Chapter 10 : Money in the Open Economy

EE312

Macroeconomics, Stephen Wiliamson, Chapter 18,6

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The foreign exchange market

- Domestic currency is traded for foreign currency.
- The nominal exchange rate (e): the price of one unit of foreign currency in terms of domestic currency.
  - P = the price of domestic goods in the unit of domestic currency.
  - P*= the price of foreign goods in the unit of foreign currency.

The real exchange rate

- eP* = the price of foreign goods in the unit of domestic currency. The real exchange rate (the terms of trade) is the price of foreign goods in terms of domestic goods:

$$\text{Real Exchange Rate} = \frac{eP^*}{P}$$

The purchasing power parity (PPP)

- Assume zero transport cost and no trade barriers.
- If $eP^* > P$, domestic goods are cheaper.
  - Foreigners buy more domestic goods; P is rising.
- If $eP^* < P$, foreign goods are cheaper.
  - Domestic consumers buy more foreign goods; P is falling.
- **The law of one price**: $P = eP^*$.

Traded and non-traded goods

- PPP holds in the case of **traded goods** with low transport cost, e.g., crude oil.
- PPP may not hold with **non-traded goods** (due to physical and legal barriers), e.g., services.
- Strong market forces push foreign and domestic prices towards PPP.
    - Physical and legal barriers tend to be overcome by consumers and firms — **international arbitrage**.

Deviation from PPP

- If PPP holds, the real exchange rate is fixed over time.
- The nominal exchange rate deviates from the real exchange rate:
  - Some inputs are non-traded goods.
  - Labor is immobile.
  - Existing trade barriers.

- The real exchange rate implied by PPP is treated as the long-run equilibrium rate.
- **Ex**: Item X is an internationally-traded good.
  - **The US**: the price of X is $10.
  - **Thailand**: the price of X THB200.
  - The PPP rate: THB200/$10 = THB20/$1.
  - But the nominal rate is THB30/$1. S
  - o the Thai baht is undervalued by 33%!
- **The Big Mac Index** by the Economist.

The exchange rate regimes

- Flexible (or floating) exchange rate system:
  - The nominal exchange rate is determined by market forces.
  - **Purely floating**: no intervention by the central bank.
  - **Dirty floating**: occasional interventions by the central bank to reduce short-run fragility.
  - Direct intervention in the FX market.
  - Indirect intervention through fiscal and monetary policies.

Fixed exchange rate system

- **Hard pegs**: the value of domestic currency is fixed relative to foreign currency for the indefinite future.
  - **Dollarization**: use foreign currency as the national medium of exchange (East Timor, Ecuador, El Salvador, Panama).
  - **Currency board:** the central bank fixes the nominal exchange rate, then buys and sells foreign-denominated assets to maintain the rate (Bosnia, Bulgaria, Denmark, Hong Kong, Lithuania).

- **Soft pegs**: no permanent fixed rate.
  - The nominal rate is fixed for a long time period.
  - Periodic adjustment to correct imbalances: devaluation (raising e) or revaluation (reducing e).
- **Gold exchange standard** (Bretton Woods arrangement, 1944-1971).
  - The International Monetary Fund (IMF) as the international lender of last resort.
  - Occasional balance-of-payments crises and devaluation.

Small-open economy with flexible exchange rate

- The economy faces a given world real interest rate and free foreign trade.
- The output supply curve (Y^s) has a positive slope.
  - Equilibrium in the labor market; labor supply is influenced by the real interest rate.
  - A given aggregate production function.

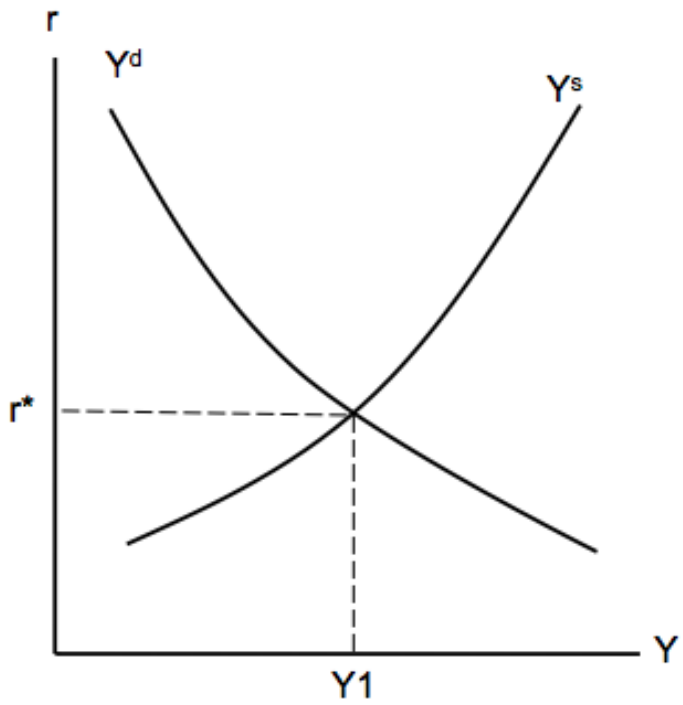
Demand for current goods

$$Y = C + I + G + NX$$

- Domestic absorption = C + I + G C,
  - I are determined by the real interest rate.
- NX = net exports.
  - NX > 0; the CA surplus.
  - NX < 0; the CA deficit.
- The output demand curve (Y^d) has a negative slope.

The goods market

- The world real interest rate (r*) is given.
- The CA adjusts so that Y^d intersects Y^s at r* and Y1.



The demand for nominal balances

- Assume PPP holds: P = eP* .
  - P* is given in the world market.
  - P and e are endogenous variables.
- The demand for nominal money balances:
  - Y = real output; r* = the world real interest rate.

$$M^d = PL(Y, r^*) ,$$

where $\frac{\partial M^d}{\partial Y} > 0$ and $\frac{\partial M^d}{\partial r} < 0$

- Assume PPP holds, no money growth (and zero inflation).
- Where P = eP* The nominal money supply Ms = M.

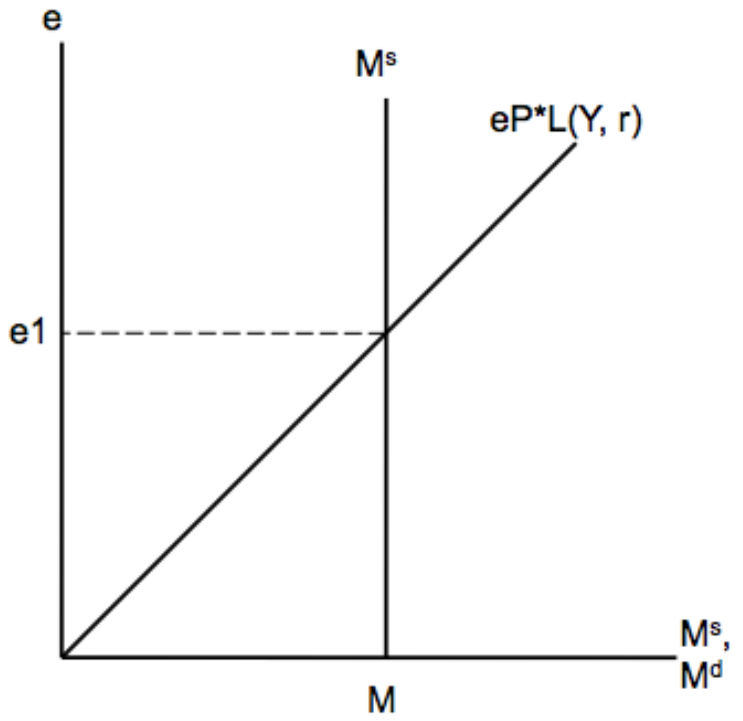
$$M^d = eP^* L(Y, r^*)$$

$$M^d = M^s$$

$$M = eP^* L(Y, r^*)$$

The money market

- Given the nominal M^s= M, the nominal money demand determines the nominal exchange rate at e1.



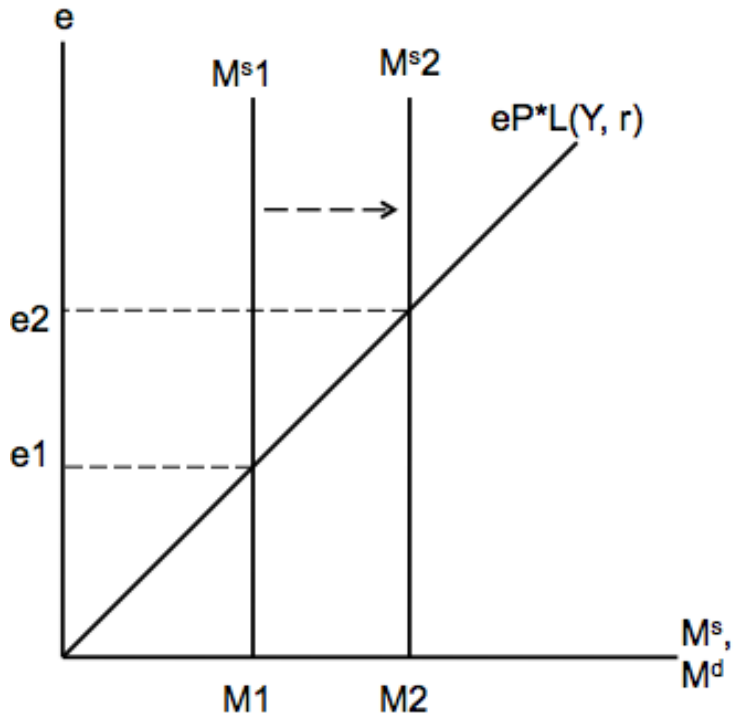
The neutrality of money

- The increase in the nominal money supply (M^s) raises the domestic price (P) and the nominal exchange rate (e) by the same proportion.
  - No change in real variables (employment, the real wage, output, the current account surplus, consumption, investment).

$$\frac{M}{e} = P^* L(Y, r^*)$$

Depreciation of the currency

- An increase in M^s causes the depreciation of domestic currency (higher e) by the same proportion.



Short-run non-neutral money

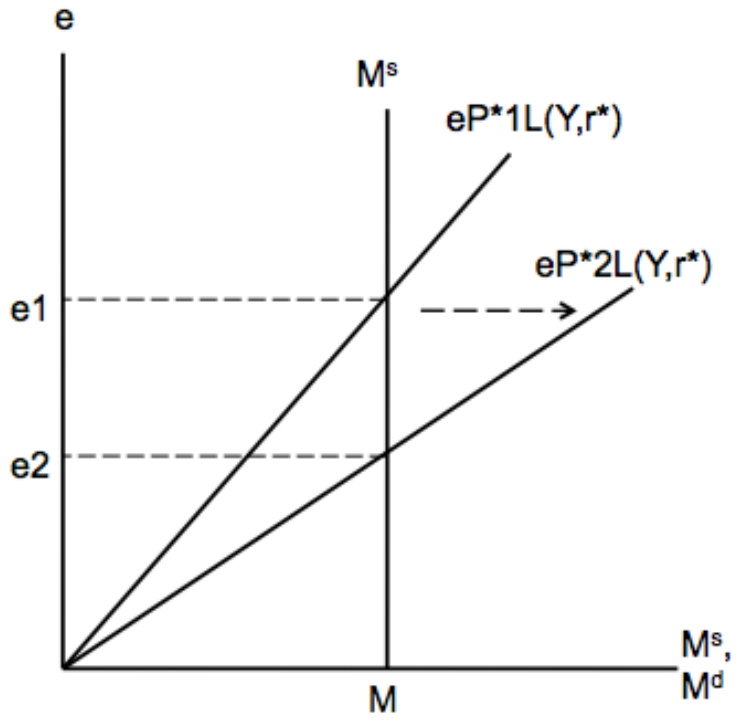
- But money may not be neutral in the short run.
  - The money surprise mechanism.
  - Frictions in the labor market (sticky wages).
  - Frictions in the goods market (sticky prices).

An increase in the world price

- The world price (P*) increases (due to a rise in the foreign nominal money supply).
  - The nominal money demand increases.
  - The nominal exchange rate (e) decreases.
  - No change in the domestic price (P) and real variables.
- The flexible exchange rate insulates the domestic economy from temporary foreign inflation.

Appreciation of the currency

- Higher P* causes an increase in nominal money demand.
- Domestic currency appreciates (lower e).

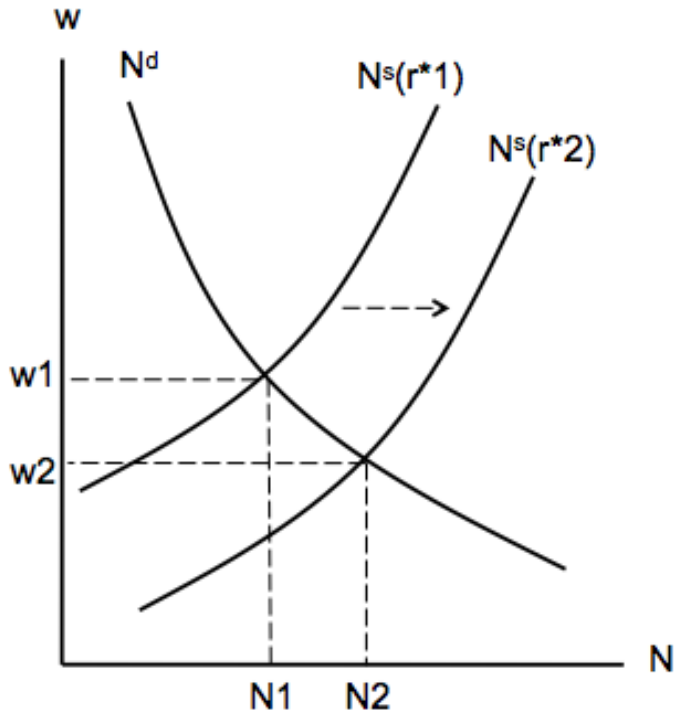


A real shock from abroad

- An increase in the world r* due to the world's falling total factor productivity.
  - Leisure decreases and labor supply increases.
  - Output increases (along the Y^s curve).
  - Investment decreases; consumption is unclear (higher r* reduces but higher income increases it).
  - Domestic absorption increases less the increased output.
  - The CA surplus increases (Y^d curve shifts right).

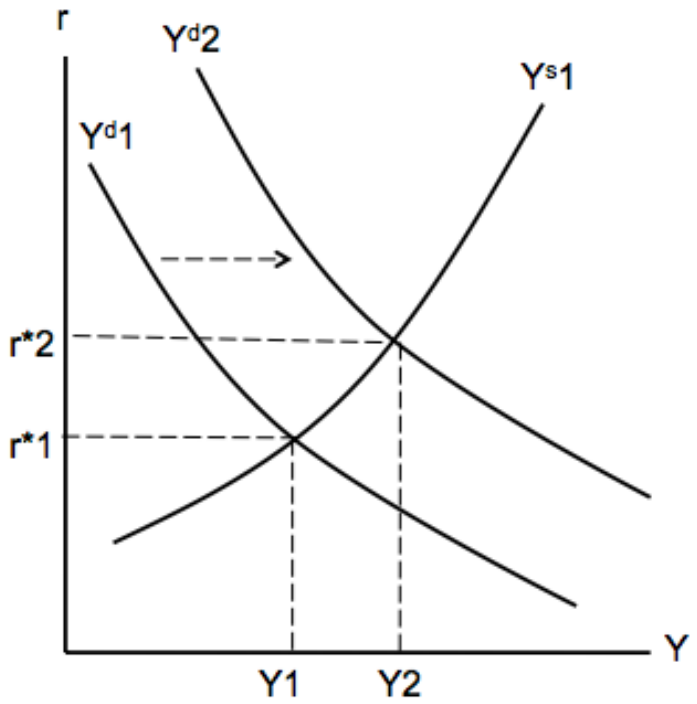
A higher r* induces labor supply

- An increase in the world real interest rate induces more labor supply.



A real foreign shock on the goods market

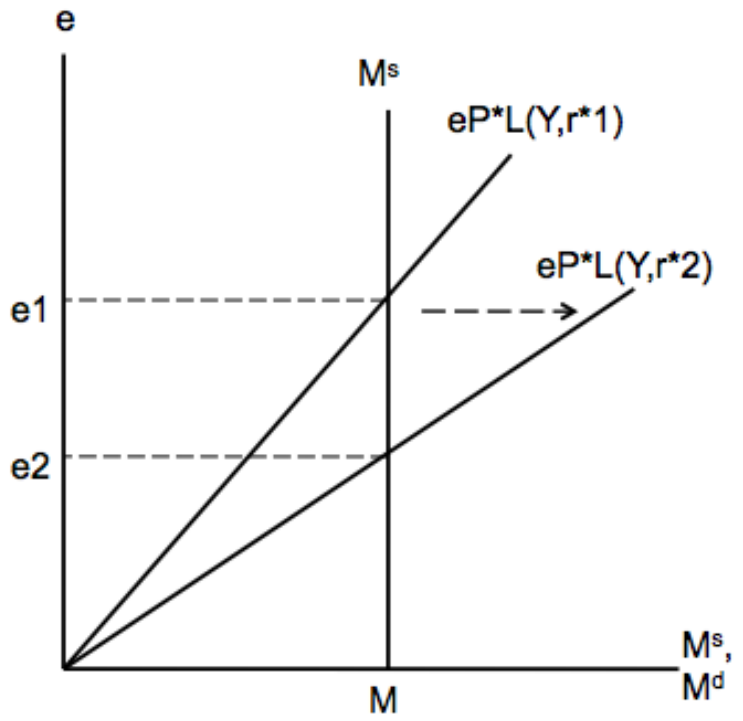
- Labor supply increases; output rises from Y1 to Y2.
- Domestic absorption increases less than output; the CA surplus increases.



- An increase in the world real interest rate affects the demand for money.
- Higher income increases but higher real interest rate decreases money demand.
- If money demand is more sensitive to income, the M^d curve shifts right.
- The nominal exchange rate (e) falls; domestic currency appreciates.
- If PPP holds (P = eP*), the domestic price falls.
- The flexible exchange rate system does not insulate the economy from foreign shocks.

A real foreign shock on the money market

- The net effect of the higher r* and larger output raises money demand.
- The exchange rate and the domestic price fall.



Small-open economy with fixed exchange rate

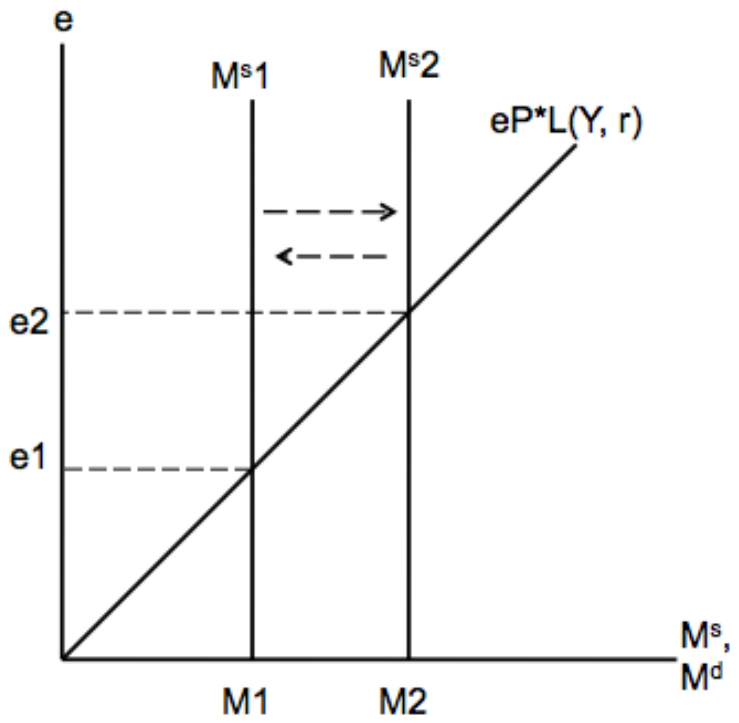
- The central bank sets the nominal exchange rate at a fixed level (e1).
  - It stands ready to buy or sell foreign currency at the fixed rate using its foreign exchange reserves.
  - If the market e rises above e1, the central bank sells foreign currency from its reserves.
  - If the market e drops below e1, the central bank buys foreign currency into its reserves.

Loss of money supply control

- The central bank cannot pursue an independent monetary policy under the fixed exchange rate regime.
  - If it increases Ms, the nominal exchange rate rises, forcing it to sell foreign currency and reduce Ms.
  - If it decreases Ms, e drops, forcing it to buy foreign currency and increase Ms.
- A fixed exchange rate does not insulate the economy from foreign nominal shocks.

Fixed exchange rate and Ms

- The central bank increases M1 to M2, causing e1 to drop to e2.
- To keep e at e1, the central bank has to sell FX and reduce M2 to M1.

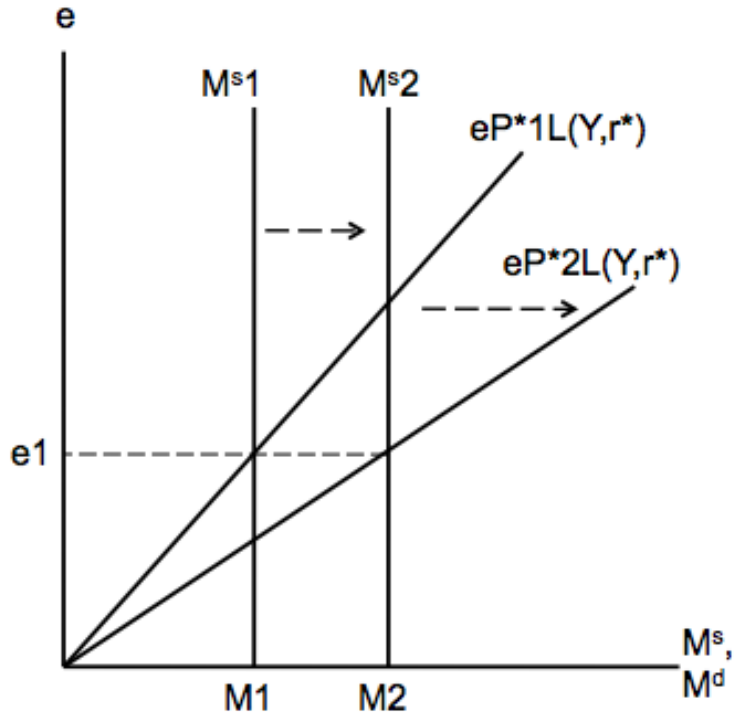


A nominal foreign shock

- The world price (P*) rises; money demand shifts to the right.
  - Downward pressure on the exchange rate to fall (domestic currency to appreciate).
- The central bank must sell domestic currency to maintain the official exchange rate (e1).
  - Money supply expands.
  - The domestic price increases proportionally to the world price — world inflation is imported.

Rising world price

- The world price P*1 rises to P*2.
- Money demand shifts right.
- Central bank must raise M1 to M2 to fix the rate at e1.
- $\Delta P = \Delta P^*$

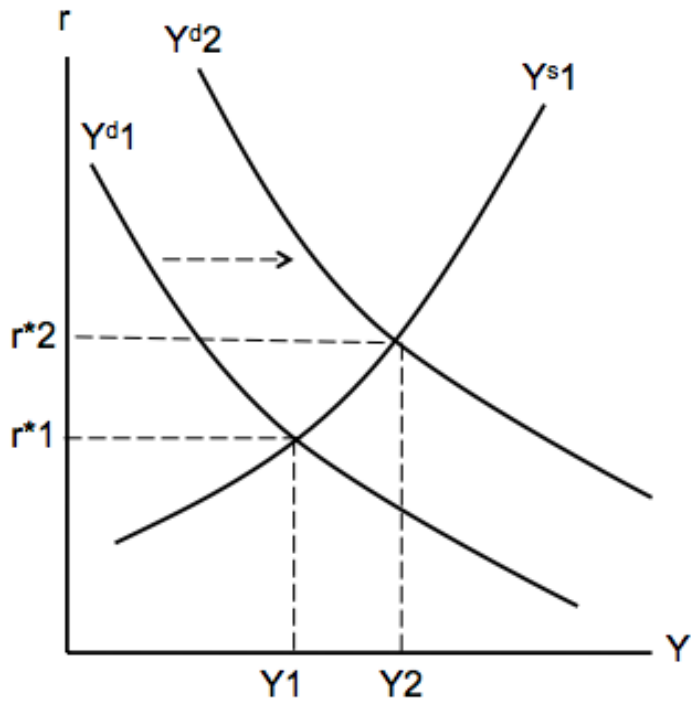


A real foreign shock

- An increase in the world real interest rate shifts output demand (Y^d) to the right.
- Investment decreases. Consumption may increase (larger Y) or decrease (higher r*).
- The current account surplus increases as domestic absorption decreases (Y^d shifts right).
- Labor supply increases as leisure decreases.

A real foreign shock on the goods market

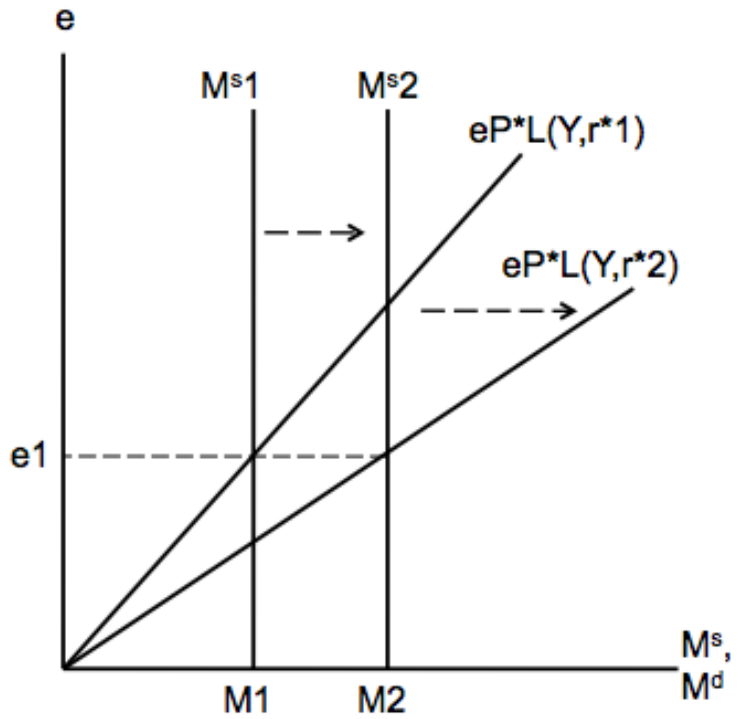
- Y^d shifts right as r* increases.
- Domestic absorption decreases; the CA surplus increases.
- Output and income increase.



- The higher world real interest rate raises the money demand.
  - Assuming the income effect being larger than the interest rate effect.
  - Money demand shifts to the right.
  - Downward pressure on e1 to fall (domestic currency to appreciate).
- The central bank must increase money supply to keep e1.
  - Domestic price (P) is the same as both e and P* are the same — price insulation from real foreign shock.

A real foreign shock on the money market

- The higher r* shifts M^d right.
- The central bank must raise M1 to M2 to keep e1.
- No change in the domestic price.

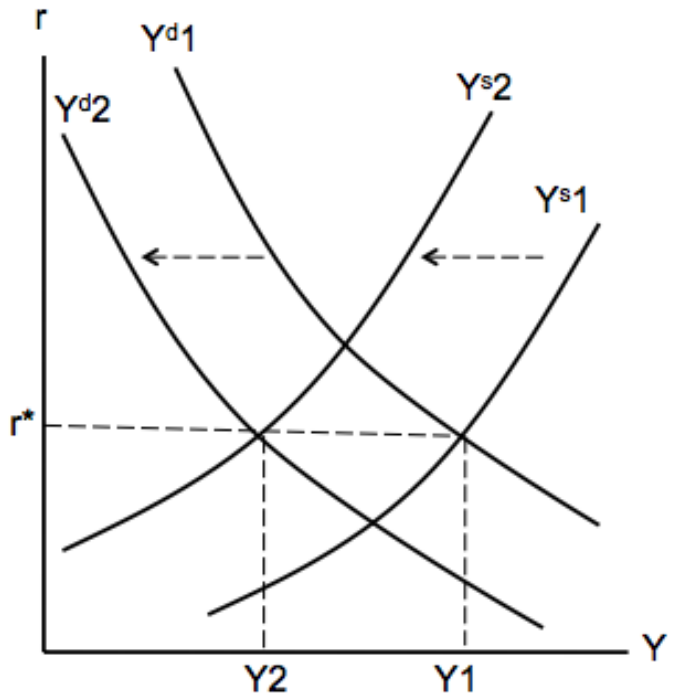


Exchange rate devaluation

- The central bank may use currency devaluation to prevent a loss of foreign exchange reserves due to domestic shocks.
- A temporary decrease in domestic total factor productivity (z) reduces employment and output (Y^s shifts left).
  - Consumption and the current account surplus decrease (Y^d shifts left).
  - Output and income drops while r* is given.

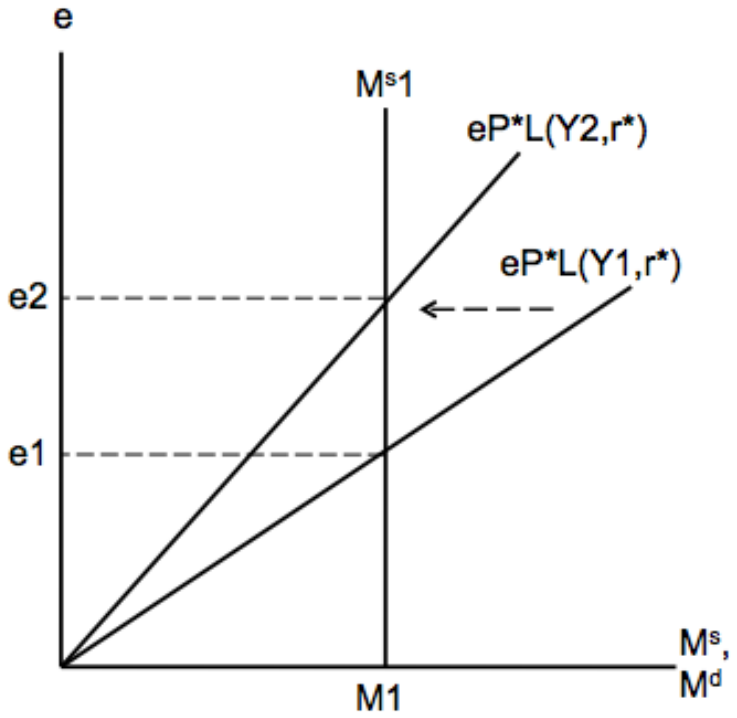
Falling z in the goods market

- A fall in z shifts Y^s to the left.
- Lower consumption and CA surplus shift Y^d to left.
- Output falls, given r*.



Falling z in the money market

- Lower income reduces money demand (M^d shifts left).
- The exchange rate is rising to e2.

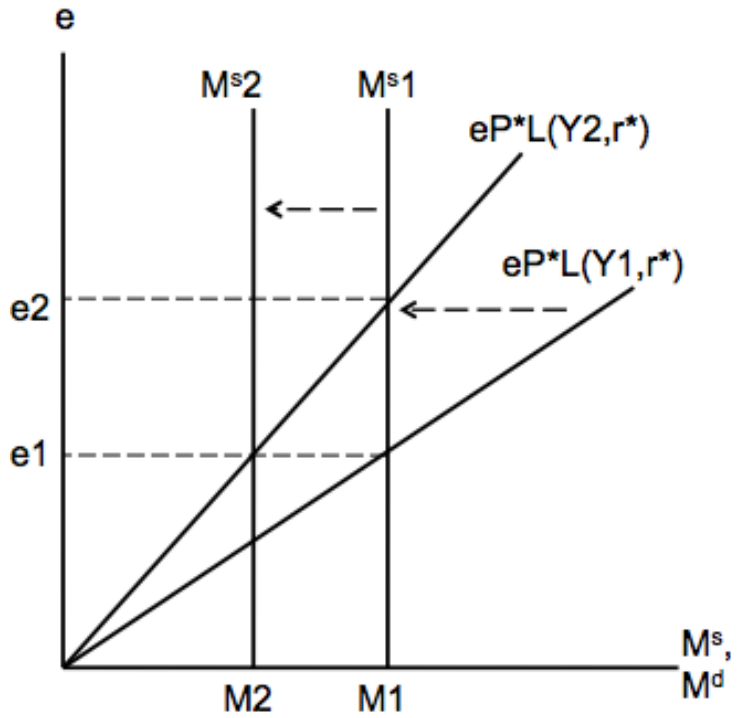


Reserves loss with fixed exchange rate

- Lower output reduces money demand.
  - Upward pressure on e1 to rise (domestic currency to depreciate).
  - The central bank must sell foreign exchange (to reduce the money supply and fix the rate at e1).
  - But there is a limit on the foreign exchange reserves — **the balance of payments crisis!**
- The central bank announces a new fixed rate at the higher e2 — **currency devaluation.**

An FX loss or a higher e?

- Lower output reduces M^d. M1 must drop to M2 to keep e1 with FX losses.
- Or to fix the new rate at e2 — devaluation.



Devaluation and the current account

- The real exchange rate is determined by PPP.
  - Currency devaluation might reduces a current account deficit in the short run.
  - But the long run rate is still PPP; the CA deficit remains.
  - Costs of devaluation — **foreign debt!**
- The CA deficit is caused by real factors:
  - Excessive government spending — spending cut.

Flexible or fixed exchange rates?

- The exchange rate regime affects how the economy is insulated from foreign shocks.
  - Policy priority — price or income stability.
- **Flexible exchange rate**:
  - Nominal foreign shocks affects the nominal exchange rate with no effect on output.
  - Real foreign shocks affects both the nominal exchange rate, the domestic price and output.
  - Price stability against nominal foreign shocks.

- **Fixed exchange rate:**
  - Nominal foreign shocks affect the domestic price, with no effect on output.
  - Real foreign shocks affects output with no effect on the domestic price.
  - Price stability against real foreign shocks.
- Independent monetary policy requires the flexible exchange rate.
  - The central bank's capability, information and political independence?
  - Fixed exchange rate forces the central bank to adopt foreign monetary policy and inflation.

The capital account

- The capital account includes all transactions in assets.
  - **Capital inflow**: foreign purchases of domestic assets.
  - **Capital outflow**: resident purchases of foreign assets.
  - **Portfolio investment**: purchases of financial assets (debts and equity instruments).
  - **Direct investment**: acquisition of physical assets.

The balance of payments

- BP = CA + KA
- BP = the balance of payments;
- CA = the current account;
- KA = the capital account.
- With the flexible exchange rate, the central bank does not intervene in the FX market:
- KA = -CA where BP = 0.

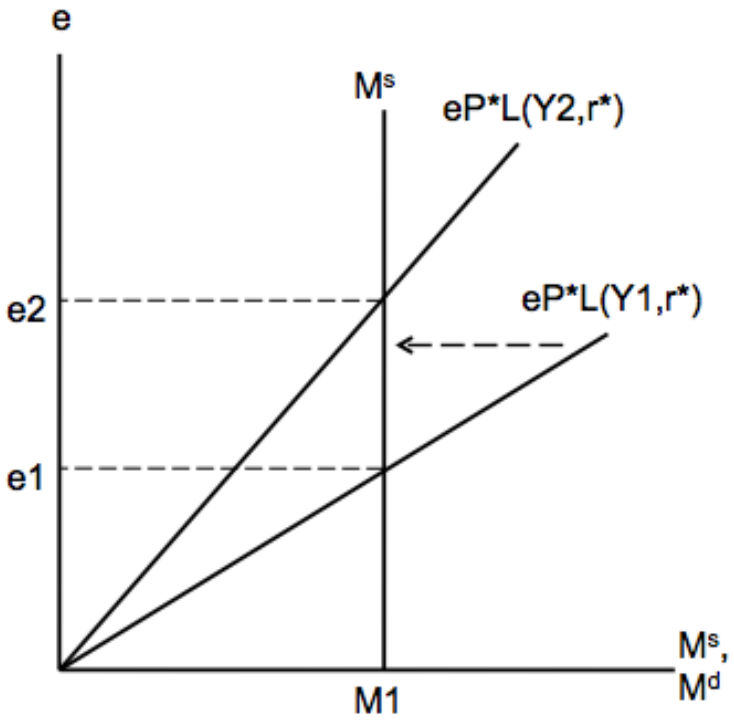
Capital controls

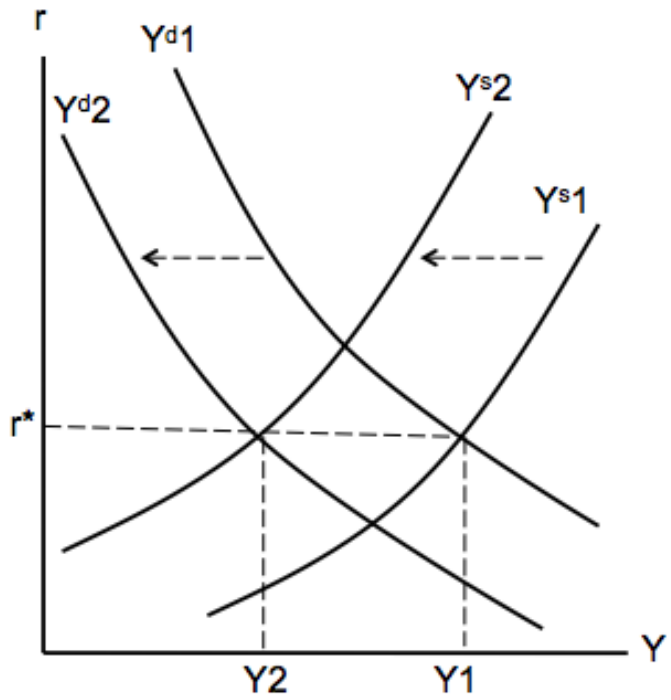
- Government's restrictions on the trade of assets across borders.
  - Mostly controls of foreign portfolio inflows and outflows (i.e., short-term capital).
  - Sometimes on foreign direct investment (foreign shareholding of domestic shares).
- Aims are to modify the economy's response to a shock — more stability.
  - Welfare loss and distortion.

Negative shock to domestic z

- A temporary decrease in domestic total factor productivity with no capital control:
  - Output supply (Y^s) shifts left; output falls.
  - The current account decreases; output demand (Y^d) shifts left.
  - Output and income drops, given the world real interest rate (r*).
  - Lower output reduces money demand; the exchange rate increases (domestic currency to depreciate).

A temporary drop in z (no capital control)



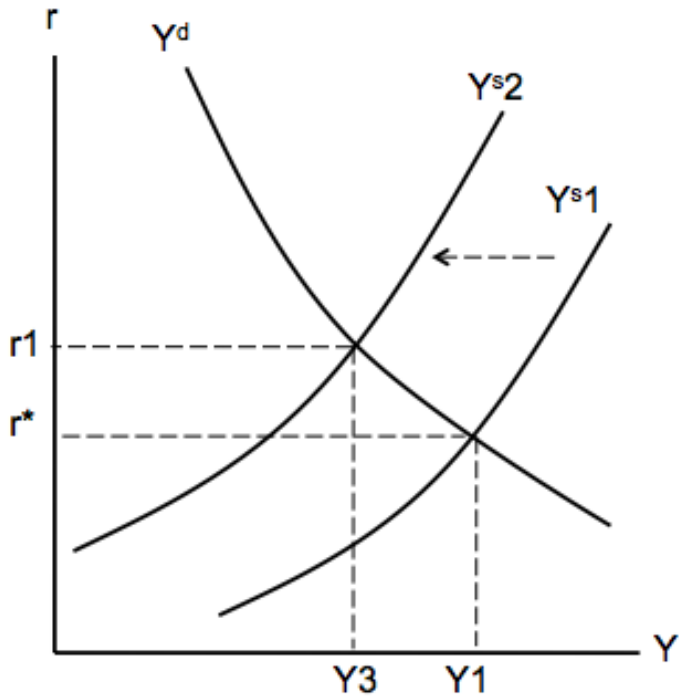


A drop in z with capital controls

- Capital controls on both inflow and outflow.
  - The capital account is always in zero.
  - The current account is thus always in zero.
- A temporary decrease in z reduces output supply; Y^s shifts left.
  - The domestic interest rate (r1) rises above the world real interest rate (r*).
  - Foreign investors cannot invest in domestic assets.
  - Output drops less than without capital controls.

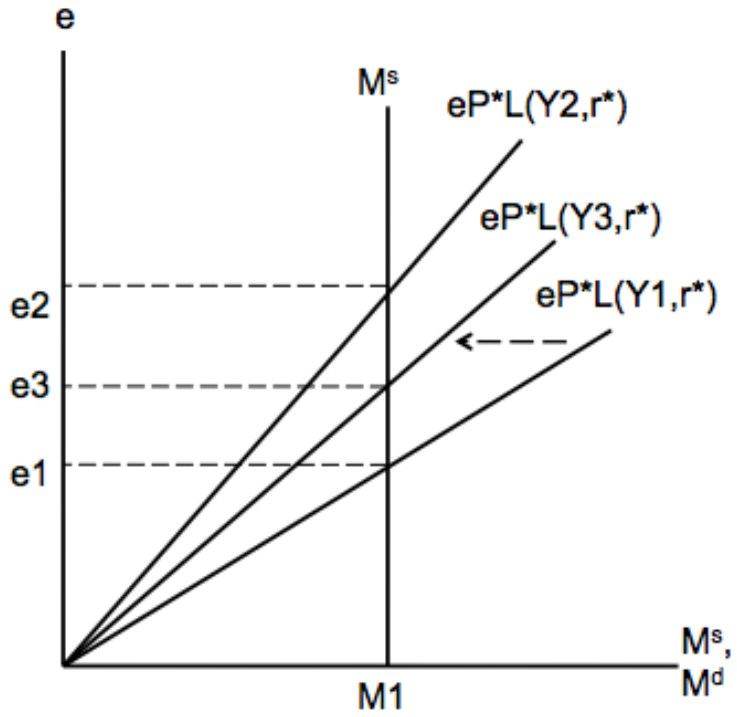
Less output loss with capital controls

- A temporary drop in z shifts Y^s left.
- The CA and KA remain the same.
- Output drops from Y1 to Y3 due to lower consumption and investment.



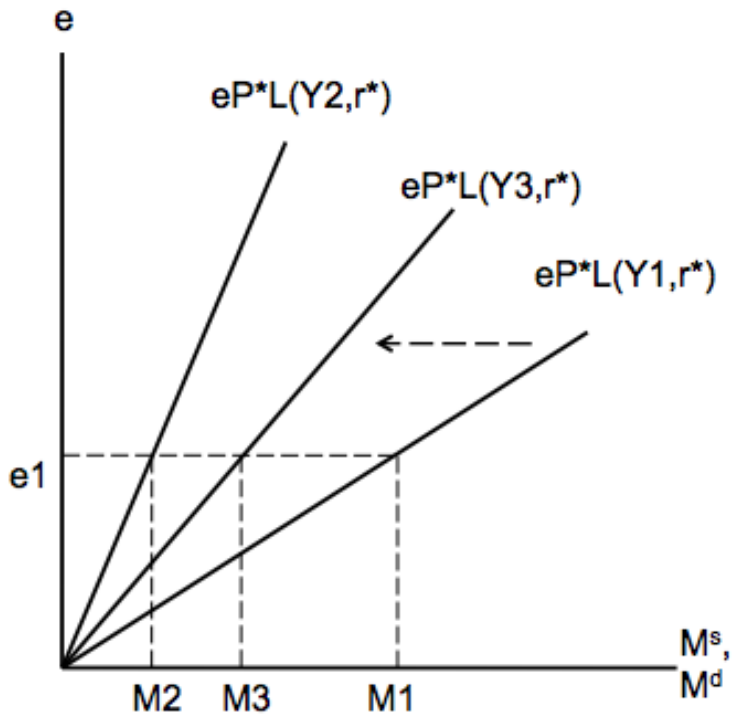
Capital controls with flexible e

- A smaller drop in output shifts money demand to the left.
- The exchange rate rises to e3 (instead of e2 — no capital control).



Capital controls with fixed e

- With the fixed e1, the central bank decreases the money supply so that e1 remains fixed.



Economic stabilization

- Capital controls dampen the effects of temporary shocks on output, the exchange rate, the current and capital accounts.
- Welfare loss and distortion.
  - Higher domestic interest rate than without capital controls — lenders gain but borrowers lose out.
  - Less liquidity in the financial system; small business loses out — rationing of financial resources.

- Capital controls with a fixed exchange rate can mitigate the loss in the foreign exchange reserves.
  - The money supply decreases less than without capital controls.