Issues in International Finance

Policy in the open economy II

UW – Madison // Fall 2018

Roadmap

- Where we have been
  1. **1.** Forex markets, asset trade, and goods trade
  2. **2.** Money market and the forex market
  3. **3.** Measuring external transactions and wealth
  4. **4.** Understanding the current account
- Today: Put all the pieces together
  1. **1.** Construct a model of the domestic output market
  2. **2.** Derive IS and LM curves in the open economy
     - IS-LM ties together forex, money, and goods markets
     - IS-LM will be our workhorse open economy macro model

Goods market equilibrium

- We have specified functions for C, I, TB
- We take T and G as exogenous
- Without $NFIA$ or NUT, $CA = TB$

$$\text{supply of goods} = Y$$

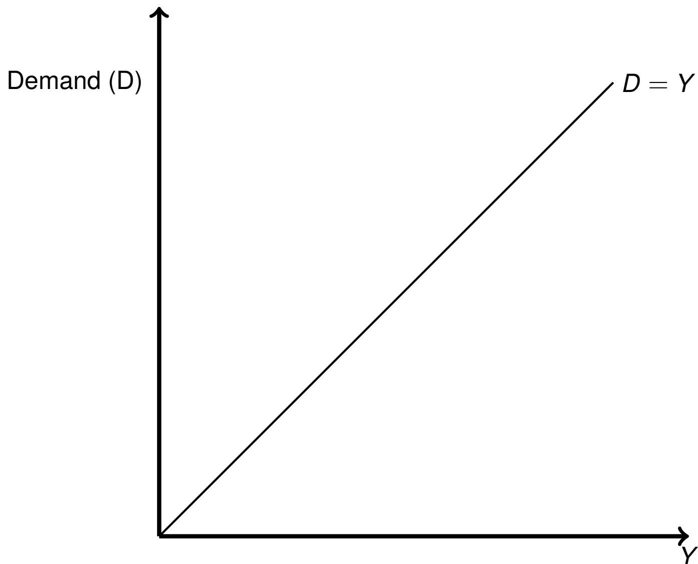
$$\text{demand for goods} = C + I + G + TB$$

- In equilibrium demand = supply

$$Y = C + I + G + TB$$

$$Y = C\left(Y - \bar{T}\right) + I\left(i\right) + \bar{G} + TB\left(E\bar{P^*}/P, Y - \bar{T}, Y^* - \bar{T^*}\right)$$

Goods market (Keynesian cross)



Why does demand slope up?

- When we drew demand, we held fixed everything but income
  - $i, \bar{G}, \bar{T}, E, \bar{Y}^*, \bar{T}^* \dots$
- So we ask: Why does demand increase when income increases?
  - Suppose income increase by \$1
  - Income shows up in C and TB
  - Consumption increases by $MPC > 0$
  - Imports increase by MPC_F, which enters domestic demand with a minus sign $-MPC_F$
  - The total effect on demand is $MPC - MPC_F$
  - As long as more of the extra dollar goes to domestic goods than foreign goods, demand increases
- Reminder: prices are fixed

Getting to equilibrium

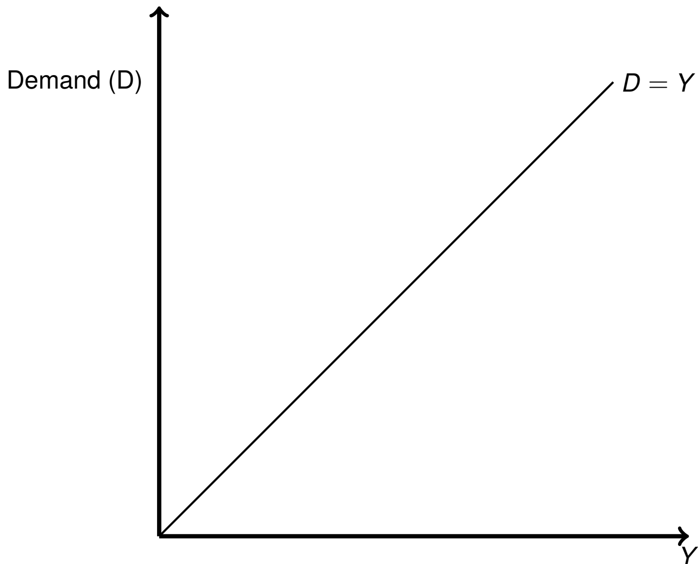
- If output is below equilibrium output, demand is greater than supply
  - Firms produce more to meet demand
- If output is above equilibrium output, demand is less than supply
  - Firms produce less to meet demand
- Output tends towards its equilibrium value

- When prices are flexible, prices adjust to clear the market. Here, output adjusts to meet demand. This is a demand-driven equilibrium.
- Firms post a (sticky) price and must meet the demand at that price.

Shifting demand

- The economist's usual routine: What happens when one of the things we held fixed changes? How does the demand curve shift?
- Consumption increases when
  1. An increase in government spending, G
  2. A decrease in taxes, T
- Investment increases when
  1. A decrease in $i \rightarrow$ increase in I
- Trade balance increases when
  1. An increase in E (depreciation) is an increase in q which increases exports / decreases imports
  2. An increase in P^* or a decrease in P
  3. An increase in T^* or a decrease in T

Goods market (Keynesian cross): Increase in demand



General equilibrium

- We need to track three markets: Goods, forex, money
- Need them all to be in equilibrium simultaneously
- We develop two extra figures to help us
  - The IS curve relates goods and forex markets
  - The LM curve relates goods and money markets
- Then we can put IS and LM together and get down to work

The IS curve

- Relates the goods market to the forex market
- It represents all the (i, Y) pairs that are consistent with equilibrium in goods and forex market
- Derive it by changing i and tracing out the corresponding Y

Deriving IS

The IS curve

- Relates the goods market to the forex market
- It represents all the (i, Y) pairs that are consistent with equilibrium in goods and forex market
- Derive it by changing i and tracing out the corresponding Y
- Already have a new result: Lowering interest rates is more stimulative in an open economy, since it causes a devaluation, making exports more attractive
- The IS curve slopes down: As interest rates fall, investment increases and the devaluation of the currency increases exports. This increase in demand is met by an increase in supply. $\downarrow i \rightarrow \uparrow Y$

Shifting IS

- Anything that changes $D = C + I + G + TB$ that is **not** the interest rate will shift the IS curve
- The IS curve shifts up when
  1. G increases
  2. T decreases
- Anything that changes FR will shift the IS curve
- The IS curve shifts up when
  1. An increase in $i^* \rightarrow$ increase in E
  2. An increase in $E^e \rightarrow$ increase in E

Shifting IS

LM Curve

- All the (i, Y) pairs such that the money market is in equilibrium
- Derive it by changing Y and tracing out corresponding i

- Note: There is nothing international about the LM curve. This is the same setup as in a closed economy.

Deriving LM

LM Curve

- All the (i, Y) pairs such that the money market is in equilibrium
- Derive it by changing Y and tracing out corresponding i
- Note: There is nothing international about the LM curve. This is the same setup as in a closed economy.

- The LM curve slopes up: When real output increases, people would like to hold more money. With money supply fixed, the interest rates must increase to keep money demand equal to money supply. $\uparrow Y \rightarrow \uparrow i$

Shifting LM

- Increase in money supply
- Things that shift money demand down (but not Y)

Shifting LM

IS-LM-FX

- Points along IS are (i, Y) where goods market and fx market are in equilibrium
- Points along LM are (i, Y) money market is in equilibrium
- Points shared by IS and LM are (i, Y) where all three markets are in equilibrium. Determines (i, Y, E)
- What point is shared by IS and LM? The intersection!

IS-LM-FX

Summary

- IS: all the points (i, Y) such that goods and fx markets are in equilibrium
  - $\downarrow T, P$ or $\uparrow G, i^*, E^e, P^*$ shift demand up and IS right
  - Any change in $C(\ )$, $I(\ )$, or $TB(\ )$ that shifts demand up, shifts IS right
- LM: all the points (i, Y) such that the money market is in equilibrium
  - $\uparrow M$ shifts LM down
  - Any change in money demand function that shifts money demand down, shifts LM down