VIDYA BHAWAN BALIKA VIDYA PITH

शक्तिउत्थानआश्रमलखीसरायबिहार

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Teacher name – Ajay Kumar Sharma

Income Determination

4.2 Movement Along a Curve versus Shift of a Curve

We shall be using graphical techniques to analyse the model of the economy. It is, therefore, important for us to learn how to read a graph. Let us now plot two variables a and b on the horizontal and vertical axes on a graph depicting the equation of a straight line of the form $b = ma + \varepsilon$, where $m > 0$ is called the slope of the straight line and $\varepsilon > 0$ is the intercept on the vertical (i.e. b) axis (Fig. 4.1). When a increases by 1 unit the value of b increases by m units. These are called movements of the variables *along the graph*.

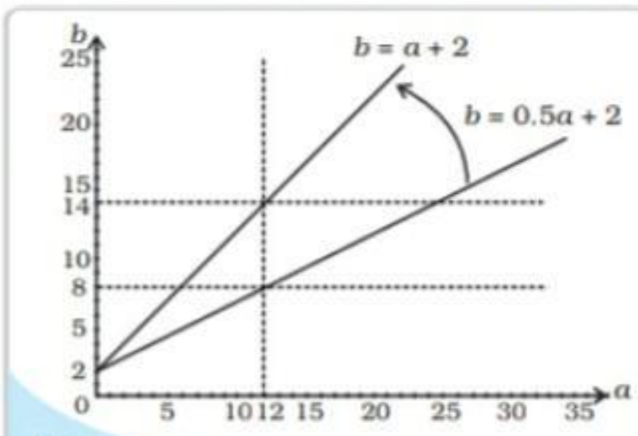

Fig. 4.1

A Positively Sloping Straight Line Swings Upwards as its Slope is Doubled

Consider a fixed value for ε equal to 2. Let m take two values $m = 0.5$ and $m = 1$, respectively. Corresponding to these values of m we have two straight lines, one steeper than the other. The entities ε and m are called the parameters of the graph. They do not appear as variables on the axes, but act in the background to regulate the position of the graph. As m increases in the above example the straight line swings upwards. This is called a parametric shift of a graph.

Since a straight line of the above form has another parameter ε, we can observe another type of parametric shift of this line. To see this hold m constant at 0.5 and increase the intercept term ε from 2 to 3. The straight line now shifts in parallel upwards as shown in Fig. 4.2.

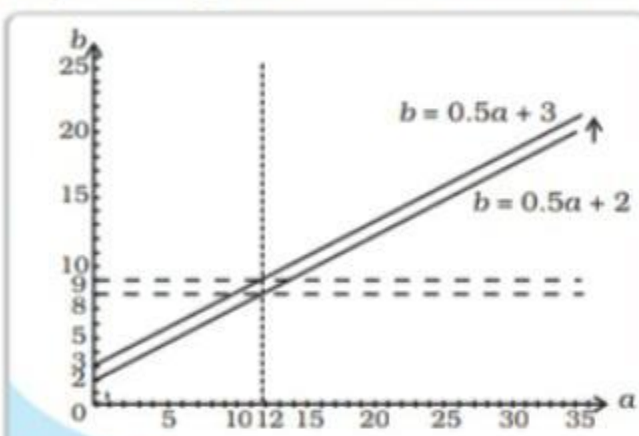

Fig. 4.2

A Positively Sloping Straight Line Shifts Upwards in Parallel as its Intercept is Increased

Consider, next, the following two equations representing a downward and an upward sloping straight line, respectively

$y = z - x$, and, $y = 1 + x$, $z \geq 0$

In the first equation z appears as an intercept parameter. Hence for increasing values of z starting from zero, the first straight line will undergo parallel upward shifts as depicted in Fig. 4.3. Consequently, its points of intersection with the second straight line will move up along the second line as shown in Fig. 4.3.

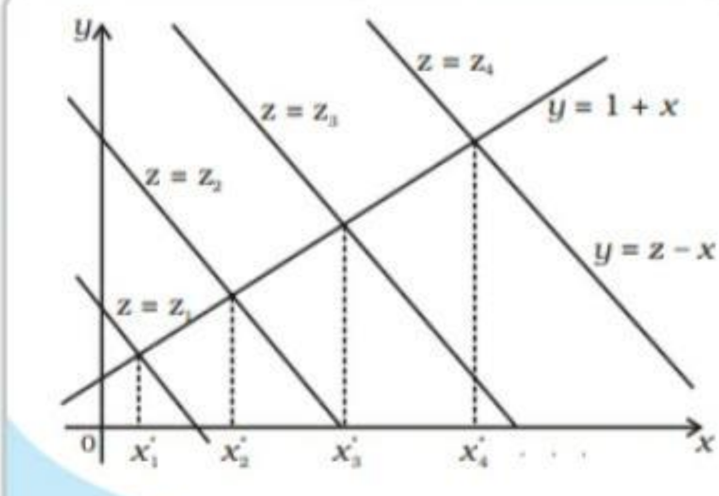

Fig. 4.3

Parametric Shift of z and Changing Equilibrium Values of x

Suppose we want to find out the relationship between z and equilibrium values of x. This can be obtained by plotting the points $(x_1^{'}, z_1)$, $(x_2^{'}, z_2)$, $(x_3^{'}, z_3)$ etc. on a figure depicting the variables x and z on the horizontal and vertical axes, respectively, as shown in Fig. 4.4.

Note that in the (x, y) plane z was being treated as a parameter. But in the (x, z) plane z is a variable in its own right. What we have essentially done is the following – we have kept z constant while dealing with x and y in the second equation and solved for y in terms of x. Then we have plugged this solution in the first equation to derive the relationship between x and z. We shall be making use of this technique throughout this chapter.

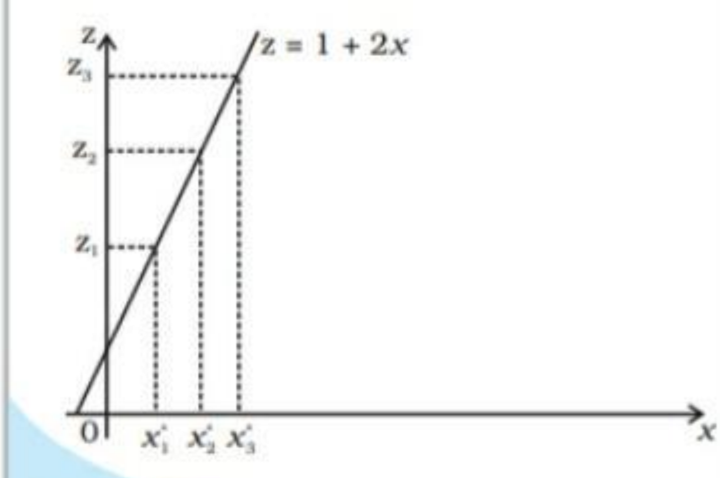

Fig. 4.4

Relationship between x and z