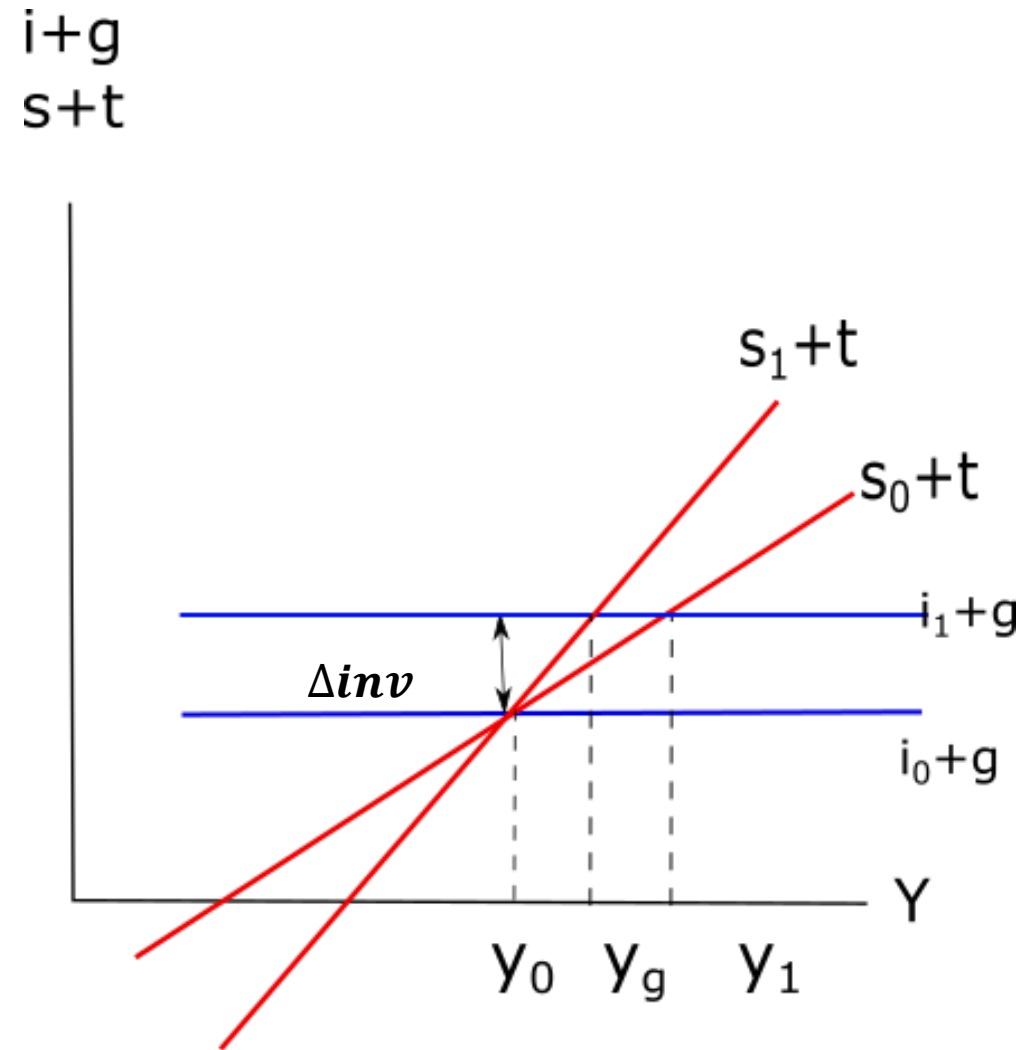
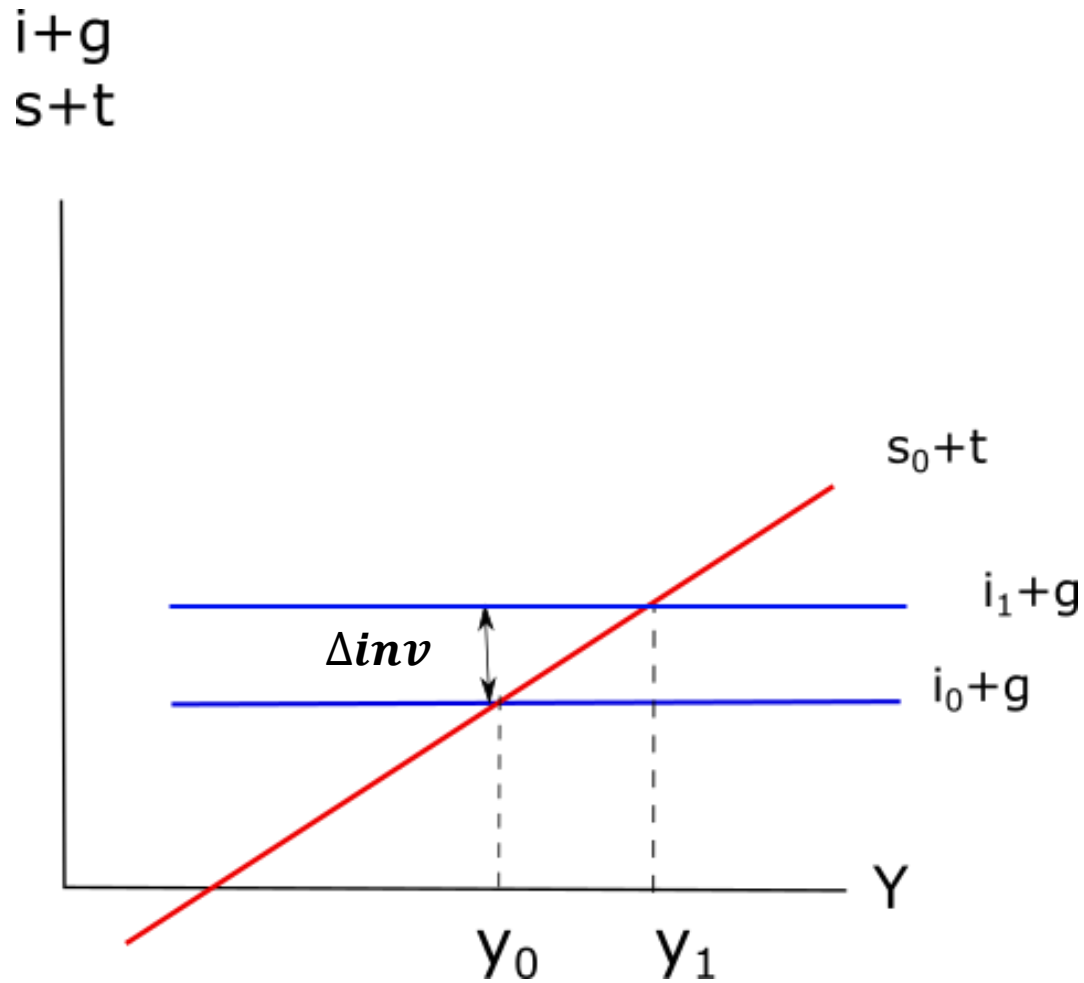


Figure 2: *Derivation of the Multiplier*

- Initial equilibrium is at point E, and income level Y_0
- \bar{A} increases to \bar{A}'
- Aggregate demand now exceeds the initial level of output
- Firms expand production and this gives rise to induced expenditure to Y'
- The gap between demand and output is reduced because the marginal propensity to consume is less than 1
- New equilibrium is at E', with corresponding level of income is Y'_0
- *Larger the increase in autonomous spending - the larger the income change*
- *The larger the marginal propensity to consume – the steeper the AD – the larger the income change*

Change in Autonomous Investment and Change in Equilibrium Income

Increase in The Investment



If the change in investment is temporary?

PERIOD	C	I	ΔC	ΔI	AGGREGATE SPENDING	$> = <$	AGGREGATE OUTPUT	Y	ΔY	REALIZED INVESTMENT	PLANNED INVESTMENT
1	540	60	0	0	600	=	600	600	0	60	60
2	540	60	0	30	630	>	600	600	0	60	90
3	540	60	22.5	0	622.5	<	630	600	30	67.5	60
4	540	60	16.9	0	616.9	<	622.5	600	22.5	65.6	60
5	540	60	12.7	0	612.7	<	616.9	600	16.9	64.2	60
6	540	60	9.5	0	609.5	<	612.7	600	12.7	63.2	60
7	540	60	7.1	0	607.1	<	609.5	600	9.5	62.4	60
8	540	60	5.3	0	605.3	<	607.1	600	7.1	61.8	60
9	540	60	3.8	0	603.8	<	605.3	600	5.1	61.3	60
10	540	60	2.8	0	602.8	<	603.8	600	3.8	61	60
.
.
n	540	60	0	0	600	=	600	600	0	60	60
n+1	540	60	0	0	600	=	600	600	0	60	60
			90	30					120		

$$C = 90 + \frac{3}{4}Y$$

$$I = 60$$

Equilibrium at 600

$$\Delta C = b \Delta Y = \frac{3}{4} \Delta Y$$

$$\text{Aggregate spending} = C + I + \Delta C + \Delta I$$

$$\text{Aggregate output} = Y + \Delta Y$$

$$\text{Savings} = (Y + \Delta Y) - (C + \Delta C)$$

If the change in investment is permanent?

PERIOD	C	I	ΔC	ΔI	AGGREGATE SPENDING	$> = <$	AGGREGATE OUTPUT	Y	ΔY	REALIZED INVESTMENT	PLANNED INVESTMENT
1	540	60	0	0	600	=	600	600	0	60	60
2	540	60	0	30	630	>	600	600	0	60	90
3	540	60	22.5	30	652.5	>	630	600	30	67.5	90
4	540	60	39.4	30	669.4	>	652.5	600	52.5	73.1	90
5	540	60	52.1	30	682.1	>	669.4	600	69.4	77.3	90
6	540	60	61.6	30	691.6	>	682.1	600	82.1	80.5	90
7	540	60	68.7	30	698.7	>	691.6	600	91.6	82.9	90
8	540	60	74	30	704	>	698.7	600	98.7	84.7	90
9	540	60	77.8	30	707.8	>	704	600	104	86.2	90
10	540	60	80.6	30	710.6	>	707.8	600	107.8	87.2	90
.
.
n	540	60	90	30	720	=	720	600	120	90	90
n+1	540	60	90	30	720	=	720	600	120	90	90

New higher equilibrium level of output/ income at 720

References

- William H Branson, Macroeconomic Theory and Policy, Second Edition, Universal Book Stall, New Delhi
- E Shapiro, Macroeconomic Analysis, 5th Edition, Galgotia Publication Pvt Ltd., New Delhi.