Output and the Exchange Rate
Chapter 17
1. Goods market equilibrium (DD)

2. Money market equilibrium (AA)

3. Equilibrium

4. Shocks

5. Current account
1 Goods Market Equilibrium

1.1 Components of aggregate demand

\[ D = C(Y - T) + I + G + CA \left( \frac{EP^*}{P}, Y - T \right) \]

- Note: simplifies IS-LM by omitting effect of the interest rate on \( C \) and \( I \)

- Net exports (CA) in dollar terms

\[ (P \times EX) - (EP^* \times IM) \]
• Net exports (CA) in real terms

\[ EX - \left( \frac{EP^*}{P} \times IM \right) = EX - (q \times IM) \]
Effect of an increase in $q$ on CA

- Foreign goods are relatively more expensive – agents switch to domestic goods – increasing $EX$ and reducing $IM$ – raising CA

- Direct effect of increase in $q$ is to raise real value of imports reducing CA

- Assume first effect dominates, so increase in $q$ raises CA
1.2 Demand = Output (DD schedule)

- Keynesian Cross

\[ Y = D = C(Y - T) + I + G + CA\left(\frac{EP^*}{P}, Y - T\right) \]

- DD schedule = relationship between \( E \) and \( Y \), other variables constant, such that goods market equilibrium holds

  - on Keynesian Cross, consider effect of an increase in \( E \) on \( D \)

  - higher \( E \) makes foreign goods relatively more expensive, switching spending onto domestic goods, raising equilibrium \( Y \)
– as $E$ increases, $Y$ must increase for goods market equilibrium

- Shifts in DD schedule
2  Asset (Money) Market Equilibrium

2.1  Components

- Interest rate parity

\[ R = R^* + \frac{E^e - E}{E} \]

- Money market equilibrium

\[ \frac{M}{P} = L(Y, R) \]
2.2 Asset market equilibrium (AA schedule)

- Combine interest rate parity and money market equilibrium
  
  \[
  \frac{M}{P} = L(Y, R^* + \frac{E^e - E}{E})
  \]

- AA schedule = relationship between \( E \) and \( Y \), other variables constant, such that asset market equilibrium holds
  
  - Using interest rate parity and money market equilibrium consider increase in \( Y \)
  
  - Higher \( Y \) raises money demand, requiring higher \( R \) to return money demand to fixed real money supply
– $R$ increases only if $E$ falls

– Therefore as $Y$ increases, $E$ falls for money market equilibrium

• Shifts in $AA$
2.3 Full-employment output (long-run value of equilibrium output)

- Exogenous and changes only with technology shock \( Y_f \)

- Simplifies by ignoring
  - Effect of real exchange rate \( q \)
  - Effect of endogenous changes in labor supply
  - Effect of changes in the capital stock due to investment
3 Equilibrium

3.1 Short-run

- $Y$ and $E$ must yield equilibrium in goods markets and asset markets

- $P$ is fixed

- Output can be away from potential
3.2 Long-run

- $Y$ and $E$ must yield equilibrium in goods markets and asset markets

- $P$ adjusts so that output is at potential
4 Monetary Expansion

4.1 Temporary ($E^e$ fixed)

- AA shifts right

- Domestic currency depreciates, raising $q$, switching spending toward domestic goods, raising output

- Long-run, money supply returns and equilibrium values return
4.2 Permanent ($E^e$ takes on long-run equilibrium value)

- Monetary neutrality implies that in LR $P$ and $E$ increase, so $E^e$ increases

- Shock is $M$ up and $E^e$ up

- Both shift AA up implying larger AA shift than for temporary shock

- Domestic currency depreciates, raising $q$, switching spending toward domestic goods, raising output
• Long-run – $P$ increases

  – reducing $\frac{M}{P}$, shifting AA partway back

  – reducing $q$ shifting DD left as agents switch spending back toward foreign goods

  – equilibrium with $E$, $E^e$, and $P$ up proportionate to the increase in $M$ and $Y = Y_f$
5 Fiscal Expansion

5.1 Temporary ($E^e$ fixed)

- $G$ increases raising demand for domestic goods, shifting DD right

- $Y$ increases, raising money demand, requiring $R$ up for goods market equilibrium

- Increase in $R$ requires $E$ down, domestic currency appreciation
• The appreciation reduces $q$, switching some of the increased spending toward foreign goods so output rises less than the multiplier times the increase in $G$

• LR - G returns and all values return to initial ones
5.2 Permanent ($E^e$ takes on long-run equilibrium value)

- Effect on $E^e$
  
  - Increase in $G$ raises relative demand for domestic goods reducing long-run value for $q$
  
  - Reduction in long-run value for $q$ reduces long-run value for $E$, reducing $E^e$
  
  - Increase in $G$ has no effect on $R^*$ or on $Y_f$ so no other effects on $E^e$
- Increase in $G$ shifts $DD$ right as before

- Reduction in $E^e$ shifts $AA$ down
  
  - Goods market equilibrium
    
    $$Y = C(Y - T) + I + G + CA\left(\frac{EP^*}{P}, Y - T\right)$$

    increase in $G$ offset by decrease in $q$ can leave output unchanged
– Money market equilibrium

\[ \frac{M}{P} = L(Y, R^* + \frac{E^e - E}{E}) \]

If \( E \) fell less than \( E^e \) falls, then \( Y \) would rise, implying a need for \( P \) to rise over time. However, money market equilibrium implies no change in \( P \) in the long run. Therefore, \( E \) and \( E^e \) fall by same amount and output is unchanged.
6 Current Account (XX Curve)

6.1 Graph

\[ CA\left(\frac{EP^*}{P}, Y - T\right) = 0 \]

- Increase in \( Y \) raises demand for imports, reducing \( CA \)

- To return \( CA \) to zero, need \( E \) up, making foreign goods more expensive, switching spending to domestic goods

- Graph for \( CA = 0 \) requires \( E \) up as \( Y \) increases
• $XX$ is flatter than $DD$

$$Y = C(Y - T) + I + G + CA \left( \frac{EP^*}{P}, Y - T \right)$$

– Increase in $Y$ increases domestic output more than demand for domestic goods creating excess supply

– Increase in $Y$ increases import demand, reducing $CA$

– Increase in $E$ makes foreign goods relatively more expensive, returning $CA$ to 0.

– However, still excess supply for domestic goods

– To eliminate excess supply need larger increase in $E$ so $CA > 0$. 
• Along $XX$, $CA = 0$
  
  – Above $XX$, $E$ is high or $Y$ is low, implying surplus
  
  – Below $XX$, $E$ is low or $Y$ is high, implying deficit

• Shifts in $AA$
  
  – General
  
  – Compare magnitudes for $AA$ with magnitudes for $DD$
6.2 Shocks

- Monetary expansion (permanent)
  - $AA$ shifts right
  - Above $XX$, so current account surplus
  - Note the effect of exchange rate depreciation, creating a surplus, dominates the effect of the increase in output, creating a deficit
- Fiscal expansion
  - $DD$ shifts right
  - if permanent $AA$ shifts down
  - Below $XX$, so current account deficit
  - Both exchange rate appreciation and possible output increase serve to decrease the current account balance
7 Other considerations

7.1 J - Curve

- real exchange rate depreciation immediately worsens the current account as prices react before quantities

- over time quantities adjust, and get effect in the model
7.2 Incomplete pass-through

- failure of the Law of One Price (LOOP)

- implies $q$ might not change with exchange rate as much as in our model