

# Issues in International Finance

## *Balance of payments review*

UW – Madison // Fall 2018

## Administrative things

- ▶ PS #4 solutions posted this afternoon
- ▶ These marked up slides posted this afternoon
- ▶ Practice exam and solutions posted
- ▶ Office hours (7444 Soc Sci):
  - ▶ Today (11/6) 2:30PM–3:30PM
  - ▶ Tomorrow (11/7) 5:30PM–6:30PM (I may be late)
  - ▶ Thursday (11/8) 9:00AM–10:00AM
- ▶ Next week: Last part of Ch. 18 “Stabilization policy”

*OR BY EMAIL*

## Exam II: Thursday 11/8

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- ▶ Exam duration is 75 minutes
- ▶ We will start on time; arrive early
- ▶ Bring
  - ▶ Calculator
  - ▶ One page of notes (8.5"x11")
  - ▶ No wireless devices or other materials
- ▶ Show your work!

## Big picture

- ▶ National income accounts in open economy
  - ▶ Big three measures: GNE, GDP, GNI
    - ▶ In both open and closed economies
  - ▶ The BOP accounts: CA, FA, KA
  - ▶  $S - I = CA$  ~~sum~~ *sum to zero*
  - ▶ Double entry transaction accounting
  - ▶ Balance of payments and external wealth
- ▶ Big idea: Current account deficits reflect borrowing
- ▶ Big idea: BOP accounts track international transactions

DEBIT/CREDIT

IM \$100 shirts  
for \$100 check

{ - \$100 CA  
+ \$100 FA }

## Big picture

### ▶ The gains from globalization

- ▶ The long run budget constraint
- ▶ Income fluctuations and consumption smoothing
- ▶ Investment and consumption smoothing
- ▶ Cross-border investment / convergence
- ▶ Why doesn't capital flow from rich to poor countries?
- ▶ Risk diversification / cross-border equity
- ▶ Limits to international financial markets

smoothing  
motive drives  
intertemporal  
trade

owning capital  
in another  
country

- ▶ Big idea: Intertemporal trade facilitates consumption smoothing
- ▶ Big idea: Institutional quality limits gains from globalization

## Big picture

- ▶ Policy in the open economy
  - ▶ Key assumption: Sticky prices and temporary policy changes
  - ▶ Three markets: Goods, money, foreign exchange
  - ▶ Keynesian cross → goods market equilibrium
  - ▶ IS curve
  - ▶ LM curve
  - ▶ IS-LM-FX diagrams
  
- ▶ Big idea: IS-LM-FX tracks equilibrium in all three markets
  
- ▶ Big idea: How shocks and policy (monetary, fiscal) affect the economy

## Open economy NIPA

- ▶ Income accounting in open economy

$$GDP = \underbrace{C + I + G}_{\text{GNE}} + \underbrace{EX - IM}_{\text{trade balance}}$$

$$GNI = \underbrace{C + I + G + EX - IM}_{\text{GDP}} + \underbrace{EX_{FS} - IM_{FS}}_{\text{NFIA}}$$

*earned income*

$$GNDI = \underbrace{C + I + G + EX - IM}_{\text{GDP}} + \underbrace{EX_{FS} - IM_{FS}}_{\text{NFIA}} + \underbrace{UT_{IN} - UT_{OUT}}_{\text{net unilateral transfers}}$$

*gifts donations*

- ▶ CA summarizes all the cross-border flows

$$CA = \underbrace{(EX - IM)}_{\text{TB}} + \underbrace{(EX_{FS} - IM_{FS})}_{\text{NFIA}} + \underbrace{(UT_{IN} - UT_{OUT})}_{\text{uni. trans. flow.}}$$

## NIPA: Current account and savings

- ▶ Start from the identity

$$Y = C + I + G + CA$$

- ▶ Rearrange

$$Y - C - G = I + CA$$

- ▶ Where  $S = Y - C - G$  is *savings* (i.e., income minus consumption)

$$S = I + CA$$

$$S - I = CA$$

- ▶ In a closed economy: savings funds investment
- ▶ In an open economy: current account makes up the difference between savings and investment



NIPA: Financial account

- ▶ The financial account records cross-border financial asset trade
- ▶ Examples: stocks, bonds, sale of a factory


"claims on another country"

$$FA = EX_A - IM_A$$

- ▶  $FA > 0$  stock of assets falling
- ▶  $FA < 0$  stock of assets rising



## NIPA: The capital account

- ▶ Not usually important in high-income countries
- ▶ The capital account records cross-border
  - ▶ Trade in nonfinancial, nonproduced assets
  - ▶ Gifts of assets 
- ▶ Examples: Patents, franchises, debt forgiveness

$$KA = KA_{IN} - KA_{OUT}$$

- ▶  $KA > 0$  net receiver of assets
- ▶  $KA < 0$  net giver of assets

## NIPA: External wealth

$$W = A - L$$

- ▶ External wealth changes for two reasons
  1. Trade in assets
  2. Change in the value of assets: *valuation effects* (from change in asset prices or change in exchange rates)

$$\Delta W = \Delta(A - L) = -FA + \text{valuation effects}$$

$EX_A - IMA$

▶ By BOP:  $-FA = CA + KA$

capital gains/losses

$$\Delta W = CA + KA + \text{valuation effects}$$

- ▶ Increase wealth by saving ( $CA > 0$ ), charity ( $KA > 0$ ), capital gains

## Long run budget constraint

- ▶ In a closed economy,  $TB = 0$ . **Budget must balance every period.**

$$GNE = GDP$$

- ▶ In a ~~closed~~<sup>open</sup> economy  $TB \neq 0$ . **Budget must balance in the long run.**

$$GNE_0 + \frac{GNE_1}{(1+r^*)} + \dots = (1+r^*)W_{-1} + GDP_0 + \frac{GDP_1}{(1+r^*)} + \dots$$

PV Expenditure

initial  
wealth

PV of  
production

Infinitely-lived  
country

## Consumption smoothing

$$C_0 + \frac{C_1}{1+r} = W_1(1+r) + Q_0 + \frac{Q_1}{1+r}$$

- ▶ An example:  $Q_0 = 100$ ,  $Q_1 = 105$ , and  $r = 0.05$
- ▶ In a closed economy,  $C_0 = 100$ ,  $C_1 = 105$  and  $U = \min\{100, 105\} = 100$ 
  - ▶ Consumption is not smooth
- ▶ In an open economy

want  $C_0 = C_1$

$$C_0 + \frac{C_1}{1.05} = 100 + \frac{105}{1.05}$$

$$C_0 + \frac{C_1}{1.05} = 200$$

- ▶ We want  $C_0 = C_1 = C$ , so

$$C \left( 1 + \frac{1}{1.05} \right) = 200$$

- ▶  $C = 102.44$ ,  $U = \min\{102.44, 102.44\} = 102.44$

## Efficient investment

$$S - I = CA$$

- ▶ Add investment to our previous model (labor & capital create output)

$$C_0 + \underbrace{I_0}_{\bar{I}} + \frac{C_1}{1+r^*} = Q_0 + \frac{Q_1}{1+r^*}$$

- ▶ With  $I_0 = 0$ :  $Q_0 = Q_1 = 100$
- ▶ With  $I_0 = 5$ :  $Q_0 = 100, Q_1 = 110$
- ▶ In a closed economy either
  - ▶  $I_0 = 0$  and  $C_0 = 100, C_1 = 100$
  - ▶  $I_0 = 5$  and  $C_0 = 95, C_1 = 110$
- ▶ Very unsmooth consumption if investment is made

## Efficient investment

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- ▶ In an open economy

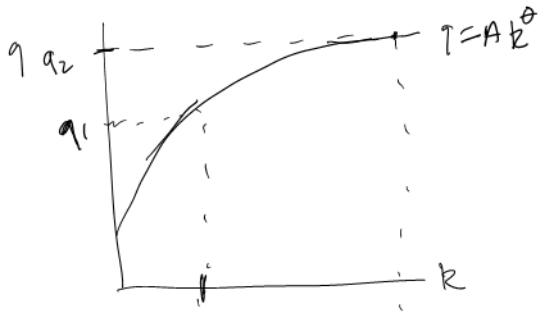
$$C_0 + 5 + \frac{C_1}{1.05} = 100 + \frac{110}{1.05}$$

$$C \left( 1 + \frac{1}{1.05} \right) = 95 + \frac{110}{1.05}$$

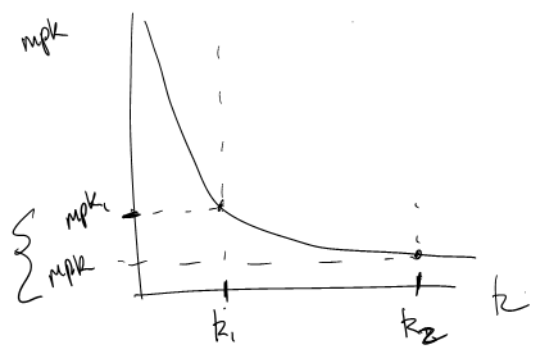
- ▶  $C_0 = C_1 = 102.32$

- ▶  $TB_0 = Q_0 - C_0 - I_0 = 100 - 102.32 - 5 = 7.32$

- ▶ Borrow the entire investment plus more!
- ▶ Consume more today because you will be richer tomorrow



Country 2 is "rich"  
 1 is "poor"  
 $q_1 < q_2$



but  
 $mpk_1 > mpk_2$   
 $\Rightarrow$   
 predicts capital  
 flows from  
 rich to poor.



## The marginal product of capital

Cross-Border Invest.

- ▶ The first order condition says that  $MPK = r$

$$q = AK^\theta$$

$$\theta AK^{\theta-1} = r$$

- ▶  $r$  is the marginal cost of capital: if not investing in capital, could be lending to someone
- ▶  $MPK$  is falling as  $k$  grows
  - ▶ This is the diminishing returns to capital
  - ▶ When  $k$  is small,  $MPK$  is high
  - ▶ When  $k$  is large,  $MPK$  is low
- ▶  $A = 1$  and  $\theta = 1/3$  Let's take a look...

## Globalization and MPK in rich and poor countries

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- ▶ Two countries: US and Mexico
  - ▶ Assumption:  $A$  and  $\theta$  are the same in both countries
  - ▶  $k^{us} = 1, k^{mx} = 0.08$
  - ▶  $q^{us} = 1, q^{mx} = 0.43$
  - ▶ Mexico is poor relative to the US because it doesn't have enough factories, trucks, machines...
  - ▶ ...but Mexico should be a great investment opportunity!
  - ▶  $MPK^{us} = 0.333, MPK^{mx} = 1.79 \rightarrow MPK^{mx} / MPK^{us} = 5.4$
  - ▶ Capital should flow to Mexico
- ▶ How does this change when  $A$  differs across countries?

TECHNOLOGY  
⊕ INSTITUTIONS

$A$  is low  
in poor  
countries.

## Diversification

- ▶ Assumption: Labor and capital used to produce output
- ▶ Assumption: No borrowing or lending (not important)
- ▶ Assumption: No investment, no government (not important)
- ▶ Assumption: Two countries suffer equal and opposite shocks to income (important)
  - ▶ In state 1:  $Q^A = 90, Q^B = 110$
  - ▶ In state 2:  $Q^A = 110, Q^B = 90$
  - ▶ States alternate through time: 1,2,1,2,1,2...
- ▶ Split between labor and capital is 60–40 (important)

## Open economy

- ▶ Allow countries to own some of the other country's capital stock
- ▶ Receive income payments from your capital in the other country
- ▶ Suppose each country buys 50% of the other country's capital

	Country A					Country B			World
	rK	wL	GNI	TB	NFIA	rK	wL	GNI	GNI
State 1	40	54	94	-4	+4	40	66	106	200
State 2	40	66	106	+4	-4	40	54	94	200

- ▶ Capital income has zero volatility
- ▶ Income (and consumption) volatility has fallen

} idiosyncratic risk  
vs.  
common risk

## Limits to international financial markets

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- ▶ Why do we not see more international finance?
  - ▶ Regulation (limits to foreign investment)
  - ▶ Capital controls
  - ▶ Transactions costs
  - ▶ Institutional risk (expropriation, default)
  - ▶ Undiversifiable risk (global shocks, labor income shocks)
- ▶ Many of these are institutional factors

higher  $i$ , less borrowing

## Goods market equilibrium

Goods MKT  
Money MKT ✓  
FX MKT ✓

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

supply of goods =  $Y$

demand for goods =  $C + I + G + TB$

- ▶ In equilibrium demand = supply

if  $\frac{\bar{E}P^*}{P} \uparrow$  SWITCH FROM FOR TO HOME

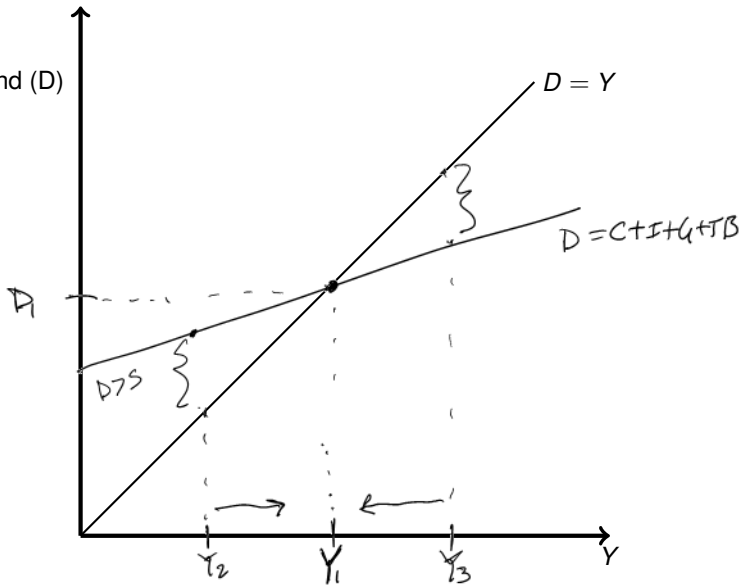
$$Y = \underbrace{C} + \underbrace{I} + \underbrace{G} + \underbrace{TB}$$

then  $TB \uparrow$

$$Y = C(\underbrace{Y - \bar{T}}) + \underbrace{I(i)} + \underbrace{\bar{G}} + \boxed{TB(\underbrace{\bar{E}P^*/P}_{\text{real ex rate}}, \underbrace{Y - \bar{T}}, \underbrace{Y^* - \bar{T}^*})}$$

QTY adjusts  
to clear the market.

Goods market (Keynesian cross)

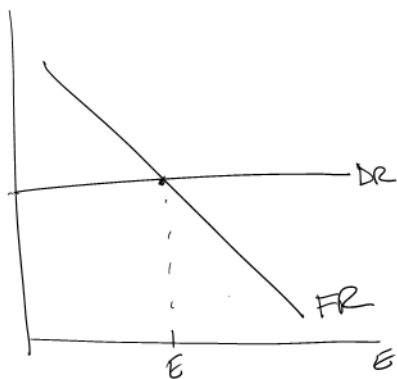
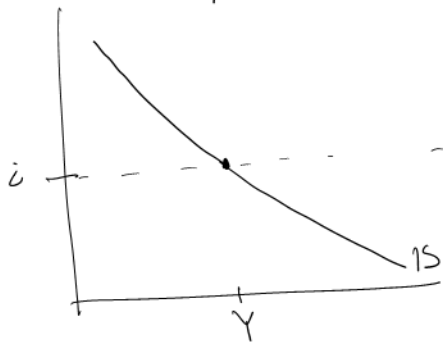
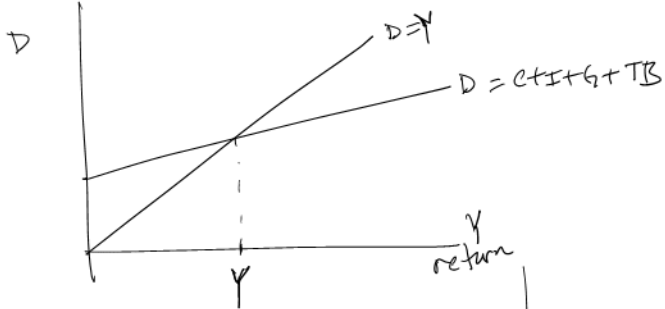


## The IS curve

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- ▶ 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.  $\downarrow i \rightarrow \uparrow Y$





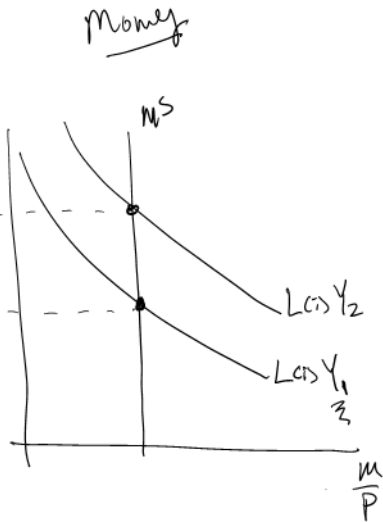
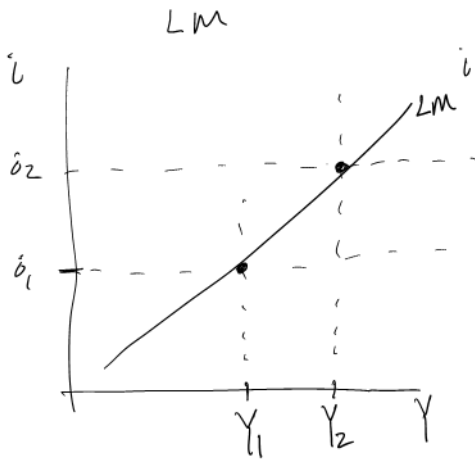
## Shifting IS

- ▶ 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  $E$

fiscal policy

## 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

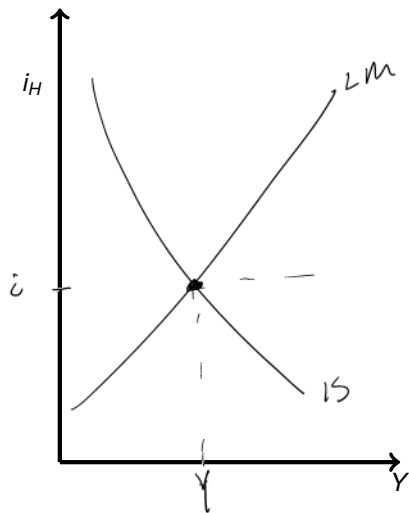
- ▶ Increase in money supply
- ▶ Things that shift money demand down (but not  $Y$ )

*monetary policy*

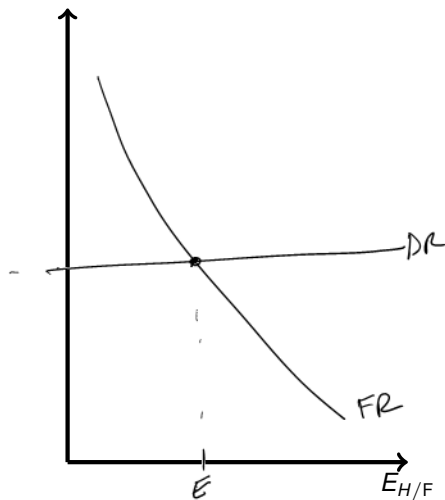
Eqm:  $(i, Y, E)$

IS-LM-FX




IS-LM



FX market

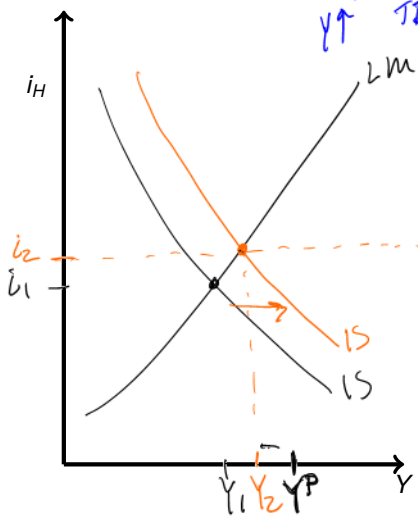


## Policy in an open economy

- ▶ Work through monetary and fiscal policy
- ▶ Assumptions
  1. Temporary policy changes: Long run expectations are constant
  2. Short-run analysis: prices sticky
  3. Free movement of capital (UIP holds)
  4. Variables in foreign country held fixed
- ▶ Think about #1 and #2 as policy responding to business cycle conditions
- ▶ Coming up
  1. Economy in initial equilibrium 
  2. Change a policy 
  3. Work through its effects 
- ▶ Start with flexible exchange rates, then look at fixed

$D = C(Y-T) + I + G + TB$  ( ,  $Y-T$  )  
 ↑ Decrease in  $T$ , flexible fx rate ↘

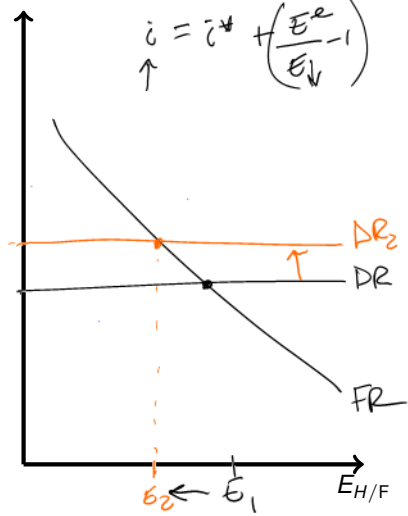
IS-LM  
 $\downarrow \frac{EP^*}{P}$   $TB \downarrow$   
 $Y \uparrow$   $TB \downarrow$



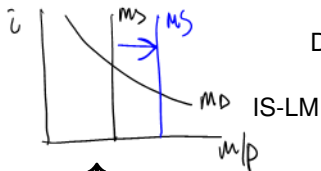
FX market

$$i = i^* + \left( \frac{E^e}{E} - 1 \right)$$

↑



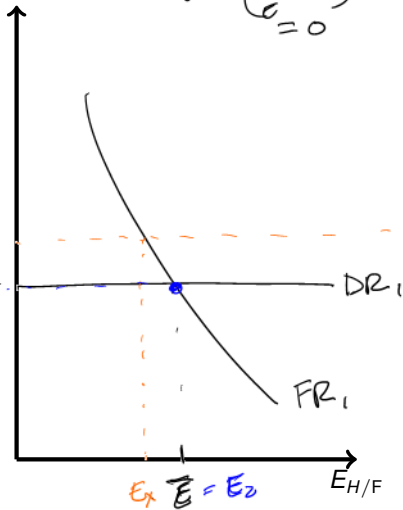
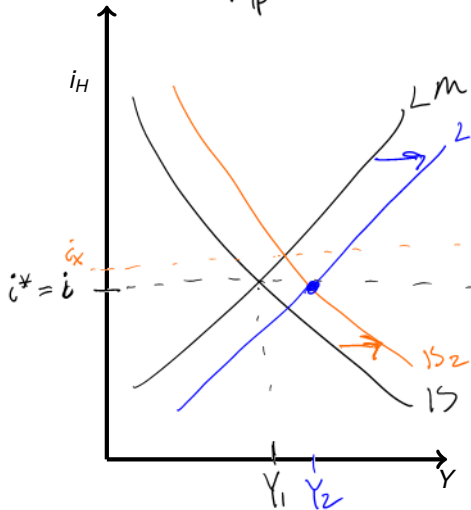




Decrease in  $T$ , fixed fx rate

FX market

$$\bar{i} = \bar{i}^* + \left( \frac{E^e - E}{E} - 1 \right) = 0$$



## Summary

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fx regime	policy	$i$	$E$	$I$	$TB$	$Y$
floating	$\uparrow M$	$\downarrow$	$\uparrow$	$\uparrow$	$\uparrow$	$\uparrow$
	$\downarrow T$	$\uparrow$	$\downarrow$	$\downarrow$	$\downarrow$	$\uparrow$
fixed	no mon. pol.	0	0	0	0	0
	$\downarrow T$	0	0	0	$\downarrow$	$\uparrow$