AGGREGATE DEMAND

1. Keynes’s Theory

- John Maynard Keynes (1936)
  • criticized classical theory for assuming that AS alone – capital, labor, and technology – determines national income
  • proposed that low AD is responsible for the low income and high unemployment that characterize economic downturns

- Study of economic fluctuations by looking more closely at AD
  → Identifying the variables that shift the AD curve, causing fluctuations in national income
  → IS-LM model shows what determines national income for any given price level and what causes income to change in the SR when the price is fixed
• IS curve: the relationship b/t the interest rate and the level of income that arises in the market for goods and services

• LM curve: the relationship b/t the interest rate and the level of income that arises in the market for money balances

2. The Goods Market and the IS Curve

(1) The Keynesian Cross

- Planned Expenditure: the amount households, firms, and the government would like to spend on goods and services ↔ actual expenditure (GDP)

why? Firms might engage in unplanned inventory investment b/c their sales do not meet their expectations

• If firms sell less of their product than they planned
  → their stock of inventories automatically rises
  → these unplanned changes in inventories are counted as investment spending
  → actual expenditure will be above planned expenditure
- Determinants of planned expenditure \((E)\)

\[
E = C + I + G = C(Y - \bar{T}) + \bar{I} + \bar{G},
\]
where \(I\): planned investment

→ planned expenditure is a function of income, the level of planned investment, and the fiscal policy variables (fig. 10-2)

- The economy in equilibrium (fig. 10-3)

→ Actual expenditure = Planned expenditure \((Y = E)\)

• How does the economy get to the equilibrium?

  Whenever the economy is not in equil.,

→ firms experience unplanned changes in inventories
→ firms change their production levels
→ changes in total income and expenditure, moving the economy toward equil. (fig. 10-4)

↓ \( I \) is not fixed
(2) The interest rate, investment, and the IS curve

- Investment function: \( I = I(r) \) (fig. 10-7 (a) )
  
  \( (\text{b/c } r \uparrow \rightarrow I \downarrow) \)

- How income changes when \( r \) changes (fig. 10-7 (b) )

- \( r \uparrow \rightarrow Y \downarrow \) (fig. 10-7 (c) ) \( \rightarrow \text{IS curve} \)

“The IS curve combines the interaction b/t \( r \) and \( I \) expressed by the investment function and the interaction b/t \( r \) and \( Y \) demonstrated by the Keynesian cross (goods market equilibrium)”

(3) How fiscal policy shift the IS curve

- Changes in fiscal policy that raise the demand for goods and service (\( G \uparrow \) or \( T \downarrow \))
  
  \( \rightarrow \text{IS curve shifts to the right} \) (fig. 10-8 )

- Changes in fiscal policy that reduce the demand for goods and service (\( G \downarrow \)or \( T \uparrow \))
  
  \( \rightarrow \text{The IS curve shifts to the left} \)
(4) A Loanable-funds Interpretation of the IS curve

\[ Y - C(Y - T) - G = S(Y) = I(r) \]

- An increase in income raises saving and thus lowers the interest rate that equilibrates the supply and demand for loanable funds (fig. 10-9)

→ the negative relationship b/w income and the interest rate

3. The Money Market and the LM Curve

LM curve: the relationship b/t the interest rate and the level of income that arises in the market for money balances

(1) The Theory of Liquidity Preference

→ How the interest rate is determined in the SR
→ The interest rate adjusts to balance the supply and demand for the economy’s most liquid asset (money)

- Supply of real money balances (fig. 10-10)
→ Assuming a fixed supply of real balances

→ \((\frac{M}{P})^s = \frac{\bar{M}}{\bar{P}}\)

(b/c \(M\) is exogenous and \(P\) is sticky in the SR)
- Demand for real money balances (fig. 10-10)
  → When the interest rate rises, people want to hold less of their wealth in the form of money
  → $(\frac{M}{P})^d = L(r)$

- Equilibrium (fig. 10-10)
  → The supply and demand for real money balances determine the equil. Interest rate
  ↓ including income $(Y)$

(2) Income, Money Demand, and the LM Curve

→ How does a change in the economy’s level of income affect the market for real money balances?

• When income ↑ → expenditure ↑ → transactions ↑
  → the use of money ↑ → real money balances ↑
  → $(\frac{M}{P})^d = L(r, Y)$

- Income ↑ → demand for money ↑

- $Y ↑ → r ↑$ (fig. 10-12) → LM curve
“The LM curve shows the combinations of $r$ and $Y$ that are consistent with equilibrium in the market for real money balances”

(3) How monetary policy shift the LM curve

- Changes in monetary policy that reduce the supply of money (fig. 10-11 )
  $\Rightarrow$ LM curve shifts to the upward (fig. 10-13 )

(4) A quantity-equation interpretation of the LM curve

- The quantity equation: $MV = PY$

- If people respond to a higher interest rate by holding less money, each dollar they hold must be used more often to support a given volume of transactions
  $\Rightarrow$ Velocity of money must increase

- The quantity equation $\Rightarrow MV(r) = PY$

  Given $M$ and $P$, $r$ is positively related to $Y$.
  $\Rightarrow$ Upward-sloping LM curve
4. The Short-Run Equilibrium

IS: \[ Y = C(Y - T) + I(r) + G \]

LM: \[ M / P = L(r, Y) \]

where, exogenous variables: \( M, G, T, P \)
endogenous variables: \( r, Y \)

- The equilibrium of the economy is the point at which the IS curve and the LM curve cross (fig. 10-14)
- Equil. in both goods market and money market
- Actual expenditure = planned expenditure
  the demand for real money balances = the supply

5. Explaining Fluctuations with IS-LM Model

(1) How Fiscal Policy Shifts the IS curve and Changes the SR Equilibrium

- Change in Government Purchase (fig. 11-1)
  \( \rightarrow \) An increase in \( G \) raises both income and the interest rate

  • Market for goods and services: Keynesian cross
    \( G \uparrow \rightarrow \) planned expenditure \( \uparrow \rightarrow Y \uparrow \)

  • Money market: The theory of liquidity
    \( Y \uparrow \rightarrow \) quantity of money demanded \( \uparrow \rightarrow \)
    \( r \uparrow \) (b/c the supply of money has not changed)

  • \( r \uparrow \rightarrow I \downarrow \rightarrow \) partially offsets the effect of \( G \uparrow \)

- Change in Taxes (fig. 11-2)
(2) How Monetary Policy Shifts the LM curve and Changes the SR Equilibrium

- Change in Money Supply (fig. 11-3)

  • Money market: The theory of liquidity
    \[ M \uparrow \rightarrow \text{people start depositing} \rightarrow r \downarrow \]

  • Market for goods and services: Keynesian cross
    \[ r \downarrow \rightarrow I \uparrow \rightarrow Y \uparrow \]

(3) The Interaction between Monetary and Fiscal Policy

  \[ \rightarrow \text{A change in one policy may influence the other, and} \]
  \[ \text{this interdependence may alter the impact of a policy} \]
  \[ \text{change.} \]

Ex) How the economy responds to a tax increase
depends on how the monetary authority responds
(fig. 11-4)

1) Fed holds money supply constant (fig. 11-4(a))

2) Fed holds interest rate constant (fig. 11-4(b))

3) Fed holds income constant (fig. 11-4(c))

  \[ \rightarrow \text{What assumption is most appropriate depends on the} \]
  \[ \text{case at hand and the many political considerations} \]
  \[ \text{that behind economic policy making.} \]
(4) Shocks in the IS-LM model

• Shocks to the IS curve
  1) Investors’ animal spirits
e.g., firms become pessimistic \( \rightarrow I \downarrow \rightarrow Y \downarrow \)
  2) Changes in the demand for consumer goods
e.g., consumer confidence \( \uparrow \rightarrow I \uparrow \rightarrow Y \uparrow \)

• Shocks to the LM curve
  - Changes in demand for money
e.g., restrictions on credit-card availability \( \rightarrow \)
    money demand \( \uparrow \rightarrow r \uparrow \rightarrow Y \downarrow \)

6. IS-LM as a Theory of Aggregate Demand

\( \rightarrow \) The price level is allowed to change

\( \rightarrow \) IS-LM model provides a theory to explain the position and the slope of the AD curve

(1) From the IS-LM Model to the AD Curve

cf) The quantity equation as AD

• Quantity equation: \( M \times V = P \times Y \)

\( \rightarrow M / P = kY \), where \( k = 1/V \)

• For any fixed \( k \) (or \( V \)), the quantity equation yields a negative relationship b/t the price level and output
1) Why national income falls as the price level rises

- \( P \uparrow \rightarrow (M / P)^S \downarrow \rightarrow \text{shift LM upward} \)
  
  \( \rightarrow r \uparrow \& Y \downarrow \) (fig. 11-5)

- The aggregate demand curve shows the set of equilibrium points that arise in the IS-LM model as we vary the price level and see what happens to income

2) What causes the aggregate demand curve to shift

- Expansionary Monetary Policy (fig. 11-6 (a) )

- Expansionary Fiscal Policy (fig. 11-6 (b) )

*(2) The IS-LM Model in the Short Run and the Long Run*

- Suppose that the quantity output demanded is below the natural rate (fig. 11-7)
  
  \( \rightarrow \) at existing price level, insufficient demand for goods and services to keep the economy producing at its potential level (SR equil.)

- Eventually, the low demand for goods and services causes prices to fall, and the economy moves back toward its natural equilibrium.

  \( \rightarrow \) This LR equil. is achieved in the IS-LM diagram by shift in the LM model.
THE OPEN ECONOMY

1. International Flows of Capital and Goods

(1) The Role of Net Exports

- \( Y = C^d + I^d + G^d + EX \)
  \[ = \text{domestic spending} + \text{foreign spending} \]

  where \( C^d \): consumption of domestic goods and services
  \( I^d \): investment in domestic goods and services
  \( G^d \): gov’t purchase of domestic goods and services
  \( EX \): exports of domestic goods and services

- \( Y = (C - C^f) + (I - I^f) + (G - G^f) + EX \)
  \[ = C + I + G + EX - (C^f + I^f + G^f) \]
  \[ = C + I + G + EX - IM = C + I + G + NX \]

  where \( IM \): the sum of domestic spending on foreign good and services
  \( NX \): net exports
- \( NX = Y - (C + I + G) \)
  \[ = \text{output} - \text{domestic spending} \]

\( \rightarrow \) In an open economy, domestic spending need not equal the output of goods and services.

**If output > domestic spending → net exports > 0**

**If output < domestic spending → net exports < 0**

(2) *Net Foreign Investment (Net Capital Outflow) and the Trade Balance*

- \( Y = (C + I + G) + NX \)
  \( \rightarrow Y - C - G = S = I + NX \)
  \( \rightarrow S - I = NX \)

\( \rightarrow \) An economy’s net exports (*trade balance*) must always equal to the difference b/t its saving and its investment (*net foreign investment or net capital outflow*)

**If \( S - I = NX > 0 \) → trade surplus**
**If \( S - I = NX < 0 \) → trade deficit**
**If \( S - I = NX = 0 \) → balanced trade**

- The national income accounts identity shows the international flow of funds to finance capital accumulation and the international flow of goods and services are two sides of the same coin.
2. Saving and Investment in a Small Open Economy

• In a closed economy, real interest rate adjust to equilibrate saving and investment

  But in an open economy, the real interest rate doesn’t.

  → allow the economy to run a trade surplus (deficit)

• What does determine the real interest rate?

  Assuming a small open economy with perfect capital mobility, the interest rate must equal to the world interest rate, \( r = r^* \).

  Note: world interest rate is an exogenous given variable (b/c a small economy has a negligible effect on world saving and world investment)

(1) Model

- Assumptions:

  • \( Y = \bar{Y} = F(\bar{K}, \bar{L}) \)
  
  • \( C = C(Y - T) \)
  
  • \( I = I(r^*) \)

- Trade balance is determined by the difference b/t saving and investment at the world interest rate (fig. 5-2)

  → \( NX = S - I = (\bar{Y} - C(\bar{Y} - T) - G) - I(r^*) \)
(2) How Policies Influence the Trade Balance

- Assumption: a position of balanced trade ($NX = 0$)

(a) Fiscal policy at home (fig. 5-3)

$$G \uparrow \text{or } T \downarrow \Rightarrow S \downarrow \Rightarrow NX \downarrow$$

$\Rightarrow$ Starting from balance trade, a change in fiscal policy that reduces national saving leads to a trade deficit

(b) Fiscal policy abroad (fig. 5-4)

If the foreign countries are a large part of the world economy,

$$G^* \uparrow \text{or } T^* \downarrow \Rightarrow S^* \downarrow \Rightarrow r^* \uparrow \Rightarrow NX \uparrow$$

$\Rightarrow$ Starting from balance trade, an increase in the world interest rate due to a fiscal policy expansion leads to a trade surplus

(c) Shifts in investment demand (fig. 5-5)

e.g., investment tax credit

$$I \uparrow \Rightarrow NX \downarrow$$

$\Rightarrow$ Starting from balance trade, an outward shift in the investment schedule causes a trade deficit
3. Exchange Rates

(1) Nominal and Real Exchange Rates

- Nominal exchange rate: the relative price of the currency of two countries
e.g., the exchange rate b/t the US dollar and the Japanese Yen is 120 yen per dollar

- Real exchange rate: the relative price of the goods of two countries (= terms of trade)
e.g., American pizza: $1 (=120yen), Japanese pizza: 240yen.

\[
\text{Real Exchange Rate} = \frac{(120 \text{ yen} / \$) \times \left( \$ / \text{American pizza} \right)}{240 \text{ yen} / \text{Japanese pizza}}
\]
\[
= 0.5 \times \frac{\text{Japanese pizza}}{\text{American pizza}}
\]

→ American pizza costs one-half of what Japanese pizza costs

Real EXRA(ε) = Nominal EXRA(ε) × Ratio of price level(\(P / P^*\))

→ If ε is high (low), foreign goods are relatively cheap (expensive), and domestic goods are relatively expensive (cheap)
(2) *The Determinants of the Real Exchange Rate*

(a) The real EXRA and the trade balance (fig. 8-7)

The lower $\varepsilon$, the less expensive are domestic goods relative to foreign goods.

→ the greater are our net exports

→ $NX = NX(\varepsilon)$

(b) trade balance($NX$) = net foreign investment ($S - I$)

From (a) and (b),

“At the equilibrium real exchange rate, the supply of dollars available for net foreign investment balances the demand for dollars by foreigners buying our net exports” (fig. 5-8)

(3) *How Policies Influence the Real Exchange Rate*

(a) Fiscal policy at home (fig. 5-9)

(b) Fiscal policy abroad (fig. 5-10)

(c) Shifts in investment demand (fig. 5-11)

(d) The effects of trade policies (fig. 5-12)

→ raise the demand for net exports

→ raise the exchange rate
(4) The Determinants of the Nominal Exchange Rate

Real EXRA(ε) = Nominal EXRA(ε) × Ratio of price level(P / P*)

⇓

Nominal EXRA(ε) = Real EXRA(ε) × Ratio of price level(P* / P)

(a) Given ε , if the domestic price level (P)↑ → e ↓
That is, b/c a dollar is worth less, a dollar will buy fewer yen

(b) Given ε , if the foreign price level (P*)↑ → e ↑
That is, b/c the yen is worth less, a dollar will buy more yen

- Inflation and Nominal EXRA

\[ e = \varepsilon \times \left( \frac{P^*}{P} \right) \]

\[ \Rightarrow \% \Delta e = \% \Delta \varepsilon + \% \Delta P^* - \% \Delta P = \% \Delta \varepsilon + (\pi^* - \pi) \]

“If a country has a high (low) rate of inflation relative to the US, a dollar will buy an increasing (decreasing) amount of the foreign currency overtime” (fig. 5-13)