Determination of Equilibrium Income

Macroeconomics

Introduction to Income Determination

GDP (Y) = Consumption (C) + Investment (I) + Government Expenditure (G) + Net export (X-M)

$$Y \text{ (Income)} = C + S + T + (X-M)$$

$$Y \text{ (Income)} = C + I + G + (X-M)$$

Assuming a closed economy, Identity for Investment and Saving,

$$C + I + G = GDP = Y = C + S + T$$

- So the National Income $C + I + G = Y = C + S + T$ .....(2)
- The above equation is in Nominal terms.
- We convert it into real terms (divided by price level).

- Real Output Identity, . $c + i + g = y = c + s + t$ .....(3)

Saving- Investment Balance

Basic NI identity is $c + i + g = y = c + s + t$ .....(3)

If we look separately to this identity, we get,

$c + i + g = y$ $\qquad$ $y = c + s + t$

$y - c = i + g$ $\qquad$ $y - c = s + t$

If we equate both, then

. $i + g = s + t$ .....(4)

$i = s + (t - g)$ ..... (5)

Planned and realized investment, $i = \bar{\imath} + \Delta inv$ ..... (6)

Unforeseen Changes in Inventory

Planned Investment

Unplanned Investment

Now replacing the investment component in eq 4 we get, $\bar{\imath} + \Delta inv + g = s + t$ ..... (7)

Adding c, we have $c + \bar{\imath} + \Delta inv + g = y = c + s + t$

Tax, Consumption and Saving functions

- Tax revenue is a function of income y,

$t = t(y) : t' > 0 :$ $t' = dt/dy$ change in tax with the change in income is positive.

Both consumption(c) and savings (s) are the functions of disposable income i.e. income after tax,
Disposable income (DI) = y - t(y)

$C = c(y - t(y))$

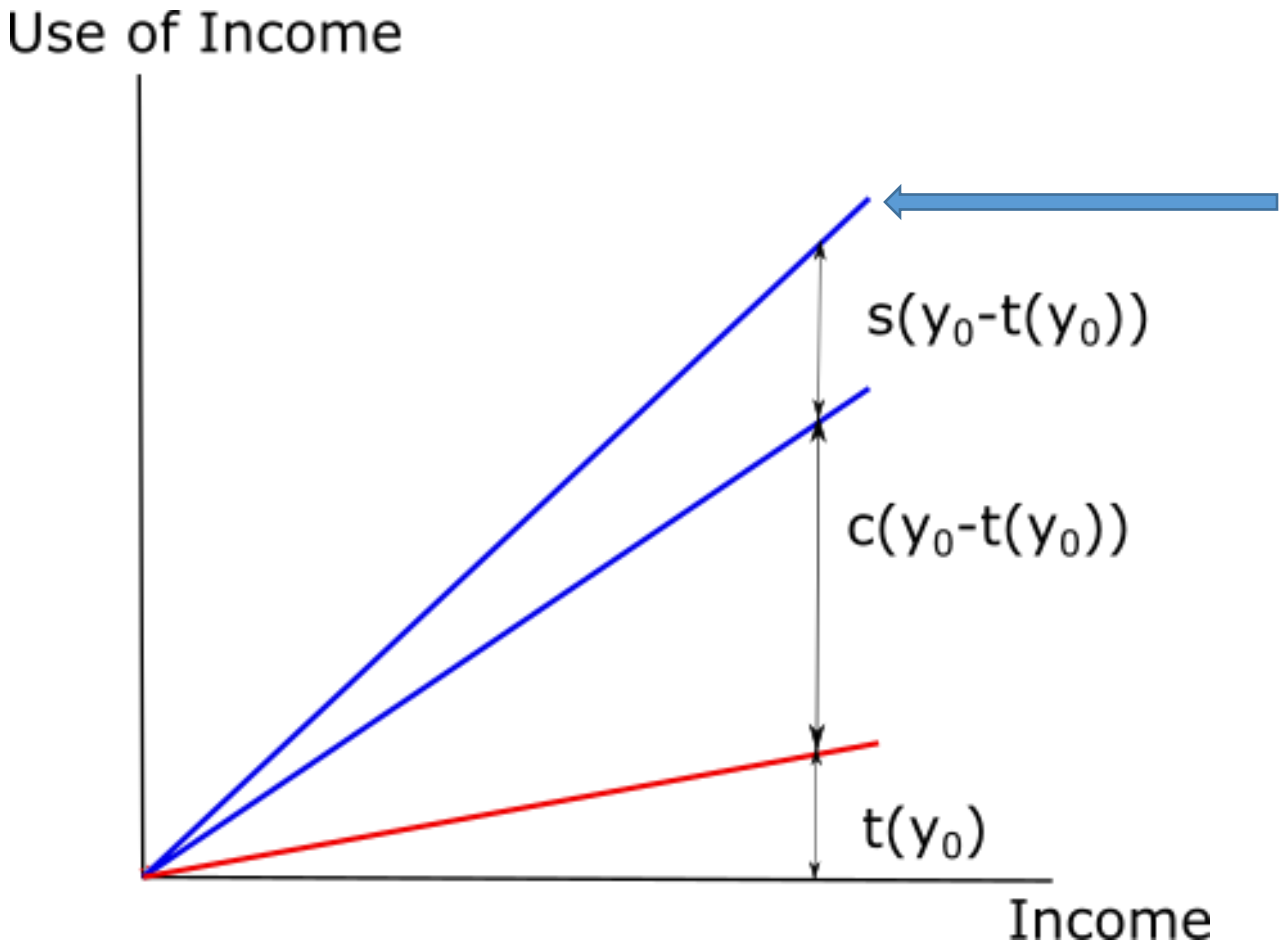
$c' > 0$, This is also known as MPC.

$S = s(y-t(y))$

$s' > 0$, This is also known as MPS.

MPC + MPS = 1.

Tax, Consumption and Saving functions



- This diagram shows how we use the income.
- Area below the 45 degree line is total income.
- Below red line we pay tax. Rest is DI.
- Area which shows c(y-t(y)) is consumption.
- Rest is saved.

Determination of Equilibrium Income

$\bar{\imath} + \Delta inv + g = s + t$

0 for equilibrium
This is the inventory or unexpected part

$\bar{\imath} + \Delta inv + g = s\,(y - t(y)) + t\,(y)$

0 for equilibrium

, $\bar{\imath} + g = s\,(y - t(y)) + t\,(y)$ ……. **(12) : This is the equilibrium condition.**

Planned Investment plus government expenditure

Savings plus tax revenue

If income increases then,

(s+t)> (i+g)

(s+t)-(i+g) = $\Delta inv > 0$

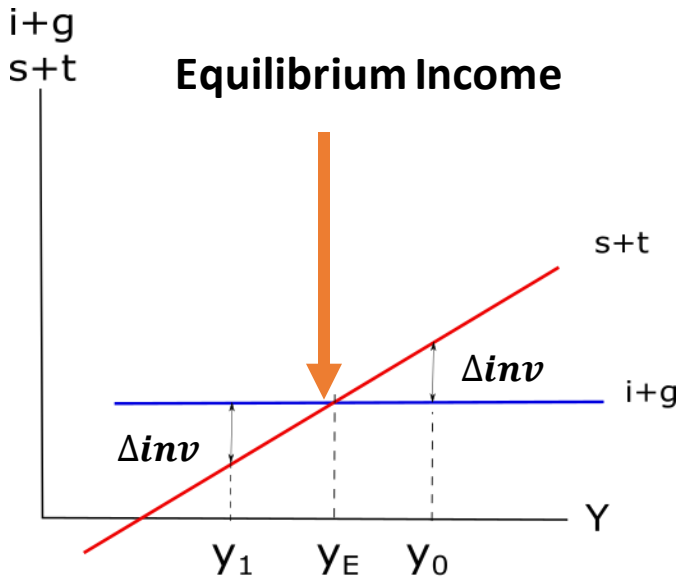
- $\Delta inv > 0$, means there will be extra inventory. So producers will call back the orders until $\Delta inv = 0$.
- Similarly **if** $\Delta inv < 0$ then there will be unexpected demand and to meet that producers will expand and then $\Delta inv = 0$ equilibrium reached.

Determination of Equilibrium Income

Stability of the Equilibrium Income

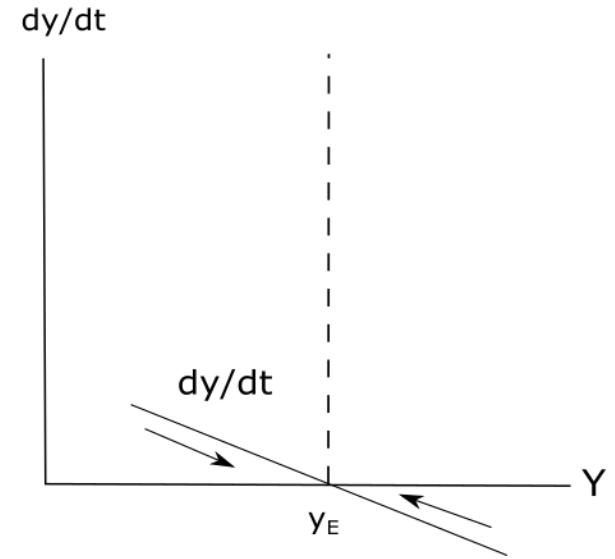
(s+t) is +vely sloped, because both are function of y. Now i and g both are autonomous, so (i+g) is fixed independently. It is a horizontal line.
Where (s+t) =(i+g) there is equilibrium income.

y_E = Equilibrium income
y_0 = New income if (s+t)>(i+g)
y_1 =(s+t)<(i+g)



At y_0, (s+t)>(i+g), producers will cut back production.

At y_1, (s+t)<(i+g). Demand is high, producers start producing more.



dy/dt is positive so income y will be rising to point y_E.

Similarly dy/dt is –ve it will go back to y_E.

Equilibrium Income and Deviation: An example

Let

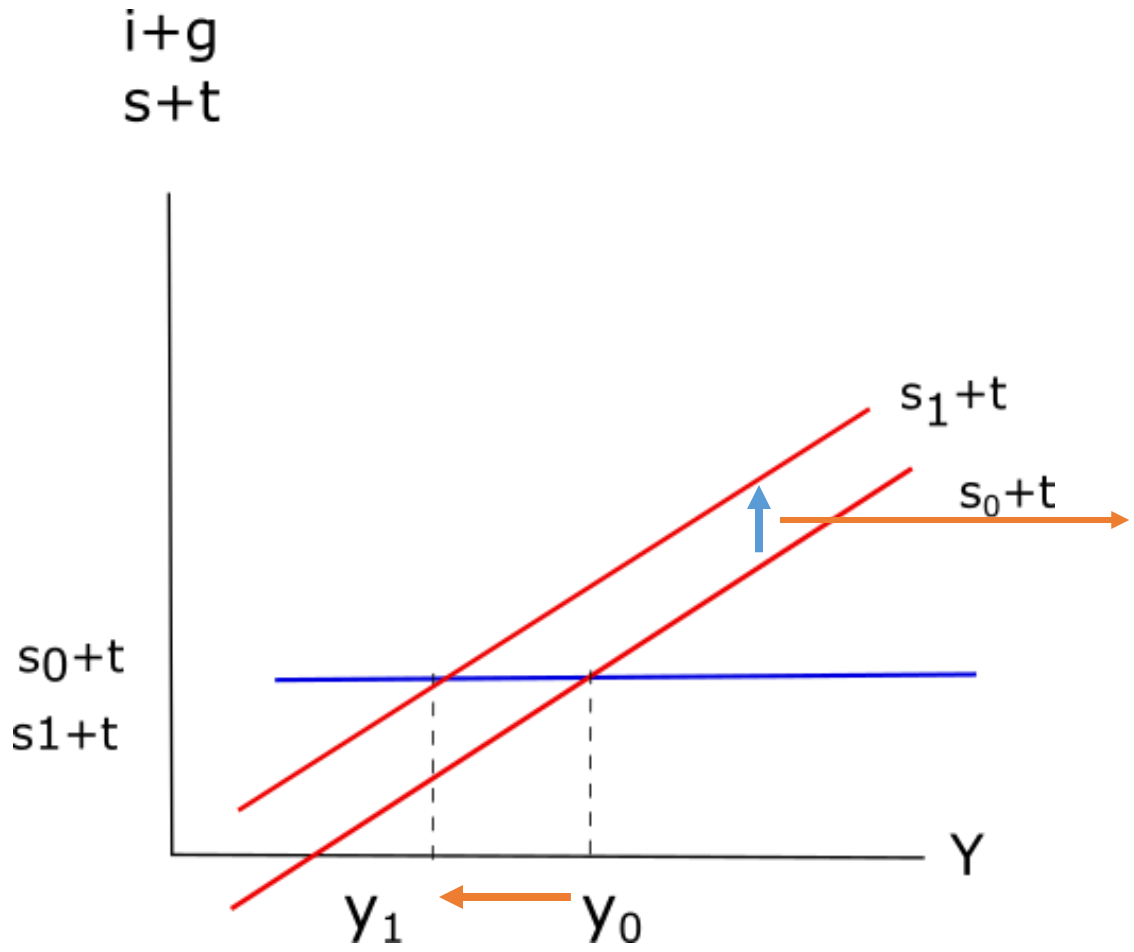
$$C = 20 + \frac{3}{4}Y$$
$$I = 20$$
$$Equlibrium\ Y = C + I$$
$$Y = 20 + \frac{3}{4}Y + 20$$
$$Y - \frac{3}{4}Y = 40$$
$$\frac{1}{4}Y = 40$$
$$Y = 160$$
$$or$$
$$Equalibrium\ income\ is\ reached\ when\ S = I$$
$$-20 + \frac{1}{4}Y = 20$$
$$Y = 160$$

Actual income may be greater than or less than the equilibrium income.

Equilibrium income can be arrived at by the increase or decrease in inventories until change in inventories become zero.

Determination of Equilibrium Income

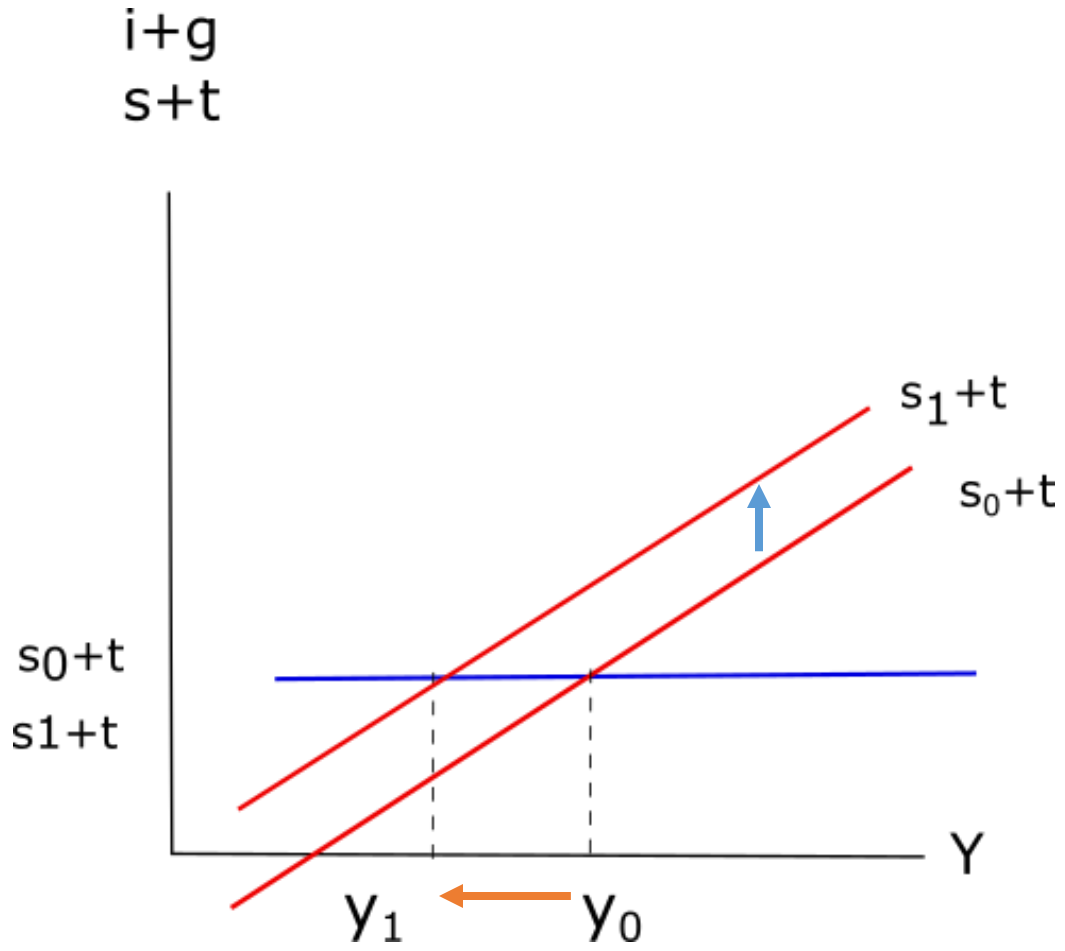
Shifts in the saving function



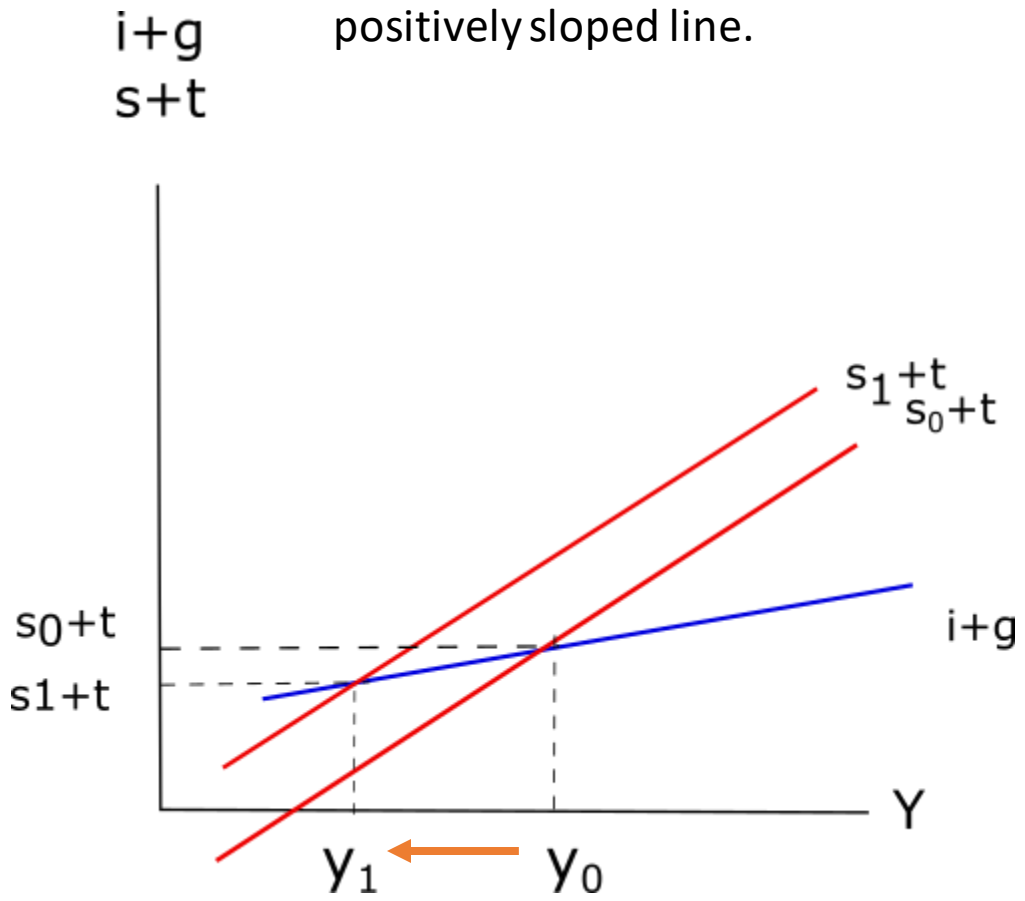
Income decreased from y_0 to y_1

Determination of Equilibrium Income

Shifts in the saving function



IF (i+g) is a function of y then (i+g) will be a positively sloped line.

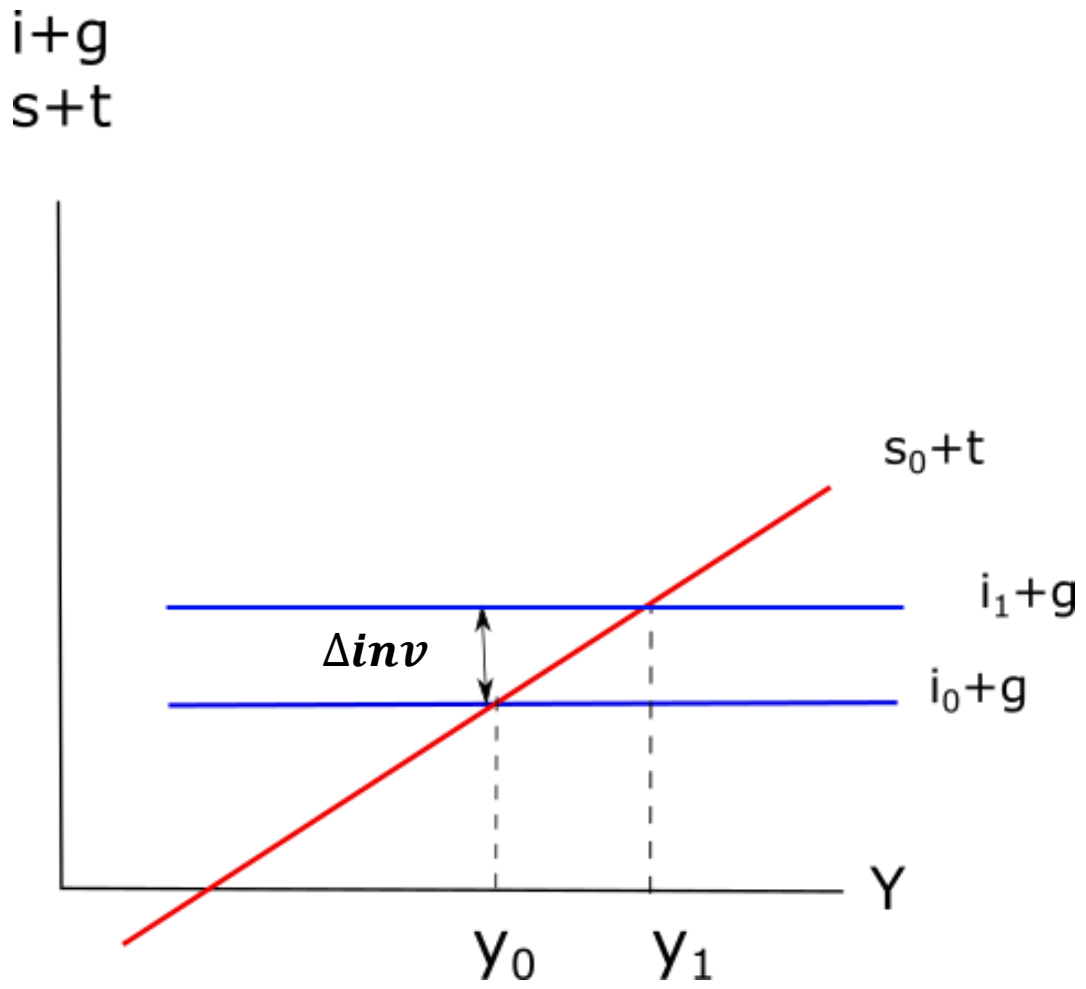


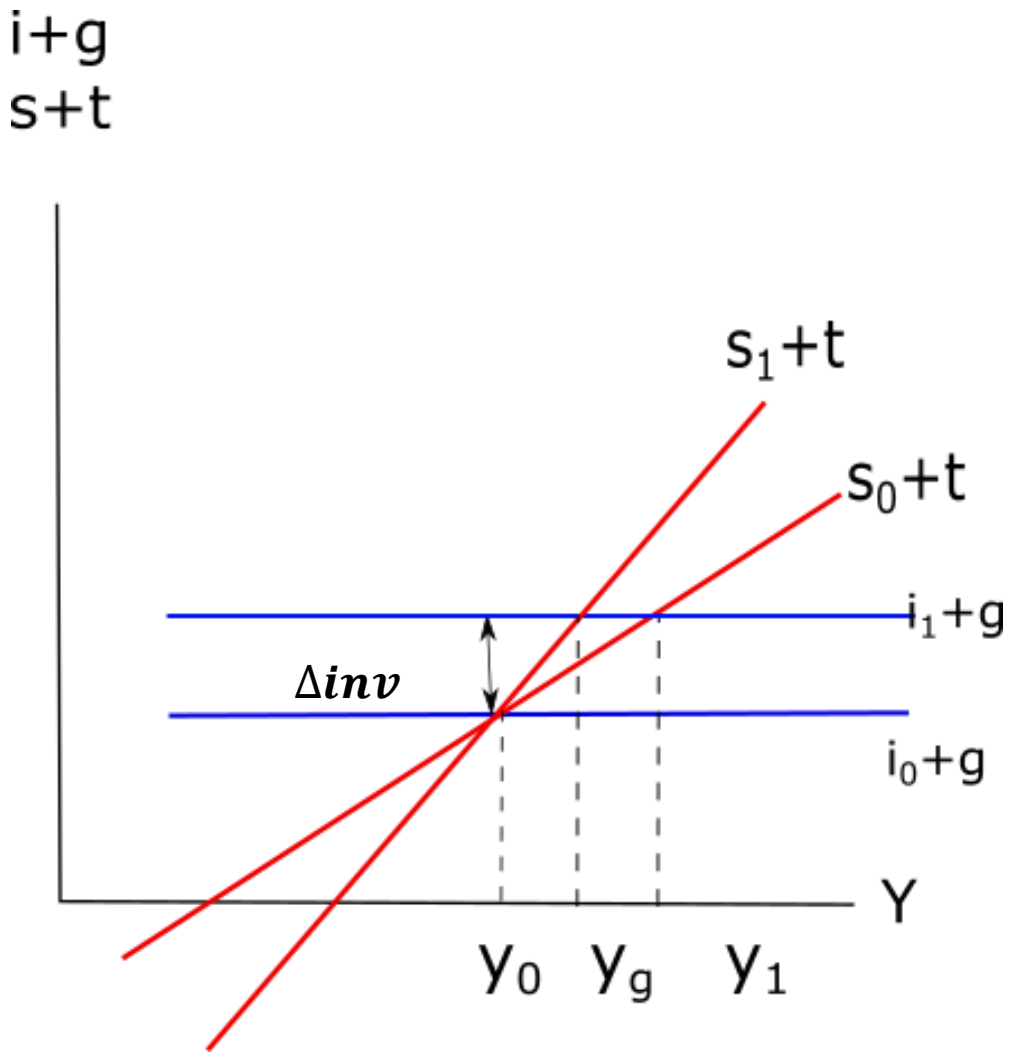
Change in y will be much higher than the normal case

Paradox of Thrift

Determination of Equilibrium Income

Increase in The Investment





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- E Shapiro, Macroeconomic Analysis, 5th Edition, Galgotia Publication Pvt Ltd., New Delhi.