Chapter 16 Extensions
1. Full employment output

2. Additions to the DD curve

3. Shocks under extended model
1 Full Employment Output ($Y^f$)

- Firm profit maximization in an open economy

  - Nominal profit

$$PAK^\alpha N^{1-\alpha} - WN - rP_kK$$

  - CPI in an open economy contains prices of domestic goods and imported goods

$$CPI = P^\gamma (EP^*)^{1-\gamma}$$
Note:

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

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

Assume:

\[ P_k = CPI \]
- Real profits
  \[
  \left( \frac{1}{q} \right)^{1-\gamma} AK^{\alpha} N^{1-\alpha} - wN - rK
  \]

- 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
    \[ C + \frac{C^f}{1 + R} = Y - T + \frac{Y^f - T^f}{1 + R} + a \]
  - Additional variables in consumption include \( R, a, \) and \( Y^f - T^f \)
    \[ C\left(Y - T, Y^f - T^f, R, a\right) \]
• Investment

  – Demand for capital equates MPK and interest rate

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

• Current Account

  – Add foreign disposable income

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

3 Model with Additions

substitute interest rate parity into expressions for DD

\[ Y = C \left( Y - T, Y^f - T^f, R^* + \frac{E^e - E}{E}, a \right) + I \left( R^* + \frac{E^e - E}{E}, A^e \right) + G + CA \left( Y - T, Y^* - T^*, \frac{EP^*}{P} \right) \]
and AA

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

and have \( Y^f \) decreasing in the long-run value for the real exchange rate.

\[ Y^f = Y^f (q, A) \]

### 3.1 New shifts

- Many new variables shift DD

- Consider relative shifts in DD and AA due to \( E^e \)
4 Shocks

4.1 Permanent monetary expansion

- Reduction in interest rate and dollar depreciation raise domestic demand, increasing output in the short run

- Long-run characterized by monetary neutrality
4.2 Permanent fiscal expansion

- Government budget constraint

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

- No effect unless we assume liquidity-constrained consumers
4.3  Shift in tastes toward domestic goods

• Short-run

• Long-run
  
  – Output rises due to fall in real exchange rate

  – $P$ falls – why?
4.4 Increase in expected future total factor productivity

- Short-run demand increases because investment rises

- Long-run output increases