

Chapter 13

Open Economy Macroeconomics



Introduction



- Our previous model has assumed a single country exists in isolation, with no trade or financial flows with any other country.
- This chapter relaxes the single country assumption, and revises our theory to permit linkages between countries
- This is accomplished via a reformulation of the IS curve.

Goods Market Equilibrium



- As established in Chapter 5, the goods market equilibrium condition for an open economy is described by these equivalent conditions:

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

$$S^d = I^d + NX$$

Modeling Strategy



- We plan to modify our model to use the new IS curve equilibrium condition.
- However, to do so, we must describe the determinants of net exports.
- This, in turn, requires us to investigate exchange rates, which affect net exports.
- So we will begin by discussing exchange rates.

The Nominal Exchange Rate



- The nominal exchange rate (or just the exchange rate) tells us the rate at which two currencies trade.
 - In our theory, we will find it convenient to assume that there are just two countries.
 - We will think of the U.S. as the home country; the second country is simply "the foreign country" (the rest of the world).
- The exchange rate will be defined as the value of the dollar, or the price of a dollar in terms of the foreign currency; for example, .85 Euro/\$.

Nominal Exchange Rate: A Convention



- Exchange rates could have been defined as \$/Euro rather than Euro/\$
 - This is an arbitrary choice
- However, we will consistently use units of foreign currency per dollar (e.g., Euro/\$)
 - This has the implication that an increase in the exchange rate is interpreted as an increase in the value of the dollar, the home currency.

Flexible and Fixed Exchange Rates



- Exchange rates between the dollar and other currencies normally fluctuate, just as other prices fluctuate in response to demand and supply conditions
- We will later see that it is possible for countries to fix the rate at which currencies trade (and some countries do fix their exchange rate to another country's currency)

Real Exchange Rates



- We are often interested in the rate at which domestic and foreign goods trade, not just the rate at which currencies trade.
- For simplicity, suppose that there is one domestic output, called Cadillacs, and that there is one foreign output, called Mercedes.
- Suppose that the price of a Cadillac is \$30,000. The price of a Mercedes is €36,000. Also, suppose that the nominal exchange rate is .8 €/\$.
- What is the price of a Cadillac in terms of Mercedes? (Answer: 2/3 Mercedes)

Real Exchange Rates (Defined)



- The real exchange rate is defined below
- Using it with the data from the previous slide, we illustrate its calculation
- What are the units?
 - Mercedes/Cadillac

$$e = \frac{e_{nom} P}{P_{For}} \quad e = \frac{0.8 \times 30,000}{36,000} = \frac{2}{3}$$

If the real exchange rate rises ...



- If the real exchange rate rises, it takes more Mercedes to buy a Cadillac, so domestic goods are more expensive – this will affect imports and exports

With Many Goods



- In the real world, countries produce many goods
- In this context, we can still define a real exchange rate:

$$e = \frac{e_{nom} P}{P_{For}}$$

- Now we would substitute price indices for domestic and foreign price levels

Some Terminology



Nominal appreciation (e_{nom} rises)

Nominal depreciation (e_{nom} falls)

Real appreciation (e rises)

Real depreciation (e falls)

Under fixed exchange rates increases and decreases in the fixed nominal exchange rate are called "revaluations" and "devaluations."

Purchasing Power Parity

Suppose that all countries produce the same good.

That would imply that the real exchange rate should be 1 (one domestic pineapple trades for one foreign pineapple).

We know that $e = \frac{e_{nom}P}{P_{for}}$, and if $e = 1$, then:

$P = \frac{P_{for}}{e_{nom}}$ or $e_{nom} = \frac{P_{for}}{P}$. This defines the "purchasing power parity" (PPP) hypothesis.



The Price of a Big Mac

- According to PPP, the price of a good should be the same in all countries after adjusting for exchange rates.
- Your textbook reports Big Mac Prices, showing recent prices ranging from \$1.20 to \$4.52 in different countries.
- So purchasing power parity does not hold (since all countries do not produce the same mix of goods, and since Big Macs are not easily shipped across borders, this should not be a surprise).



Relative Purchasing Power Parity

Again consider the definition of the real exchange rate: $e = \frac{e_{nom}P}{P_{for}}$

This implies the following result for decomposing changes in e :

$$\frac{\Delta e}{e} = \frac{\Delta e_{nom}}{e_{nom}} + \frac{\Delta P}{P} - \frac{\Delta P_{for}}{P_{for}}$$

If e is constant, then relative purchasing power parity holds:

$$\frac{\Delta e_{nom}}{e_{nom}} = \frac{\Delta P_{for}}{P_{for}} - \frac{\Delta P}{P}. \text{ This holds reasonably well with real-world data.}$$



The Real Exchange Rate and Net Exports

- Our macro model is being modified by including net exports as a component of spending.
- Net Exports should depend on the real exchange rate
 - The real exchange rate is the price of domestic goods (in terms of foreign goods).
 - If Cadillacs become more expensive relative to Mercedes, then sales of Cadillacs fall and those of Mercedes rise.
- We expect an inverse relationship between the real exchange rate and net exports



The J Curve

- Suppose that oil is the foreign good
- If the price of foreign oil rises, the real exchange rate falls.
- Even though we import fewer barrels of oil, the real value of that oil (in terms of domestic output units) can rise.
- This leads to the paradoxical result that net exports can (initially) fall when exports become relatively cheaper
 - After a time, when the home country can better substitute for the more expensive foreign good, net exports are more likely to rise

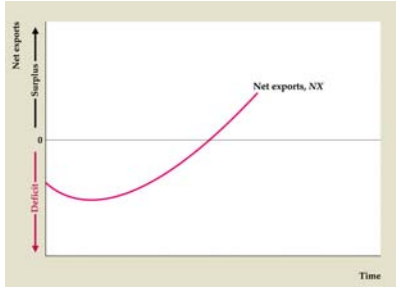


The J Curve

- Plotting the fall and then rise of net exports over time in response to a fall in the real exchange rate produces a graph that might resemble the letter J, hence the J Curve.



The J Curve



We Assume ...

- Despite the possibility of J Curve effects, we assume that our period of analysis is long enough that it is appropriate to assume that the real exchange rate and net exports are inversely related.
- As the next slide shows, this is empirically plausible

Net Exports and the Real Exchange Rate



Modeling Strategy Again

- Recall that our modeling strategy involves explaining what determines NX , the “new” component of desired spending in our revised goods market equilibrium condition
 - We know that NX will depend on the exchange rate, but it may also depend on other things
 - We also need to explain what determines exchange rates
- More fully explaining what determines exchange rates and net exports is our task in the next few slides

Determinants of Exchange Rates

- Currencies are traded in markets, and changing prices reflect movements in demand and supply
- Variables that might alter demand-supply conditions in the currency market are listed on the next slide

Determinants of the Real or Nominal Exchange Rate

SUMMARY 16

Determinants of the Exchange Rate (Real or Nominal)

An increase in	Causes the exchange rate to	Reason
Domestic output (income), Y	Fall	Higher domestic output raises demand for imports and increases supply of domestic currency.
Foreign output (income), Y_{for}	Rise	Higher foreign output raises demand for exports and increases demand for domestic currency.
Domestic real interest rate, r	Rise	Higher real interest rate makes domestic assets more attractive and increases demand and decreases supply of domestic currency.
Foreign real interest rate, r_{for}	Fall	Higher foreign real interest rate makes foreign assets more attractive and increases supply and decreases demand for domestic currency.
World demand for domestic goods	Rise	Higher demand for domestic goods increases demand for domestic currency.

Determinants of Net Exports

- We know that net exports depends on the real exchange rate, but it also depends on other things listed on the next slide

Determinants of Net Exports

SUMMARY 17 Determinants of Net Exports

An increase in	Causes net exports to	Reason
Domestic output (income), Y	Fall	Higher domestic output raises demand for imports.
Foreign output (income), Y_{for}	Rise	Higher foreign output raises foreign demand for exports.
Domestic real interest rate, r	Fall	Higher real interest rate appreciates the real exchange rate and makes domestic goods more expensive relative to foreign goods.
Foreign real interest rate, r_{for}	Rise	Higher foreign real interest rate depreciates the real exchange rate and makes domestic goods cheaper relative to foreign goods.
World demand for domestic goods	Rise	Higher demand for domestic goods directly increases net exports.

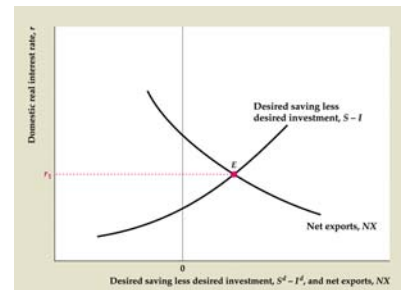
Deriving the Open-Economy IS Curve

- We are now ready to return to the derivation of the IS curve for the open economy model
- Recall the equilibrium condition for the goods market, which suggests a diagram to follow:

$$S^d = I^d + NX$$

$$S^d - I^d = NX$$

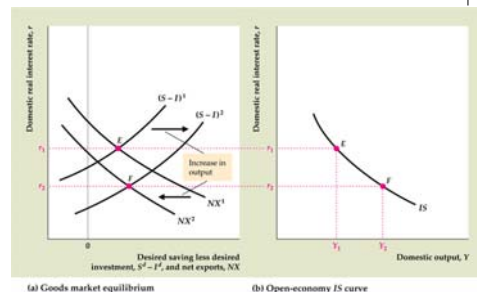
Goods Market Equilibrium



Deriving IS

- As in the closed economy case, an increase in Y causes desired saving to rise, with no direct effect on desired investment. So the $S-I$ curve shifts to the right.
- An increase in Y decreases net exports, shifting the NX curve to the left.

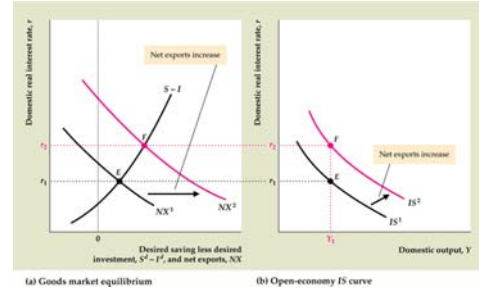
Derivation of the IS curve in an open economy



NX Shocks

- If the net exports curve shifts, this also shifts IS.
- Suppose that an exogenous event (something outside of our model) makes U.S. goods more attractive
 - This shifts the net exports curve to the right.
- For any level of income, the S-I curve intersects the net exports curve at a higher interest rate, implying that IS shifts up (to the right).

Shifting IS



International Shocks

- The following foreign variables (considered exogenous to the U.S.) will affect the home (U.S.) IS curve:
 - Y_{for} up: IS shifts right
 - r_{for} up: IS shifts right
 - A change in tastes favoring U.S. goods: IS shifts right

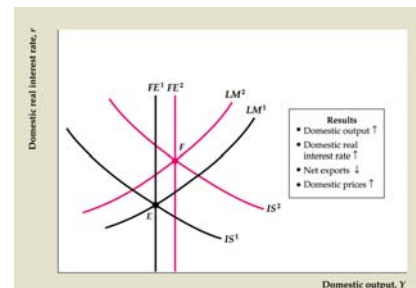
Domestic Shocks

- We can also ask how domestic shocks, including policy shifts, affect both domestic and international economies in an open economy setting

An Increase in Government Spending

- Suppose government spending increases (temporarily)
- We already know how to use our model to make inferences about the income and the interest rate
 - The home country IS curve shifts to the right.
 - In the classical view, the FE curve would also shift right because of a negative wealth effect (but probably not in a Keynesian view)

An Increase in Government Spending: Diagram



What Happens to the Exchange Rate? and NX?



- Higher income causes domestic residents to increase imports, which also creates demand for the foreign currency, lowering the exchange rate
- However, the resulting interest rate increase causes the exchange rate to rise.
- So we are left with an ambiguous overall implication for the exchange rate
- NX declines because of the rise in the interest rate and the rise in income
 - The ambiguity in the exchange rate might appear to make the effect on NX , ambiguous but this is not the case.

A Monetary Contraction



- A decrease in the (home) money supply shifts LM to the left.
- In the Keynesian model, income falls and the real interest rate rises.

What Happens to the Exchange Rate?



- Falling income means falling demand for imports, and falling demand for the foreign currency. The home currency would appreciate.
- A higher interest rate means foreign funds seek to invest in financial assets in the U.S., increasing demand for dollars. Again, the home currency would appreciate.
- So both falling income and a rising interest rate cause an appreciation of the dollar.

What happens to NX?



- The fall in income lowers demand for imports, causing an increase in net exports
- The increase in the exchange rate causes an increase in the real exchange rate, which means that U.S. goods are more expensive. This decreases net exports
- So the overall impact on NX is ambiguous

What about the J-Curve?



- The evidence on the J-curve tells us that the change in the terms of trade can have different effects over time
- U.S. goods have become more expensive, so that net exports should eventually fall, but the immediate impact could have the opposite sign
- This suggests that the likely short-term effect will be that the NX will increase

Long-Run Effects of a Monetary Contraction



- In the closed economy model, money neutrality prevailed in the long run.
- The same should be true in the open economy context.
- The monetary contraction shifted LM and AD left. In the long run, the leftward shift of AD puts downward pressure on the price level. But this shifts LM back to its original location.
- With LM back to its starting point, Y and r will also return to their original values. The real exchange rate is unchanged, so trade patterns (NX) are unchanged.

The Nominal Exchange Rate?

- The price level has fallen, so the nominal exchange rate has risen in equal proportion.
- Recall:

$$e = \frac{e_{nom} P}{P_{for}}$$

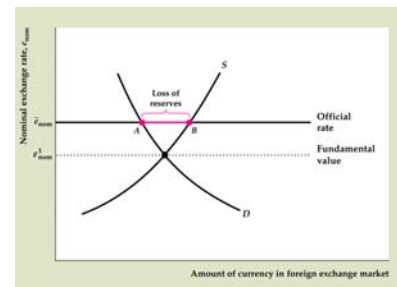
Fixed Exchange Rates

- We have been analyzing the open economy under a flexible exchange rate regime, where the exchange rate is determined by demand and supply forces.
- Under a fixed exchange rate regime, a country (or both countries) officially set a rate of exchange between currencies.
- How can this be done?
 - A country's central bank does ultimately control the supply of the currency. The official rate will be compatible with the market equilibrium rate so long as the central bank sets the money supply appropriately.

What if Official and Equilibrium Market Rates Diverge?

- The next slide plots demand and supply curves for dollars (as a function of the nominal exchange rate).
- But suppose that the official rate exceeds the market equilibrium rate? What happens?

An overvalued exchange rate



Speculative Runs and Exchange Rate Crises

- Suppose that investors believe that an overvalued currency will soon be devalued
- Abel-Bernanke conclude: "If the exchange rate is overvalued, the country must either devalue its currency or make some policy changes to raise the fundamental value of the exchange rate."

Exchange Rate Crisis: Hong Kong

- WSJ Oct. 23 1997 Hong Kong
- ... the odds are that the authorities won't give up the peg with the U.S. dollar, say market participants. The Hong Kong Monetary Authority pushed overnight interest rates up to 300% in a desperate attempt to maintain the Hong Kong dollar's link with the U.S. dollar.
- Does this make sense? (Yes, if a depreciation of a fixed rate is expected, an extremely high rate of interest on the home currency may be needed if people are to be discouraged from fleeing the home currency).

What about an Undervalued Exchange Rate?



- If a country has an undervalued exchange rate, it accumulates international reserves.
- This doesn't lead to the same problems of unsustainability as an overvalued rate, but it can make trading partners uncomfortable, and it may be of questionable rationality (you accumulate currencies that are presumably worth less than you paid for them).

How to Make Fundamentals Coincide with an Official Rate



- Suppose that the currency is overvalued (the official rate exceeds the fundamental value).
- To raise the fundamental value of the currency, a monetary contraction is required

Under Fixed Exchange Rates Monetary Policy is Constrained



- Under fixed exchange rates, the money supply must be set to insure that the value of the currency stays at the official rate.
- This means that the money supply cannot be varied for other purposes, like countercyclical stabilization policy.

Fixed vs. Flexible Exchange Rates



- Flexible exchange rates permit a country to control its own monetary policy
- However, exchange rate swings lead to trade fluctuations that make trade sensitive sectors risky
- Fixed exchange rates can reduce the large exchange rate induced trade fluctuations, but they are subject to crises and they limit a countries ability to determine its own monetary policy

The End

