Lesson 3: Aggregate Demand, Aggregate Supply and Equilibrium: Part 2 (IS-LM Analysis and the AD Curve)

Aggregate Demand

The **aggregate demand (AD)** curve shows the combinations of aggregate income and price level at which the following conditions are satisfied:

- Planned expenditures equal actual (or realized) income/output.
- There is equilibrium in the money market

The IS Curve (Relationship Between Income and the Real Interest Rate)

In order to derive the relationship between income and the real interest rate, we look at the factors that influence each of the components of aggregate demand.

The IS Curve

Consumption

The main determinant of consumption expenditure in an economy is disposable income.

Disposable income = GDP – Business saving – Net taxes

The marginal propensity to consume (MPC) is the proportion of an additional unit of disposable income that is consumed or spent.
The marginal propensity to save (MPS) is the proportion of an additional unit of disposable income that is saved (MPS = 1 – MPC).

BOTTOM LINE: CONSUMPTION VARIES POSITIVELY WITH INCOME, AND NEGATIVELY WITH TAXES.

The IS Curve

Investment

GDP includes gross investment as opposed to net investment.

The two most important determinants of investment spending (I) in an economy are:

- The level of interest rates represents the cost of obtaining funds for investment.
    - The higher the cost of obtaining funds, the lower the level of investment in an economy.

- The current level of aggregate output/income serves as an indicator of expected profitability of new investments.
    - The higher the level of aggregate output/income, the higher the return expected on new investments.

BOTTOM LINE: INVESTMENT EXPENDITURE VARIES POSITIVELY WITH INCOME, AND NEGATIVELY WITH REAL INTEREST RATES.

The IS Curve

Government Expenditure

The government's fiscal balance can be represented as: $G - T = G - t(Y)$

Government expenditure (G) is treated as an exogenous policy variable that is not affected by the interest rates, exchange rates, and other economic factors.

Net taxes (T) increase as aggregate income increases and decrease as aggregate income declines.

- Taxes collected (e.g. income and valued added taxes) increase as aggregate income increases and vice versa.
- Transfer payments (which are typically based on economic need) are inversely related to aggregate income. Unemployment benefits paid out decrease as unemployment falls and aggregate income rises.

BOTTOM LINE:

- GOVERNMENT EXPENDITURE DOES NOT VARY WITH INCOME.
- TAXES VARY POSITIVELY WITH INCOME.
- THEREFORE, THE GOVERNMENT'S FISCAL BALANCE VARIES NEGATIVELY WITH INCOME.

The IS Curve

Net Exports

Two of the most important factors that affect net exports (X – M) are:

Relative incomes in the domestic country and in the rest of the world:

- An increase in domestic income increases demand for imported goods, reducing net exports.
- An increase in income in the rest of the world increases foreign demand for domestic goods, increasing domestic exports.

Relative prices of domestic and foreign goods and services:

- An increase in prices of domestic goods increases demand for imports (as foreign goods become more competitive), reducing net exports.
- An increase in foreign prices increases foreign demand for domestic goods, increasing net exports.

BOTTOM LINE: NET EXPORTS VARY NEGATIVELY WITH INCOME, AND NEGATIVELY WITH DOMESTIC PRICE LEVELS.

The IS Curve

The IS curve assumes that planned expenditure equals actual (or realized) income/output.

The equality of income and expenditure is expressed through the following equations that we derived earlier:

$C + S + T = C + I + G + (X - M)$

$S - I = (G - T) + (X - M)$ … (Equation 7)

The IS Curve

Example: The IS Curve

The following equations are given for a hypothetical economy:

Consumption function:	$C = 1{,}500 + 0.5(Y - T)$
Investment function:	$I = 300 + 0.1Y - 20r$
Government spending:	$G = 1{,}000$
Net export function:	$(X - M) = 1{,}200 - 0.2Y$
Tax function:	$T = -150 + 0.2Y$

1. Based on the above equations, find the equation that describes the IS curve.
2. Given a real interest rate of 5%, find:
   a. The level of GDP
   b. Tax receipts
   c. Consumption spending
   d. Investment spending
   e. Net exports
3. Find the new IS curve if the government increases its expenditure from 1,000 to 1,500.
4. Given a real interest rate of 5%, determine how the increased government spending is funded.
5. Given that the output level calculated in Question 2 is the most the economy can produce with the given resources and that the economy is operating at that level, what must happen to maintain the balance between expenditure and income if the government increases its expenditure from 1,000 to 1,500?

The LM Curve

The LM curve shows the combinations of interest rates and real income for which the money market is in equilibrium.

Quantity theory of money: MV = PY

M/P and M_D /P = kY
where:
k = I/V
M = Nominal money supply
M_D = Nominal money demand
M_D/P is referred to as real money demand and M/P is real money supply.

Demand for real money (RM_D or M_D/P) is a positive function of real income and a negative function of interest rates.

- The quantity theory equation above suggests that real money demand increases with real income (Y).
- Households choose to hold less money in favor of investing it in higher yielding securities when interest rates rise. Therefore, demand for real money varies inversely with interest rates (r).

The LM Curve

Equilibrium in the money market requires that money supply and money demand be equal.

Aggregate Demand

The point where the IS and LM curves intersect defines the combination of real interest rates and real income where:

- There is equilibrium in the goods market, i.e. planned expenditures equal actual (or realized) income/output.
- There is equilibrium in the money market, i.e. the available real money supply is equal to the demand for real money.

Aggregate Demand

Other factors that explain the negative slope of the aggregate demand curve:

- Higher prices reduce the purchasing power of those whose incomes are fixed in nominal terms.
- Higher prices reduce the real value of assets and decrease real wealth.
- Higher prices reduce the value of nominal assets like stocks and bonds.
- Higher prices make foreign goods more competitive and domestic goods less competitive so imports rise and exports fall.

Slope of the Aggregate Demand Curve

For simplicity, we assume that the fiscal and trade balances are fixed.

Therefore, in order to ensure that aggregate expenditure equals aggregate income, any change in investment must be matched by a similar change in private saving.

The steepness of the slope of the AD curve depends on the relative sensitivities of investment, saving, and money demand to income and real interest rates.

The AD curve will be flatter (small changes in price cause relatively large changes in quantity demanded) if:

- Investment expenditure is highly sensitive to the interest rate.
- Saving is insensitive to income.
- Money demand is insensitive to interest rates.
- Money demand is insensitive to income.

Example: Aggregate Demand

The following equations are given for a hypothetical economy:

Real money demand: $M_D/P = -250 + 0.4Y - 35r$
Real money supply: $M/P = 1{,}800 / P$

- Find the equation for the LM curve.
- Using the IS curve from Question 1 of Example 5, find the equation of the AD curve.
- Find the levels of GDP and the interest rate if P = 1.
- What will happen to GDP and the interest rate if the price level rises to 1.1 or falls to 0.9?
- Suppose investment spending were more sensitive to the interest rate so that the IS becomes (Y = 5,821.43 – 60r). What happens to the slope of the AD curve? What does this imply about the effectiveness of monetary policy?