Open Economy 3: A Fixed Exchange Rate
Open Economy Model
1. How to peg the exchange rate

2. Fixed exchange rate IS-LM model

3. Shocks

4. Currency crises
1 How To Peg the Exchange Rate

- Example - let’s say Mexico decides to peg the peso to the dollar
  - First, it must acquire dollar reserves
  - Then, it must be willing to buy or sell any amount of dollars for pesos at the fixed exchange rate
  - If agents decide they want to sell pesos, then the monetary authority must buy them using its dollar reserves
  - Exchange rate pegging ends
    * Whenever the government chooses to cease the pegging operation
    * Or if it runs out of dollar reserves and can’t borrow more reserves
• Currency board - country holds reserves equal to its monetary base
  – Cannot run out of reserves
  – Could still choose to end the peg

• When a peg ends, the country can
  – devalue its exchange rate (like depreciation)
  – or revalue it (like appreciation)
  – or let it float so the market determines its price
• Interest rate parity and an exchange rate peg ($\tilde{E}$)

$$1 + i = (1 + i^*) \frac{\tilde{E}}{E^e_{t+1}}$$

if the exchange peg is credible then $E^e_{t+1} = \tilde{E}$, and

$$i = i^*$$

even in the short run.

• Monetary authority must adjust the money supply, shifting LM, to keep $i = i^*$.

• Since $\epsilon$ can change over time, due to changes in the price level, it is not necessary for $r$ to equal $r^*$ in the short-run. However, in the long-run $r = r^*$. 
• Intuition

– Mexico wants to reduce its nominal interest rate by increasing its money supply (sell money and buy bonds - LM shifts right)

– With a fixed exchange rate, no one would want Mexican assets with an interest rate lower than the world rate.

* Sell Mexican bonds for pesos

* Take pesos to central bank and buy dollars

* Central bank buys the pesos reducing the money supply, shifting LM back

– A country with a fixed exchange rate and capital mobility \((i = i^*)\) cannot shift its LM curve - even in the SR
• **Trilemma**: A country can choose two of the following three

  – Freely mobile capital (no capital controls)
  
  – Fixed exchange rates
  
  – Monetary policy freedom
2 Fixed Exchange Rate IS-LM-FE model

- Use nominal interest rate since nominal interest rate parity is a constraint on monetary policy

- IS curve with the nominal interest rate and a fixed exchange rate

\[ Y = C (Y - T, Y^f - T^f, i - \pi^e, a) + I (i - \pi^e, A^e) + G + N X \left( Y, Y^*, \frac{\tilde{E}P}{P^*} \right) \]

  - Assume \( \pi^e \) is fixed – an increase in \( \pi^e \) reduces the real interest rate for a given nominal rate, increasing \( I \), shifting IS right

  - A change in \( \epsilon = \frac{\tilde{E}P}{P^*} \) shifts the IS curve
• LM curve with the nominal interest rate

\[
\frac{M}{P} = L(Y, i)
\]

where, for a credible fixed rate regime

\[
i = i^\ast
\]

• FE is vertical at \( \bar{Y} \)

• Shifts right with increase in

  - \( A \)
  - \( \epsilon = \frac{\tilde{\epsilon} P}{P^*} \).
3 Shocks

- Transitory increase in $A$ (lasts long enough for prices to adjust, but not long enough to build new capital)
  - Increase in $A$ raises MPN, increasing $\bar{N}$, and shifting FE right
  - SR equilibrium occurs at intersection of original IS and LM, so no change in SR
– Over time $P$ falls
  * shifting LM right
  * and reducing the relative price of domestic goods $(\epsilon = \frac{\bar{E}P}{P^*})$
    - shifting IS right
    - shifting FE left

– LR equilibrium must occur at the same $i^*$ and a lower $P$ and a higher $Y$

– Compared with flexible rates, the fall in $P$ (coupled with money supply changes to keep $i = i^*$) must reduce $\bar{\epsilon}$.
World taste shift in favor of domestic goods

- Taste change raises NX, shifting IS right
- To keep the domestic interest rate from rising (and the currency from appreciating) the monetary authority must increase money supply must increase, shifting LM to intersect IS at $i^*$. 
- Intuition - as $i$ tends to rise, agents sell foreign currency to the domestic bank, buying domestic currency to buy domestic bonds
- SR equilibrium occurs at the intersection of IS and LM at $i^*$, implying that $Y$ rises.
- Note the larger increase in $Y$ compared with flexible exchange rates because $\frac{\bar{E}P}{P^*}$ does not increase in the SR
– Over time $P$ rises

  * shifting LM left
  
  * and increasing the relative price of domestic goods
    
    · shifting IS left
    
    · shifting FE right

  * LR equilibrium must occur at $i^*$ and a lower $P$.

  * $Y$ is higher than initially, but lower than SR
• Increase in $M$
  – not possible because would reduce $i$
  – monetary authority must buy any increase in $M$ back using foreign exchange reserves to keep the exchange rate pegged

• Exchange rate depreciation $\tilde{E}$ decreases
  – This directly reduces $\epsilon$, raising $NX$, shifting IS right
  – To keep the interest rate from rising, monetary authority must increase the money supply, shifting LM right
  – No long-run real effects - over time $P$ rises, shifting LM and IS left
  – China and undervalued real exchange rate?
• Decrease in $E_{t+1}^e$ - expect a devaluation

  – Shifts interest rate line up – agents are unwilling to hold domestic bonds unless their interest rate rises enough to compensate for expected depreciation

  – Sell domestic bonds for pesos and take pesos to central bank and buy dollars

  – Central bank purchases pesos, reducing the money supply and shifting LM left until equilibrium is reached at interest rate parity

  – equilibrium occurs at the intersection of IS and LM at lower output and at a higher nominal interest rate such that $1 + i = (1 + i^*) \frac{\tilde{E}}{E_{t+1}^e}$
4 Currency Crises

- Why would $E_{t+1}^e$ fall?
  - Consider a taste change away from domestic goods which causes a recession
    * The recession will end only after domestic price has fallen enough to shift the IS curve out
    * The government could devalue the currency immediately, shifting the IS curve out, ending the recession
    * People know this and begin to expect a devaluation whenever a country is in a major recession
      - Why major?
– As an alternative, assume that the government gets out of the recession by raising $G$, but not $T$

* IS shifts back to FE, LM shifts back, and the recession ends

* But, let’s say the government has a lot of debt and either does not want to issue more or cannot issue more

* It pays for the $G$ by printing money, not just currently, but in every period, shifting LM right repeatedly

* The domestic interest tends to fall, causing agents to sell domestic assets for domestic currency and to sell the domestic currency to the central bank for foreign currency

* The central bank must use its reserves of foreign currency to buy the domestic currency shifting LM back, such that $i$ remains at $i^*$
* But if the government wants to keep $G$ higher than $T$, it shifts LM right again, and the process repeats

* The government is financing its deficit with its reserves and running them down

* As reserves get low, agents begin to expect devaluation
Assume that the government continually pays for its deficit by issuing government debt

* Lenders impose a default risk premium on domestic government raising its interest rate and causing recession

* With high external debt and recession, agents begin to expect devaluation

The decrease in $E_{t+1}^e$ creates a recession (or makes an existing recession worse) unless the monetary authority devalues
• Consequences of crisis with devaluation

  – Model says that devaluation is expansionary because IS shifts right
    * When devaluation is not accompanied by a financial crisis, it tends to be expansionary in the data

  – Other times lose ability to borrow internationally, so become a closed economy
    * Forces adjustment of \( C + I + G = Y \)
    * Do not get large expansion of \( Y \) as might expect if prices are sticky
    * Get a recession due to disruption of financial markets and impact on consumption and investment
5 Benefits of Fixed Exchange Rates

- Reduce exchange rate volatility (because flexible rates are volatile), reducing costs of international trade

- If monetary policy is very inflationary, might be good to substitute a foreign monetary policy for the domestic one

- Currency union, like the EMU, can reduce transactions costs associated with using multiple small currencies

- Dollarization – give up national currency and use the US dollar – reduction in transactions costs due to choosing the most liquid international currency
6 Costs of Fixed Exchange Rates

- Lose monetary policy
- Exchange rate crises
- If dollarization, lose right to print money and buy goods and services (seigniorage)