National Income Determination

- Just like equilibrium of individual markets is important analysis for economists to comprehend their operations, macroeconomists have developed models that explain/predict economies' national output levels.

- Other than aggregate demand and aggregate supply, national output/income can also be

determined/predicted using Keynesian Cross diagram.

Keynesian Cross

- Keynesian Cross records economies' aggregate expenditure (or planned expenditure) on vertical axis and nominal GDP (or actual output or actual national income) on horizontal axis.

Keynesian Cross

Aggregate Expenditure (AE)

AE=Y

AE

Nominal GDP (Y)
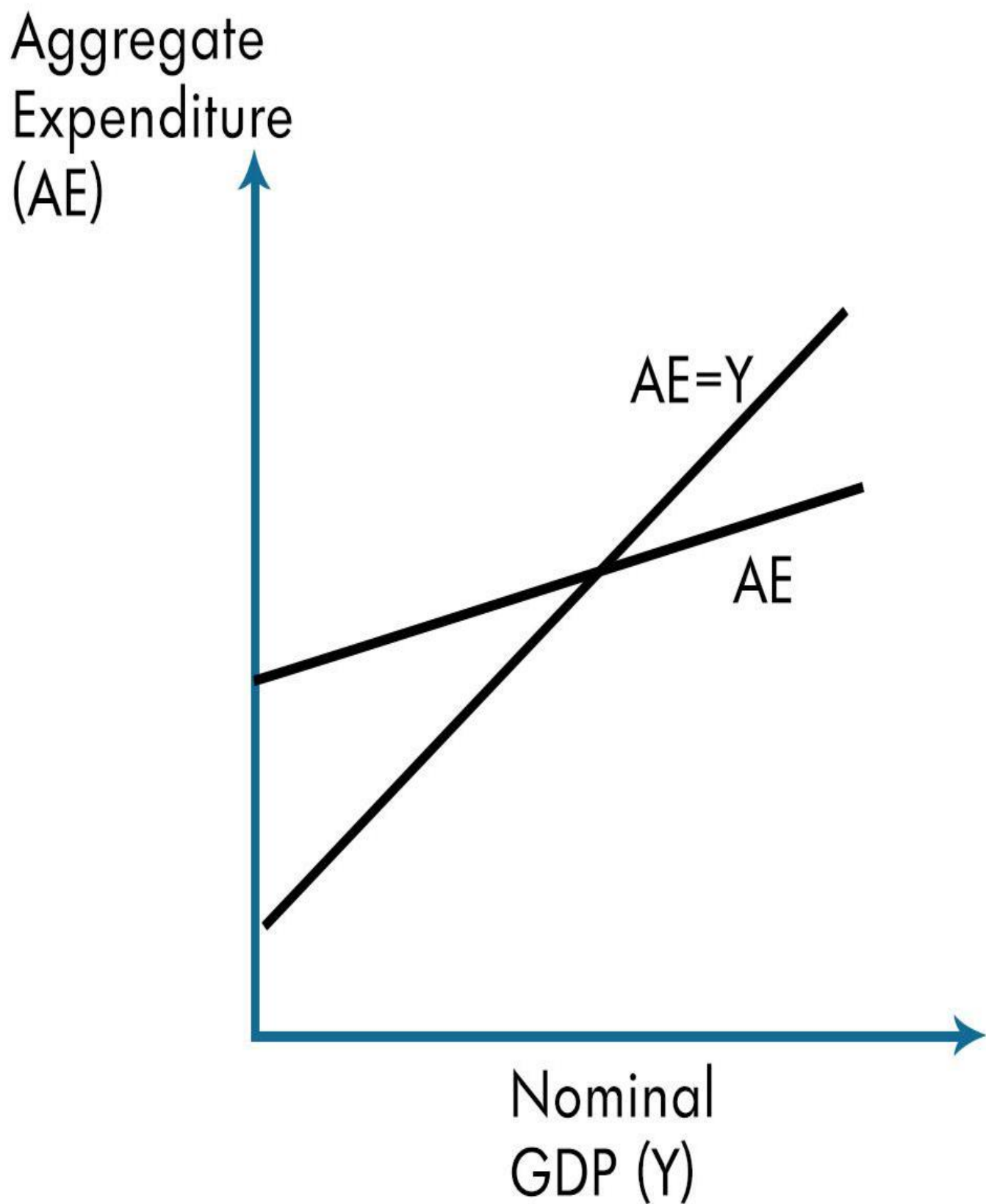
Keynesian Cross

- Aggregate Expenditure: The total planned spending/expenditure on economy's goods/services for given level of national income during certain period of time.

$$AE=C+I+G+(X-M)$$

Keynesian Cross

- Aggregate expenditure being citizens' planned expenditure is made up of similar components as aggregate demand. Therefore, an economy's planned expenditure is accumulated expenditure that arises from citizens' consumption, investment, government expenditure and net exports.

Consumption Function

- $C = C_0 + C_1 \cdot Y$

- C_0 is autonomous consumption that individuals undertake when their income levels are zero. This consumption is financed either through their savings or borrowing.

- Y refers to national income and T refers to direct taxation. Therefore aggregate consumption in an economy is function of national income and direct taxation. C_1 refers to marginal propensity to consume.

Consumption Function

- At any given point in time, C1 is assumed to be constant. Marginal Propensity to Consume (MPC) is proportion of additional income that is consumed by consumers.

Consumption Function

- MPS refers to marginal Propensity to Save and records proportion of additional income that is saved by individuals.

- MPC+MPS=1

- Since consumption and saving are the only two options available to anyone, additional income will either be consumed or saved making MPC and MPS sum equal to 1.

Consumption Function

- Rich people have comparatively lower MPC as compared to less wealthy people. This is because their living standards are already very high and therefore instead of consumption most of their additional income is saved.

Saving Function

- Just like economy's aggregate consumption function that is determined by national income aggregate saving function is also a function of national income.
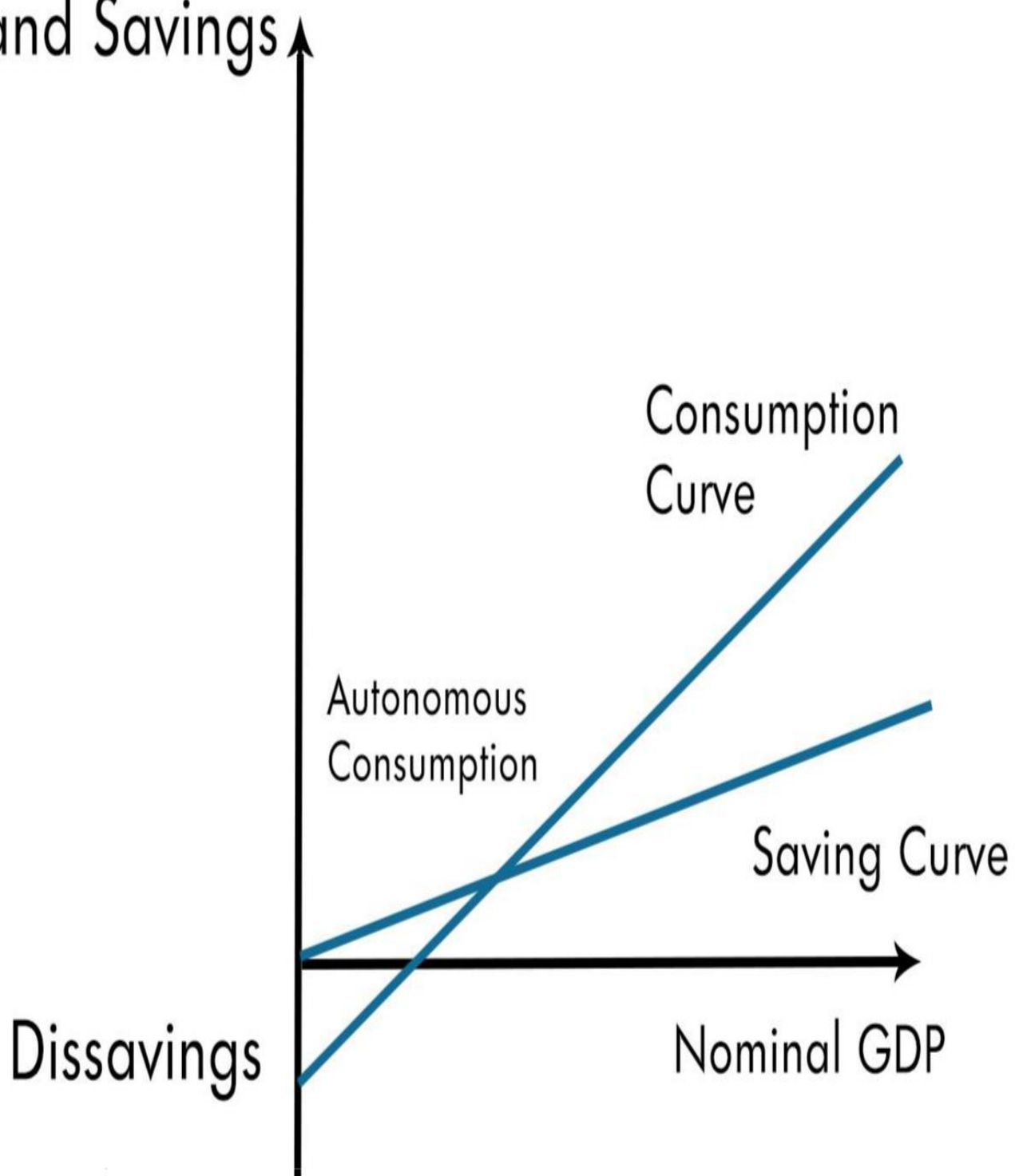
$$S = - So + S1. Y$$

- So is Dissaving that consumers need to utilize for their autonomous consumption when their income levels are zero.

- S1 is Marginal Propensity to Save (MPS).

Consumption and Saving Function

Investment Function

- Following economic variables collectively determine the level of investment in an economy:

1. **Interest Rates:** being the cost of capital/investment interest rates are inversely related to level of investment undertaken during any time period.

2. **Autonomous Investment:** that is unexplainable is often undertaken to replace depleted/depreciated capital goods.

3. **National Income**: since higher income level of economy positively affect its consumption, therefore national income should be positively related to nominal GDP.

Investment Function

- However for Keynesian macroeconomic equilibrium determination purposes we will assume that it is only autonomous investment that is undertaken in any economy. Therefore investment function is exogenous to our model and therefore its determinants are not explained.

Determinants of Government Expenditure

- Most governments' expenditure is regardless of their revenue and as a result they often experience budget deficits (when their expenditure exceeds their revenue). However in times of higher national income, higher government expenditure can be financed without experiencing budget deficit.

Determinants of Government Expenditure

Therefore, at times, government expenditure might increase following increase in economic activity. However Keynesian Macroeconomic Equilibrium model do not take this into account income induced government expenditure. Therefore government expenditure is exogenous (not explained within the model) to your model.

Determinants of Government Expenditure

- Hence governments spending is regardless of national income and is just based upon governments' macroeconomic objectives.

Determinants of Net Exports

• Economic research has shown following variables to be significant in determining economies' net exports:

1. **Competitiveness of exports** in comparison with imports (better quality, cheaper goods are demanded more and will hence help boost economy's net exports)

Determinants of Net Exports

2. **Domestic national income** is often inversely related with countries' net exports. Higher national income increases demand for imports which adversely affects their net exports. Similarly increase in other economies national income is often positively related with an economy's net exports.

3. **Moreover protectionist policies** might increase economies' net exports.

Aggregate Expenditure

- Aggregate Expenditure= C + I + G + NX where
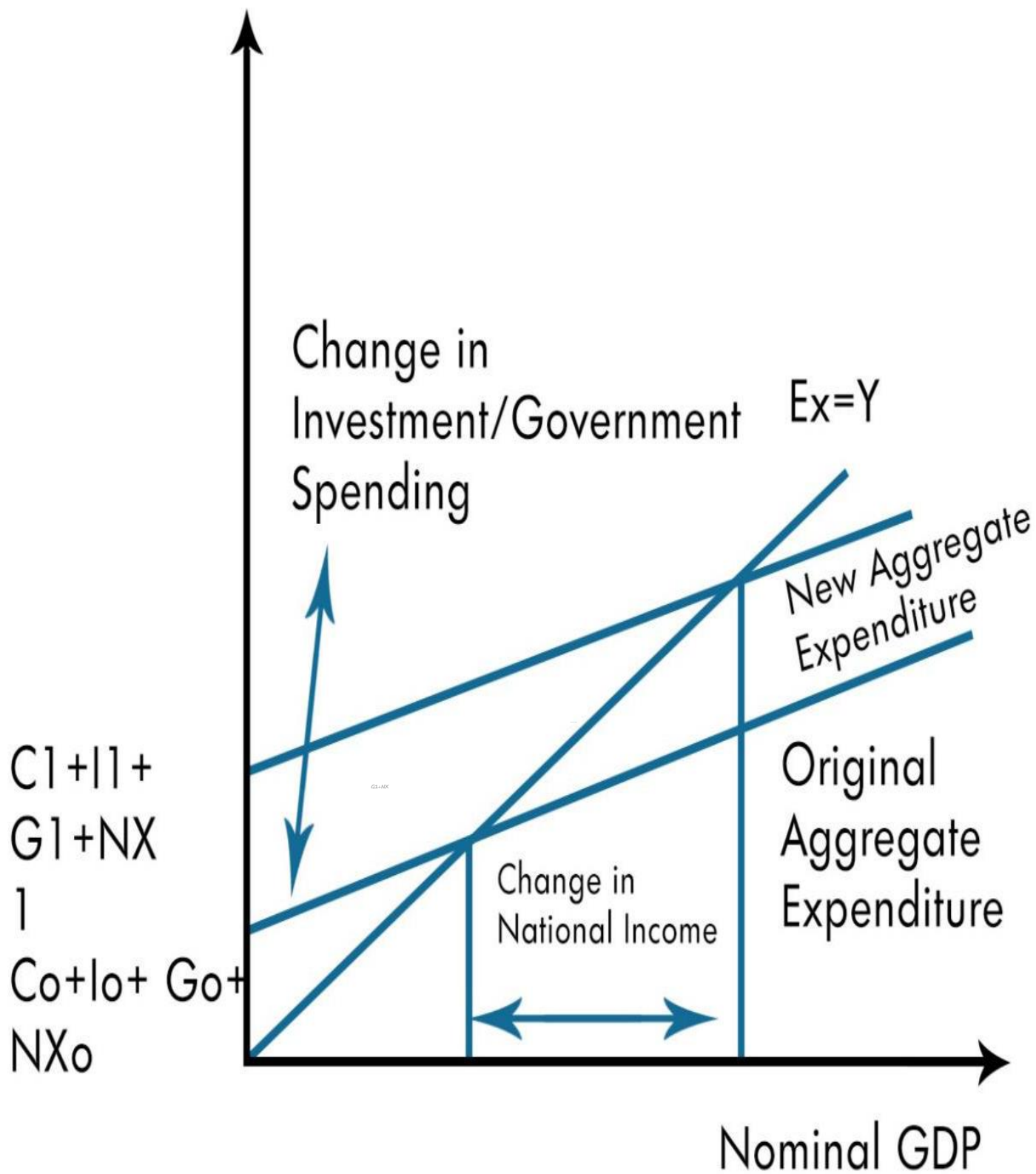
1. $C = C_o + MPC \cdot Y$

2. $I = I_o$

3. $G = G_o$

4. $NX = NX_o$

- For the sake of simplicity Keynesian Cross assumes that except for aggregate consumption *NO* other aggregate expenditure component is dependent upon national income.

Aggregate Expenditure

National Income Determination

- The macroeconomic equilibrium of an economy exists where aggregate expenditure is equal to nominal GDP. Hence X = Y line on the Keynesian Cross diagram represents all possible equilibrium points of an economy.

National Income Determination

- Economies having aggregate (planned) expenditure greater than nominal (actual) GDP will experience inflationary pressure causing its current national output (income) to increase to restore equilibrium. Similarly in times when economies' aggregate (planned) expenditure is less than their nominal (actual) GDP then by experiencing deflationary pressures the economy will shrink in size (lower national output).

National Income Determination

- Therefore Keynesian macroeconomic equilibrium as explained through Keynesian Cross exists where X = Y line interests aggregate expenditure line.
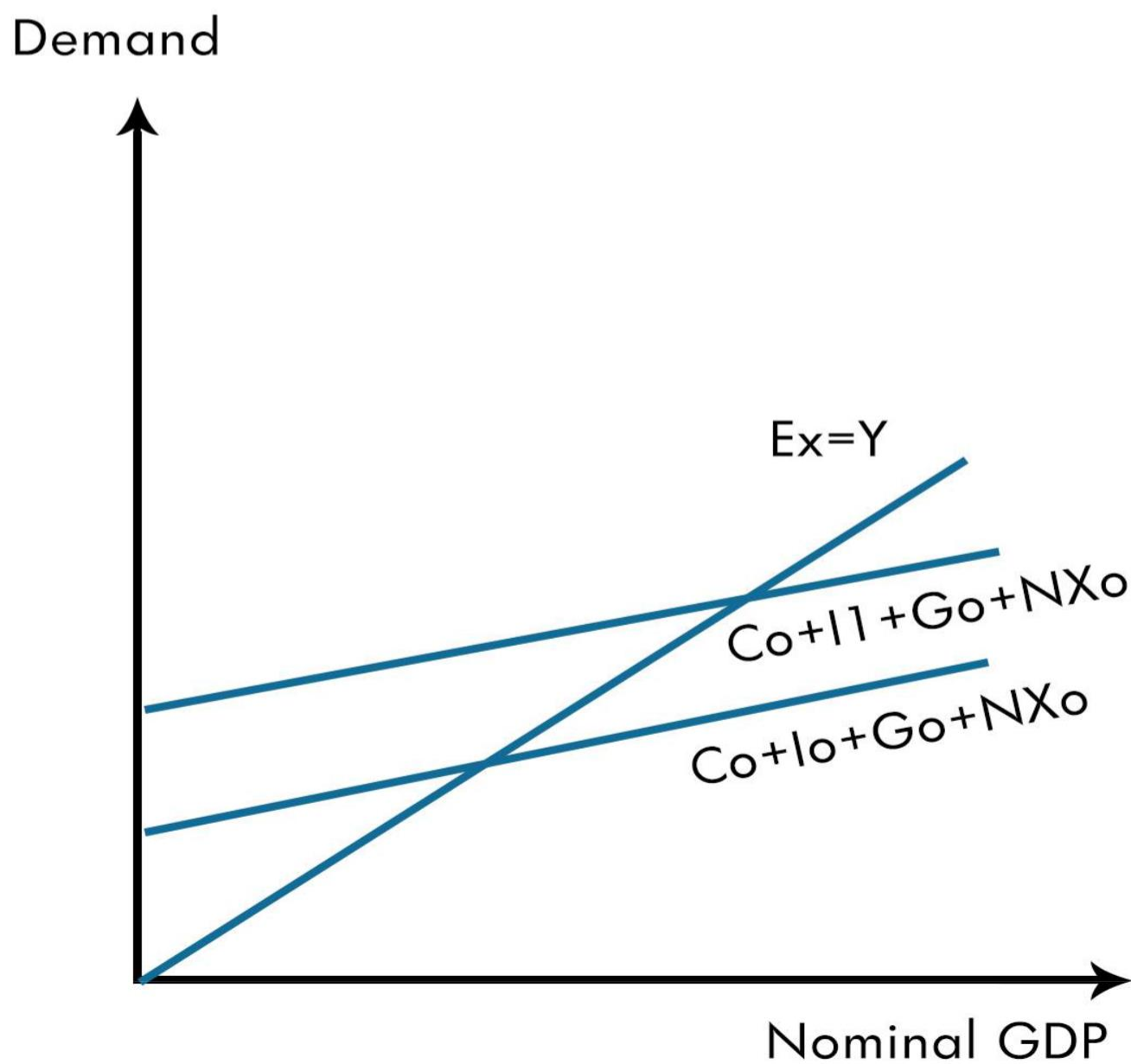
1. Aggregate Expenditure = Nominal GDP

2. Aggregate Expenditure = $C + I_o + G_o + NX_o$

- Where $C = C_o + MPC \cdot Y$

- Therefore in equilibrium

- $Y = C_o + MPC \cdot Y + I_o + G_o + NX_o$

Changes in Investment and Government Spending

Demand

Nominal GDP

$Ex=Y$

$Co+I1+Go+NXo$

$Co+Io+Go+NXo$

Equilibrium in Macroeconomy

- Mathematically macroeconomic equilibrium exists where economy's injections are equal to economy's leakages.

- Therefore the following condition holds true in equilibrium:

- S+T+M=X+G+I

- Hence the above equation holds true for any economy that is in equilibrium meaning aggregate expenditure is equal to nominal GDP.
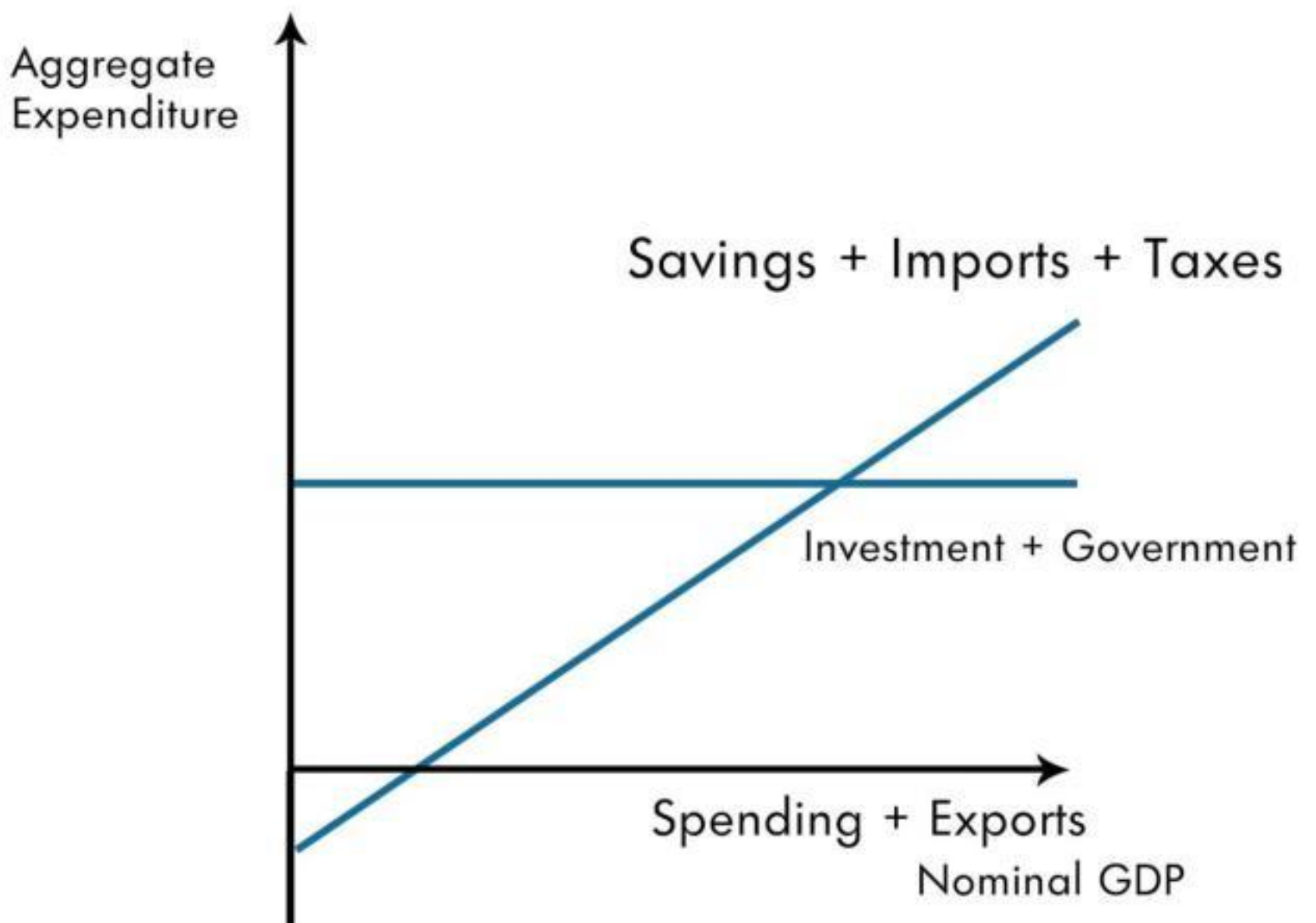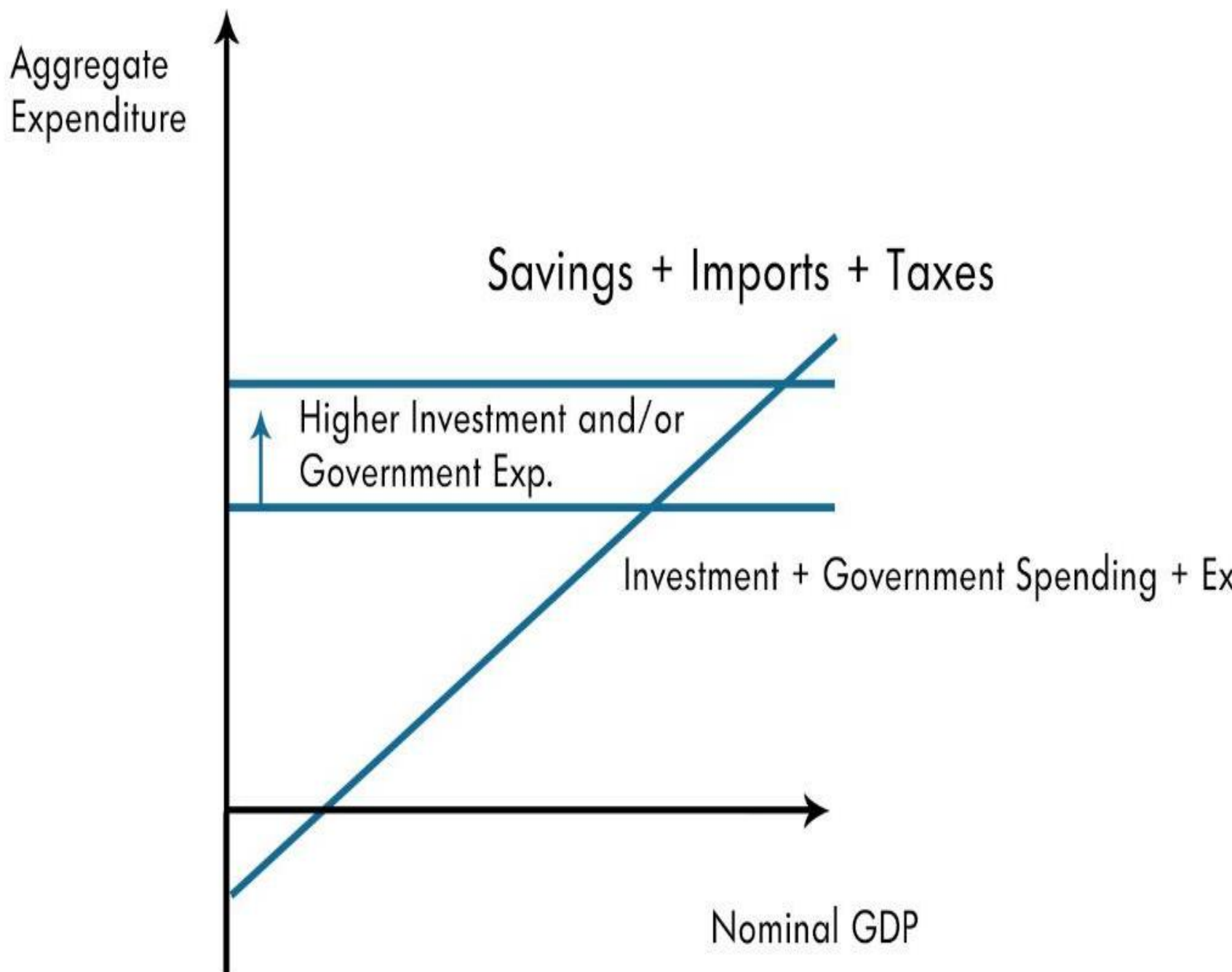
Equilibrium in Macroeconomy
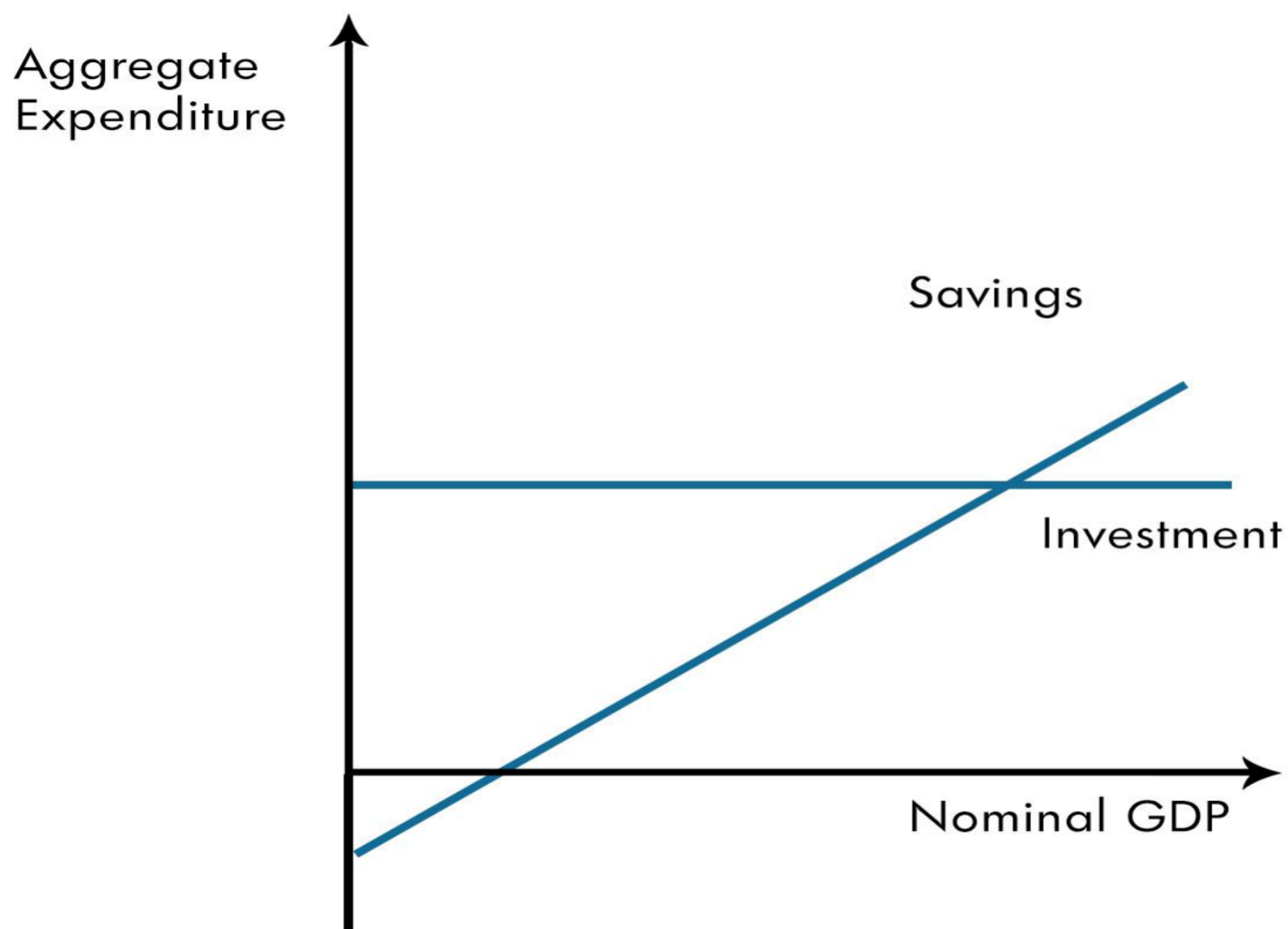
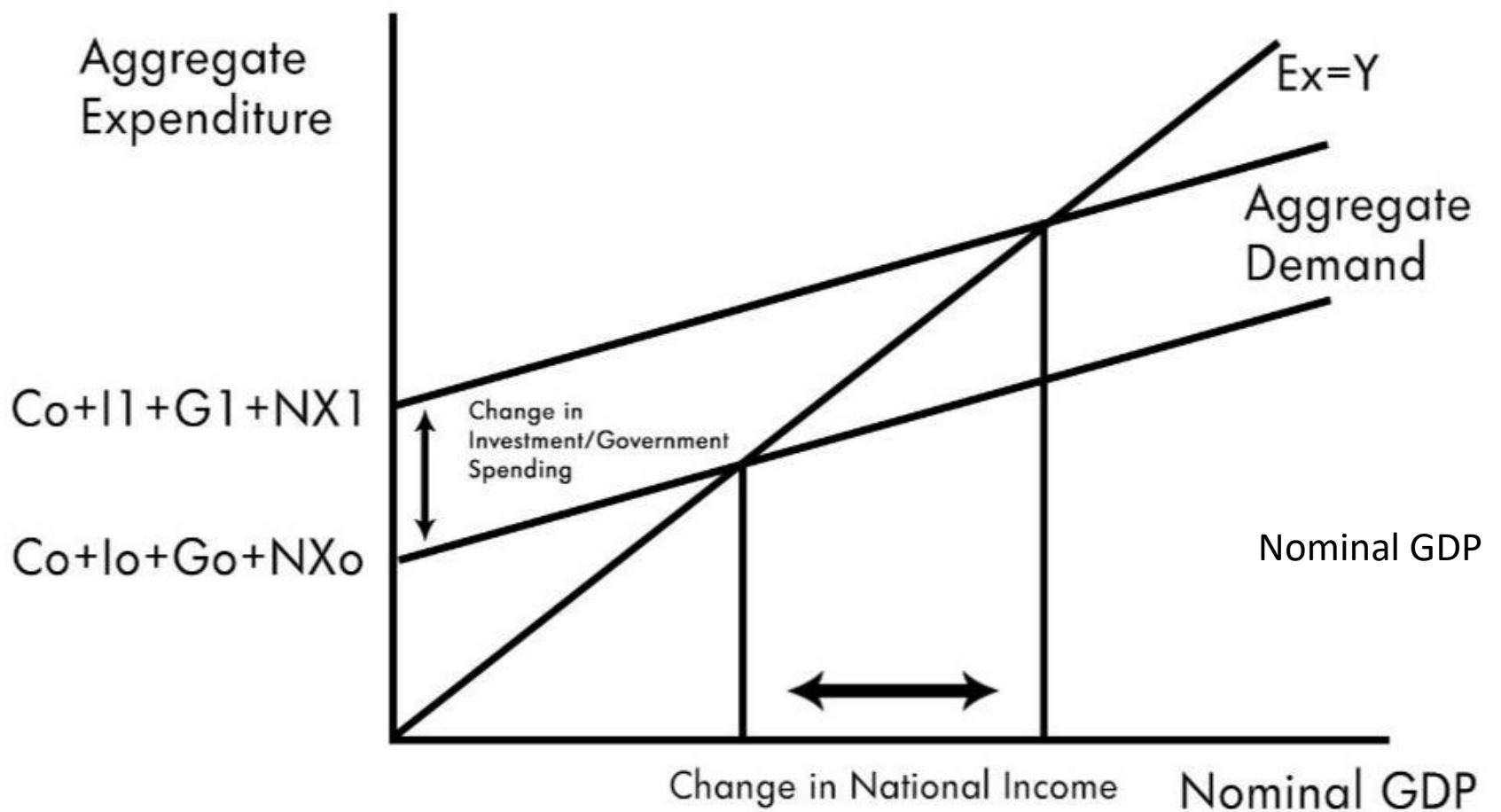# Equilibrium in Macroeconomy

Equilibrium in Macroeconomy

Equilibrium in Macroeconomy

Aggregate Expenditure

Savings + Imports + Taxes

Higher Investment and/or Government Exp.

Investment + Government Spending + Ex

Nominal GDP
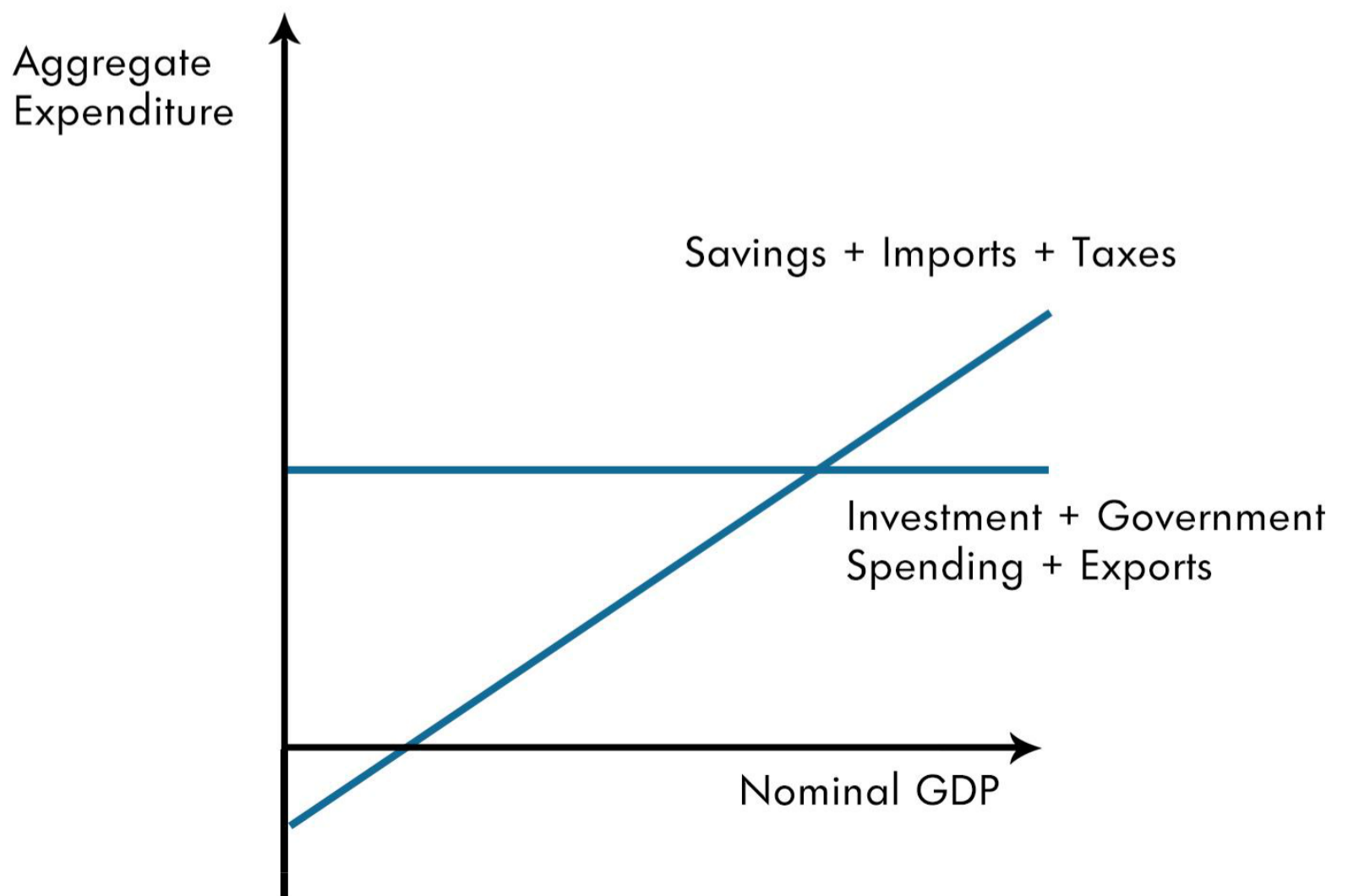
Multiplier

Multiplier

- Multiplier effect is explained as income generation process through which change in national income is much more than change in economy's injections.

- For instance if government expenditure changes by $200 and assuming that economy's Marginal Propensity to Consume (MPC) is 0.8 then total change in economy's national income will be $ 1,000.

Multiplier

- Hence the formula to calculate multiplier of an economy is as follows:

- 1/MPS

Multiplier In Three and Four Sector Economies

- Three sector economies consist of households, firms and governments.

- Four sector economies consist of households, firms, governments and foreign trade.

- Multiplier in Three and Four Sector Economy:

- 1/MPS+MRT (In Three Sector Economy)

- 1/MPS+MRT+MPM (In Four Sector Economy)

- Where MRT is Marginal Rate of Tax and MPM is Marginal Propensity to Import

Multiplier Effect

- The larger the amount of leakages the lower will be increase in economy's national income following a change (increase) in its injections.

- Since in two sector households saving is the only leakage and investment is the only injection therefore each additional dollar increase in injection results in 1/MPS increase in national income.

- For the three sector economy other than savings, taxation is another leakage. Therefore Multiplier in three sector economy is calculated as follows:

Multiplier Effect

- 1/MPS+MRT

- Similarly for four sector economy other than savings and taxation, imports are also leakage of income from an economy. Therefore Multiplier in four sector economy is calculated as follows:

- 1/MPS+MRT+MPM

Accelerator

- As mentioned earlier while discussing investment function that investment in an economy along being function of other economic variables is also determined by level of national income.

- The relationship between national income and level of investment in any economy is fairly simply and intuitive. Higher income levels increase aggregate consumption which as the result raises aggregate demand and hence encouraging firms to produce more.

Accelerator

- This type of investment that depends upon economy's national income is known as induced investment. Investment that does not depend upon national income is known as autonomous investment.

Accelerator

- Accelerator is a quantitative measure of ratio of changes in economy's investment following a change in its national income. The value is known as Accelerator Coefficient.

Accelerator = Changes in Investment / Changes in National Income

- An Accelerator value/coefficient of 3 would mean that $1 increase in national income would cause $3 increase in economy's investment.

Accelerator

- Changes in Accelerator values over time can be used to gauge improvement in economy's production potential. Higher Accelerator values predict investors' /firms' optimistic expectations about future.

- According to Keynesian school of economic thought increase in economies' growth rates will cause increase in economies' accelerator coefficients.