

# Open Economy AS/AD Model: Floating Exchange Rate

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## Questions

How do the previous results change when exchange rates are floating?

Key result:

When prices are flexible, floating and fixed exchange rates produce similar results at least in the medium run.

Why?

Changing prices can mimic the effects of changing exchange rates.

## Model

IS:

$$Y = C(Y - T) + I(Y, i) + G + NX\left(Y, Y^*, \frac{P}{EP^*}\right) \quad (1)$$

LM:

$$M/P = Y \times L(i) \quad (2)$$

UIP:

$$E = E^e \frac{1 + i^*}{1 + i} \quad (3)$$

AS:

$$Y = F\left(\frac{P}{P^e} \frac{1}{1 + m}, z\right) \quad (4)$$

Endogenous:  $Y, P, i, E$

## Simplified Equilibrium

The model is hard to analyze graphically (4 equations in 4 variables)

Next step: simplify into two equations that we can plot.

Step 1: Substitute UIP into IS:

$$Y = C(Y - T) + I(Y, i) + G + NX \left( Y, Y^*, \frac{1+i}{1+i^*} \frac{P}{E^e P^*} \right) \quad (5)$$

Intuition: higher  $i$  implies dollar appreciation and lower trade balance.

We did the same for the floating exchange rate IS/LM model.

## Simplified Equilibrium

Step 2: Use LM to substitute out  $i$ :

- ▶ LM implies a positive relationship between  $i$  and  $P$ :

$$L(i) = \frac{M}{PY} \quad (6)$$

- ▶ Intuition: Higher prices reduce money supply.

Write as

$$i = \hat{L}\left(\frac{M}{PY}\right) \quad (7)$$

- ▶ where  $\hat{L}$  is downward sloping
- ▶ so that  $i$  and  $P$  are again positively related

Substitute into IS:

$$Y = C(Y - T) + I\left(Y, \hat{L}\left(\frac{M}{PY}\right)\right) + G + NX\left(Y, Y^*, \frac{P}{P^*} \frac{1 + \hat{L}\left(\frac{M}{PY}\right)}{1 + i^*}\right)$$

## Simplified Equilibrium

$$Y = C(Y - T) + I\left(Y, \hat{L}\left(\frac{M}{PY}\right)\right) + G + NX\left(Y, Y^*, \frac{P}{P^*} \frac{1 + \hat{L}\left(\frac{M}{PY}\right)}{1 + i^*}\right)$$

This is basically a downward sloping  $AD$  curve.

To see this:  $P \uparrow \implies i \uparrow \implies$

1.  $I \downarrow$
2. dollar appreciation  $\implies NX \downarrow$

Note: I am ignoring the complication that  $Y$  appears inside of  $\hat{L}$  for simplicity.

## Simplified Equilibrium

AS:

$$Y = F \left( \frac{P}{P^e} \frac{1}{1+m}, z \right) \quad (8)$$

AD:

$$Y = Y^D (P; T, G, M, Y^*, i^*) \quad (9)$$

Endogenous:  $Y, P$

# Fiscal Policy Shock

The analysis of  $G \uparrow$  looks like a closed economy.

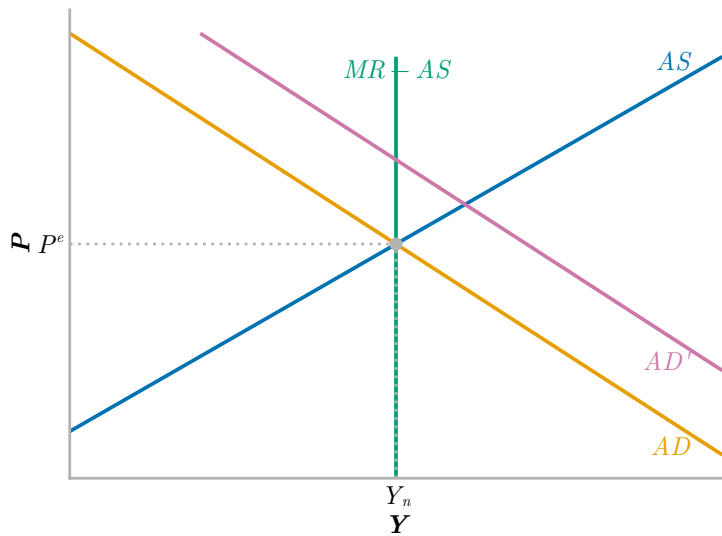
- ▶ AD shifts right.

SR: higher  $Y$  and  $P$ .

- ▶ Therefore lower  $NX$



# Fiscal Policy Shock



## Fiscal Shock: Medium Run

MR: unchanged  $Y$  and higher  $P$ .

- ▶ Therefore lower  $NX$ .

Higher  $P$  implies higher  $i = \hat{L}\left(\frac{M}{PY}\right)$

- ▶ Therefore: dollar appreciation.

Full crowding out:

- ▶  $Y = C + I \downarrow + G \uparrow + NX \downarrow$

# Tariffs

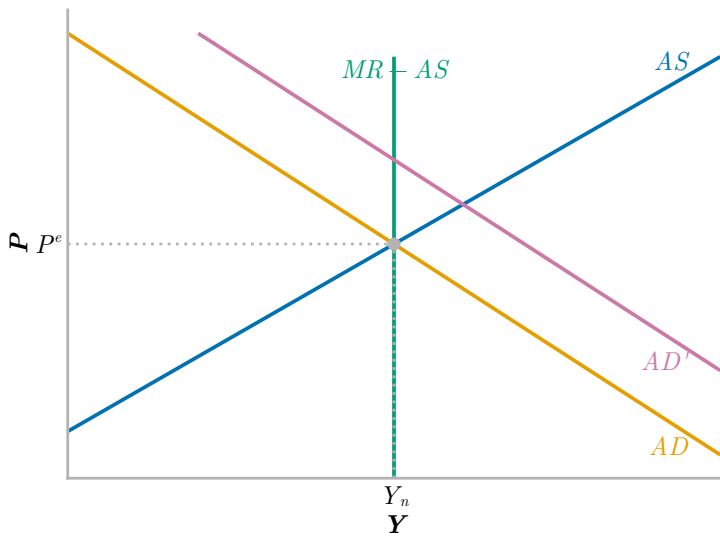
Tariff: improves  $NX$  holding everything else equal

- ▶ right shift in AD

Medium run:

- ▶ graph looks like fiscal shock
- ▶ again full crowding out - no change in  $NX$
- ▶ intuition?

# Tariffs



## Tariff: Short run

- ▶ Higher  $Y$  and  $P$ 
  - ▶ move along AS
- ▶  $M/P = Y \times L(i) \implies i \uparrow \implies$  dollar appreciation

$NX$  improves (that's the shock)

- ▶ but again  $NX/Y$  not clear

## Summary

Qualitatively, floating exchange rates look a lot like a closed economy

Medium run is also similar to fixed exchange rates.

Price adjustments mimic exchange rate adjustments.

Tariffs may improve  $NX$  in the short run.

But in the medium run,  $NX$  is determined by saving and investment decisions.

# Reading

- ▶ Blanchard / Johnson, Macroeconomics, 6th ed., ch. 21

Additional reading:

- ▶ Jones, Macroeconomics, ch. 15.