Chapter 17 Extensions
1. Full employment output

2. Additions to the DD curve

3. Shocks under extended model
1 Full Employment Output ($\bar{Y}$)

- Firm profit maximization in an open economy
  - Nominal profit
    
    $PAK^\alpha N^{1-\alpha} - WN - rP_kK \quad r = R - \pi^e$
  
  - CPI in an open economy contains prices of domestic goods and imported goods
    
    $CPI = P^\gamma (EP^*)^{1-\gamma}$
Note:

\[
\frac{P}{CPI} = \frac{P}{P^\gamma (EP^*)^{1-\gamma}} = \left( \frac{P}{EP^*} \right)^{1-\gamma} = \left( \frac{1}{q} \right)^{1-\gamma}
\]

\[w = \frac{W}{CPI}\]

Assume:

\[P_k = CPI\]
– Real profits

\[(\frac{1}{q})^{1-\gamma} AK^\alpha N^{1-\alpha} - wN - rK\]

– Firm’s labor demand

\[\left(\frac{1}{q}\right)^{1-\gamma} (1 - \alpha) AK^\alpha N^{-\alpha} = w\]

requires the marginal product of labor, adjusted for the real exchange rate equal the real wage.

– Labor demand shifts up with a fall in the real exchange rate (real appreciation).

• Full employment output rises with a fall in the real exchange rate
• Increase in the price of imported oil is an increase in $q$

  – Reduces the marginal products of capital and labor, reducing employment and desired capital

  – Real output falls

  – Acts like a negative technology shock in reducing marginal products and equilibrium input demands

  – Important that the increase in the price of imported oil is an increase in the real exchange rate
• Is a real appreciation good or bad for the economy?

  – Real appreciation makes domestic goods relatively more expensive shifting demand away

  – Real appreciation increases the purchasing power of domestic output over foreign goods, raising real income and equilibrium capital and labor
2 Goods Market Equilibrium

2.1 Additions to DD Curve

• Consumption

  – Budget constraint

    \[ C + \frac{C^f}{1 + r} = Y - T + \frac{Y^f - T^f}{1 + r} + a \quad r = R - \pi^e \]

  – Superscript \( f \) denotes future (continue to use superscript * for foreign)

  – Additional variables in consumption include \( R - \pi^e, a \), and \( Y^f - T^f \)

    \[ C \left( Y - T, Y^f - T^f, R - \pi^e, a \right) \]
• Investment

  – Demand for capital equates MPK and real interest rate

  – Additional variables in investment include \( R - \pi^e \) and expected future productivity \( A^e \)

• Current Account

  – Add foreign disposable income

\[
Y = C \left( Y - T, Y^f - T^f, R - \pi^e, a \right) + I \left( R - \pi^e, A^e \right) + G \\
+ CA \left( Y - T, Y^* - T^*, \frac{EP^*}{P} \right)
\]
2.2 No Changes to AA Curve

3 Model with Additions

real interest rate with interest rate parity

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

substitute interest rate parity into expressions for DD
\[ Y = C \left( Y - T, Y^f - T^f, R^* + \frac{E^e}{E} - \frac{P^e}{P}, a \right) + I \left( R^* + \frac{E^e}{E} - \frac{P^e}{P}, A^e \right) + G + CA \left( Y - T, Y^* - T^*, \frac{EP^*}{P} \right) \]

and AA

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

and have \( \bar{Y} \) decreasing in the long-run value for the real exchange rate.

\[ \bar{Y} = \bar{Y} (q, A) \]
4 Shocks

4.1 Permanent monetary expansion

- $E^e$ and $P^e$ both up so no need for $E$ to change to keep real interest rate unchanged

- Shift in $AA$ due to $E^e$ up and $M$ up as before

- Long-run characterized by monetary neutrality
4.2 Permanent fiscal expansion ($G$ and $G^f$ up)

- Government budget constraint

\[ G + \frac{G^f}{1 + r} = T + \frac{T^f}{1 + r} \]

- No direct effect of permanent expansion on DD unless we assume liquidity-constrained consumers

- Let's assume an effect on DD as before

- Consider effect through $q$
4.3 Shift in tastes toward domestic goods

- Short-run
  
  - Direct effect of $CA$ up

- Need $E^e$ and $P^e$

- $q$ falls

- Get $P^e$ from long-run money market equilibrium
  \[
  \frac{M}{P} = L(\bar{Y}, R^*)
  \]

- since $q$ falls, $E^e$ falls more than $P^e$ falls
• Long-run
  
  – Output rises due to fall in real exchange rate
  
  – \( P \) falls
4.4 Increase in expected future total factor productivity

• Short-run demand increases because investment and $Y^f - T^f$ rise

• Effects on $E^e$ and $P^e$

• Since $q$ rises, $E^e$ is ambiguous, but $P^e$ falls

• Long-run output increases