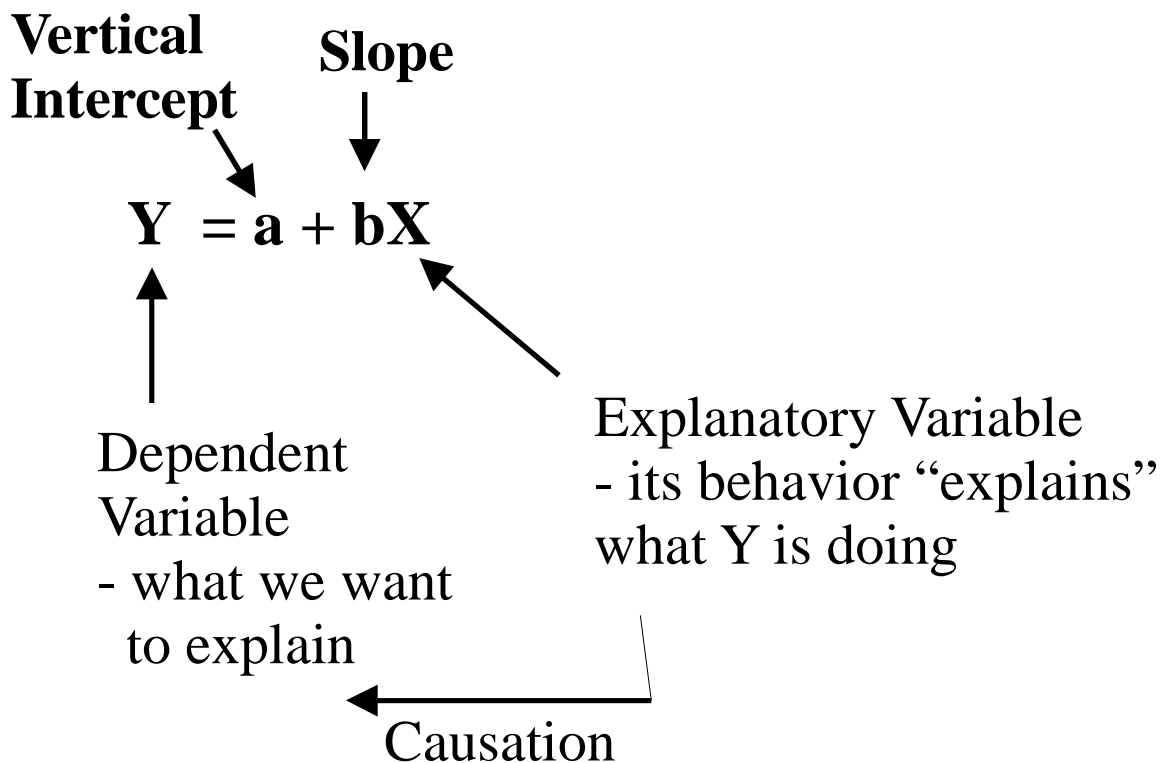


Algebra Basics for Macroeconomics

To express how macro variables of interest fit together, we will use algebraic equations

Causation: changes in X *cause* Y to change

- theory defines this for us



In noting the way X and Y are linked, focus on:

1. Direction of causation
2. Magnitude of effect

1. Direction of Causation

- the sign of b (slope) tells how X and Y are related

Negative sign \Rightarrow when $X \uparrow$ then $Y \downarrow$

- this is an inverse relationship

- when graphed is downward sloping

Positive sign \Rightarrow when $X \uparrow$ then $Y \uparrow$

- this is a positive (direct) relationship

- when graphed is upward sloping

2. Magnitude of Effect

- the value of b (slope term) tells the *rate of change* in Y as X changes

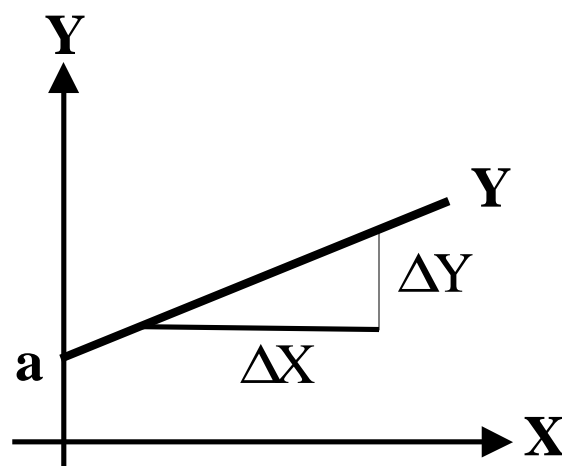
ex: if $b = 2$ and X is measured in \$, then a \$1 $\uparrow X$ raises Y by 2 units

In $Y = a + bX$: $b = \Delta Y / \Delta X$, so if $b = 2$, then:

$$\Delta Y / \Delta X = 2 \Rightarrow \Delta Y = 2\Delta X$$

a is the *vertical intercept*: the value of Y when $X=0$

You do not need to know how to graph points here but how to read and interpret graphs



Upward slope \Rightarrow as $X \uparrow$, $Y \uparrow$

If there were values on the graph:

- would be able to find Y for a given X

- slope = $\Delta Y / \Delta X$, plug in ΔY and ΔX values and get a *value* for the slope

Terminology Used in Macroeconomics

Intercept = **autonomous Y**

- represents the joint influence of everything other than X on Y (i.e., the "other things")

If one of the "other things" changes

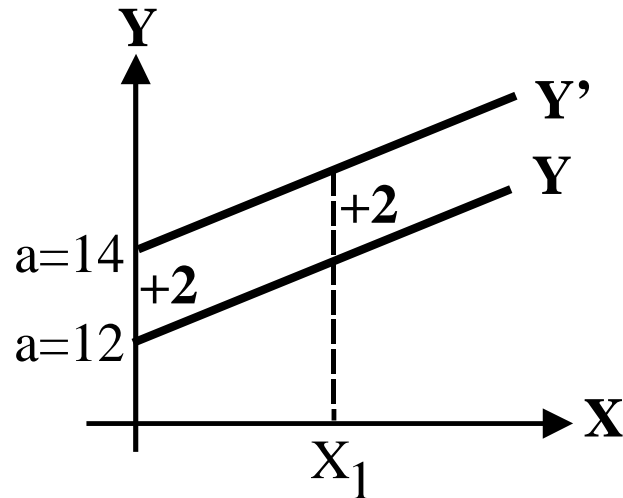
\Rightarrow autonomous Y is different

\Rightarrow new vertical intercept \Rightarrow parallel shift of line

ex: if autonomous Y rises by 2

=> when $X = 0$, Y has now changed by +2

For us: => for any X (say X_1), Y now greater by +2



Remember: this will be caused by one of the "other things" changing. You will need to determine which way Y changes as a result

Slope = **Marginal Propensity** of Y

- rate of change in Y as X changes - *will generally be less than 1 in magnitude*