Business Cycles in the Open Economy

Mundell-Fleming with Fixed Exchange Rates

Andrew Rose, Global Macroeconomics 10
Three Important Assumptions

• Prices are *Sticky*
  – Business Cycle Model, Short Run

• Capital is Internationally *Mobile* – No Substantial Barriers to Private Capital Flows
  – Rich countries, some emerging markets (but only recently)

• Nominal Exchange Rates *fixed* by Central Bank
  – Some economies, though more have fixed in past
Add Net Exports to Real Economy (IS)

• Recall that net exports (\(NX \equiv X-M\); current account) determined by:
  1. Domestic output \(Y\), raises imports (\(M\))
  2. Foreign output \(Y^*\) (assumed to be exogenous, since foreign), raises exports (\(X\))
  3. Real exchange rate \(\varepsilon\) (\(\varepsilon \equiv eP/P^*\)), “competitiveness” affects both \(X\) and \(M\)
Add Net Exports to Real Economy (IS)

- Thus IS now: $Y = A(G, i, Y) + NX(\varepsilon, Y, Y^*)$
  - $A$ is domestic absorption
Financial Equilibrium (LM): What is a Fixed Exchange Rate?

• *Nominal* exchange rate fixed, so real exchange rate \((\varepsilon = \frac{eP}{P^*})\) fixed in short run

• *Fixed Exchange Rate Regime* \(\Leftrightarrow\) authorities take either side of FX transaction in unlimited quantity
Fixed Exchange Rate Regime

• The “Authorities”: Government chooses to fix exchange rate (or not); Central Bank enacts policy
  – Fix: Authorities promise to use international reserves to take either side of any FX transaction in any size at fixed exchange rate (or within bands)
  – Hence fix may affect IR, HPM, thus money supply
Financial Equilibrium

• LM looks same but not under complete control of Central Bank
  – Recall $M = \mu \ast HPM; HPM = (IR + CBC); IR$ used to fix exchange rate
Balance of Payments (BoP)

- Recall: \( \text{c/acc} + \text{k/acc} + \text{ORS} = 0 \)
  - Current Account given by net exports (NX)
  - Capital Account – private capital flows
  - ORS – authorities must keep exchange rate fixed
    - “Credible Fix” is expected to remain fixed
    - Can loosen assumption, allow “imperfect credibility”
Capital Mobility 1

• Assume capital can flow freely without (serious) restrictions between the small open (home) economy and large (“center” or “anchor”) neighbor (US/EMU)

• Assume domestic & foreign bonds “perfect substitutes,” identical in liquidity, maturity, taxes, risk...
  – Can also easily add country risk premium

• Also assume nominal exchange rate is fixed and expected to stay fixed (“credible fix”)
Capital Mobility 2

- Conclude: perfect capital mobility implies supply and demand curves infinitely elastic at $i=i^*$
  - If $i>i^*$ capital flows in quickly and massively (capital account surplus since we sell bonds to foreigners)

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Summary: Mundell-Fleming Model

• Real economy (IS)
  – *Looks* same as before, *but NX added* (foreign income and real exchange rate fixed)

• Financial markets (LM)
  – *Looks* same as before, *though now money is endogenous* (international reserves used to defend exchange rate, affect money supply)

• Balance of Payments (BoP)
  – New: horizontal because of capital mobility: $i=i^*$
Formally

- **IS**: \( Y = A(G,i,Y) + NX(\varepsilon,Y,Y^*) \)
  
  where \( A = \{1/(1 - c(1-t))\}*[C_0 + cTr + l_0 - bi + G_0] \),
  
  and \( \varepsilon,Y^* \) exogenous

- **LM**: \( M_s/P = L(i, Y) \)
  
  where \( M_s = \mu \cdot HPM = \mu \cdot (IR + CBC) \)

- **BoP**: \( c/acc + k/acc + ORS = 0 \)
Graphically

**LM:** \( \frac{M_s}{P} = L(i, Y) \), where
\[
M_s = \mu \times HPM = \mu \times (IR + CBC)
\]

**IS:**
\[
Y = A(G, i, Y) + NX(\varepsilon, Y, Y^*), \text{ where}
\]
\[
A = \frac{1}{1 - c(1 - t)} (G_0 + cTr + I_0 - bi + G_0)
\]
and \( \varepsilon, Y^* \text{ exogenous} \)

**BoP:**
\[
c/acc + k/acc + ORS = 0
\]
Monetary Policy (LM) Shock

- Expansionary Open Market Operation (CBC↑)
- Leads to i↓, capital outflows, intervention
Enduring Effect

• Note that central bank can only change \textit{composition} of high-powered money since it defends fixed exchange rate ($\text{IR} \downarrow$) to offset capital outflow (HPM and $M^s$ unchanged)
Key Concept: Mundell’s *Incompatible/Holy Trinity*

- The following are individually desirable but mutually incompatible:
  1. Independent national monetary policy ("Monetary Sovereignty")
  2. Perfect capital mobility
  3. Fixed/stable exchange rates

- Different countries make different “sacrifices” and choices also change over time
Fiscal Policy

- $G \uparrow$ (debt-financed) leads to capital inflows, $IR \uparrow$, $HPM \uparrow$, $M^s \uparrow$ and $Y \uparrow$
Enduring Effect

• Highly potent (no “crowding out” since interest rates given from abroad)

• Changes composition of output (G↑, NX↓)
  – Can explain “twin deficits” of government, c/acc
Foreign (Interest Rate) Shock

• Foreign (large country) interest rate rise ($i^* \uparrow$)
  – BoP schedule shifts up
Foreign Shocks, Continued

• Role in crises/regime switch
  – Mexico 1994, EMS 1992

• Sterilization of reserve flows: offsetting change in international reserves with equal and opposite change in central bank credit
  – As IR falls, CBC rises 1:1
  – HPM unchanged
  – Only possible temporarily
Notes

• Can generalize (im-) potency of monetary/fiscal shocks to all financial/real shocks

• Can allow for imperfect capital mobility with upwards sloping BoP (must raise interest rates above foreign to attract inflows)
  – One way to model a “large” country
Key Takeaways

• Credible fixes constrain monetary policy
• Real shocks have large effects during fixes
• Mundell’s Trilemma: tradeoffs between open capital markets, stable exchange rates, and monetary sovereignty