ECON 1550 International Finance

Output and the Exchange Rate in the Short Run

Behavioral equations in the goods market

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

$$\text{DEMAND FOR DOMESTIC GOOD} = C + I + G + CA$$

$$\text{SUPPLY FOR DOMESTIC GOOD} = Y$$

Demand for domestic goods

DEMAND FOR DOM GOODS $= C + I + G + CA = D$

DOMESTIC DEMAND FOR GOODS $\equiv A = C + I + G$

$A + EX - IM = A + CA = D$

Demand for domestic goods

$C = C(Y_D)$ (+1) CONSUMPTION (OF DOM. AND FOREIGN)

$Y_D \equiv Y - T$ DISPOSABLE INCOME

$I = \bar{I}$ EXOGENOUS INVESTMENT

$G = \bar{G}$ " GOV. PURCHASES

} BOTH DOM AND FOR. GOODS

$CA = CA(q, Y-T, Y^*)$

$q \equiv \frac{EP^*}{P} = \frac{\text{DOLLAR PRICE OF FOREIGN GOOD}}{\text{DOLLAR PRICE OF DOM GOOD}}$

Demand for domestic goods

$CA = EX - IM$

$EX = EX(q, Y^*)$

(+1 (+1

$IM = IM(q, Y_D)$

(-) (+1

$q\uparrow$ VOLUME $\downarrow$ PRICE $q\uparrow$

VOLUME DOMINATES

$q\uparrow$ REAL DEPR.

$\frac{EP^*}{P} = q$ => HOME GOOD APPEARS CHEAPER

$IM = \overbrace{PRICE}^{\equiv q} \times VOLUME$

IM: DOM GOOD

PRICE: DOM GOOD / FOREIGN GOOD

VOLUME: FOREIGN GOOD

A short-run model of the goods market

Exogenous variables

Variable	Description
E	Nominal exchange rate
I	Investment
G	Government spending
T	Taxes
P	Price level
P^*	Foreign price level
Y^*	Foreign income

Endogenous variables

Variable	Description	Equation	Type of equation
Y	Income, production	$Y = D$	Equilibrium condition
Y_D	Disposable income	$Y_D \equiv Y - T$	Identity
EX	Exports	$\mathrm{EX} = \mathrm{EX}(\underset{(+)}{q}, \underset{(+)}{Y^*})$	Behavioral
IM	Imports	$\mathrm{IM} = \mathrm{IM}(\underset{(-)}{q}, \underset{(+)}{Y_D})$	Behavioral
CA	Current account	$\mathrm{CA} \equiv \mathrm{EX} - \mathrm{IM} = \mathrm{CA}(\underset{(+)}{q}, \underset{(-)}{Y_D}, \underset{(+)}{Y^*})$	Identity
D	Demand for domestic goods	$D \equiv C + I + G + \mathrm{CA}$	Identity
A	Domestic demand	$A \equiv C + I + G$	Identity
C	Consumption	$C = \mathrm{C}(\underset{(+)}{Y_D})$	Behavioral
q	Real exchange rate	$q \equiv \dfrac{EP^*}{P}$	Identity

DD Curve

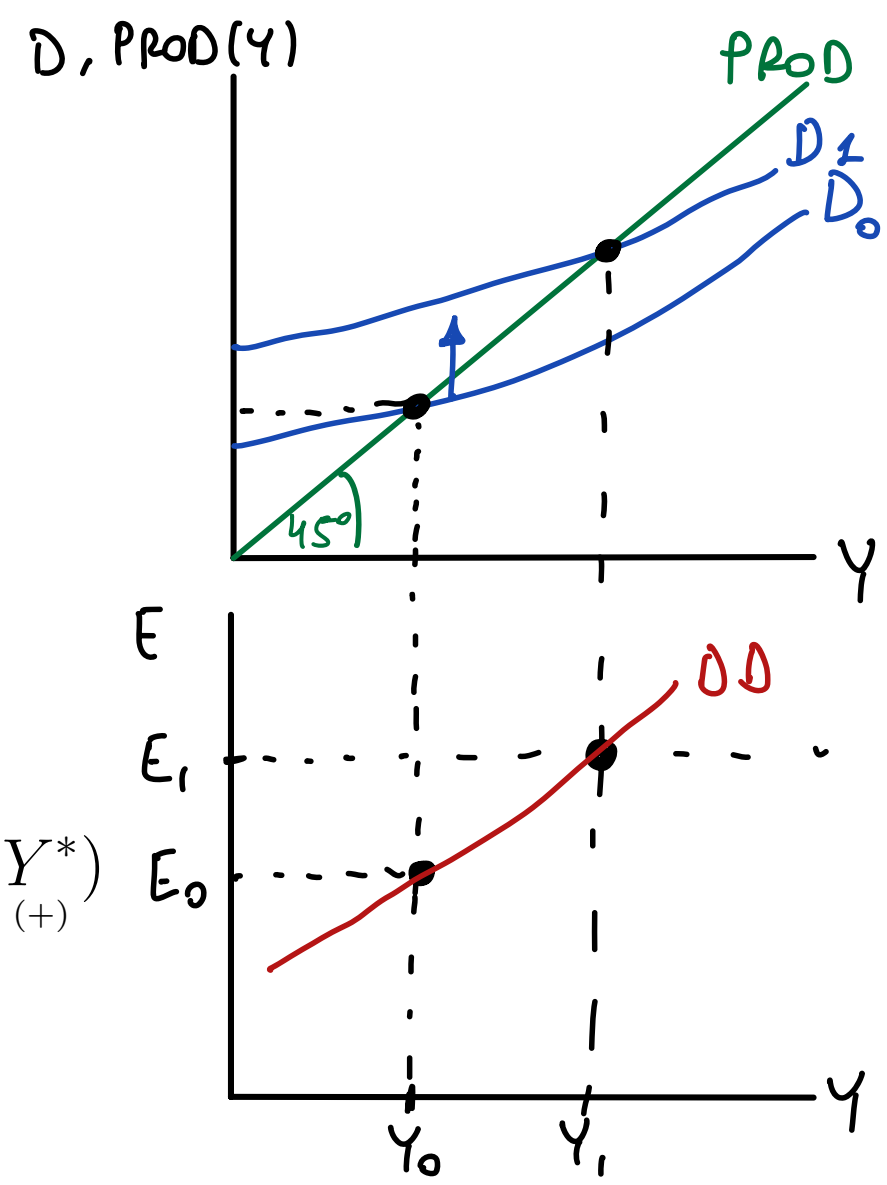
$$Y = D$$

$$Y = C + I + G + \mathrm{CA}$$

$$Y = \underset{(+)}{\mathrm{C}}(Y_D) + I + G + \underset{(+)}{\mathrm{CA}}(\underset{(+)}{q}, \underset{(-)}{Y_D}, \underset{(+)}{Y^*})$$

$$Y = \underset{(+)}{\mathrm{C}}(Y_D) + I + G + \underset{(+)}{\mathrm{CA}}(\underset{(+)}{EP^*/P}, \underset{(-)}{Y_D}, \underset{(+)}{Y^*})$$

$Y\uparrow$ $C\uparrow$ BUT $CA\downarrow$. HOWEVER, D ALWAYS $\uparrow$



$D = C + I + G + NX$ WHEN Y ↑

C ↑ NX ↓ SO D?

NOT UNCLEAR, D ↑

C: CONS. OF DOM. AND FOREIGN GOODS

C − IM = DOM DEM. FOR DOM GOOD

$NX = EX - IM$

DOES NOT CHANGE — IM GOES UP

$C = C_{DOM\ GOOD} + C_{FOREIGN\ GOOD}$

IM - DOM DEMAND FOR FOREIGN

Short-run FX and money market model

Exogenous variables

Variable	Description
R^*	Foreign interest rate
E^e	Expected exchange rate
Y	Real income
M^s	Money supply
P	Price level

Endogenous variables

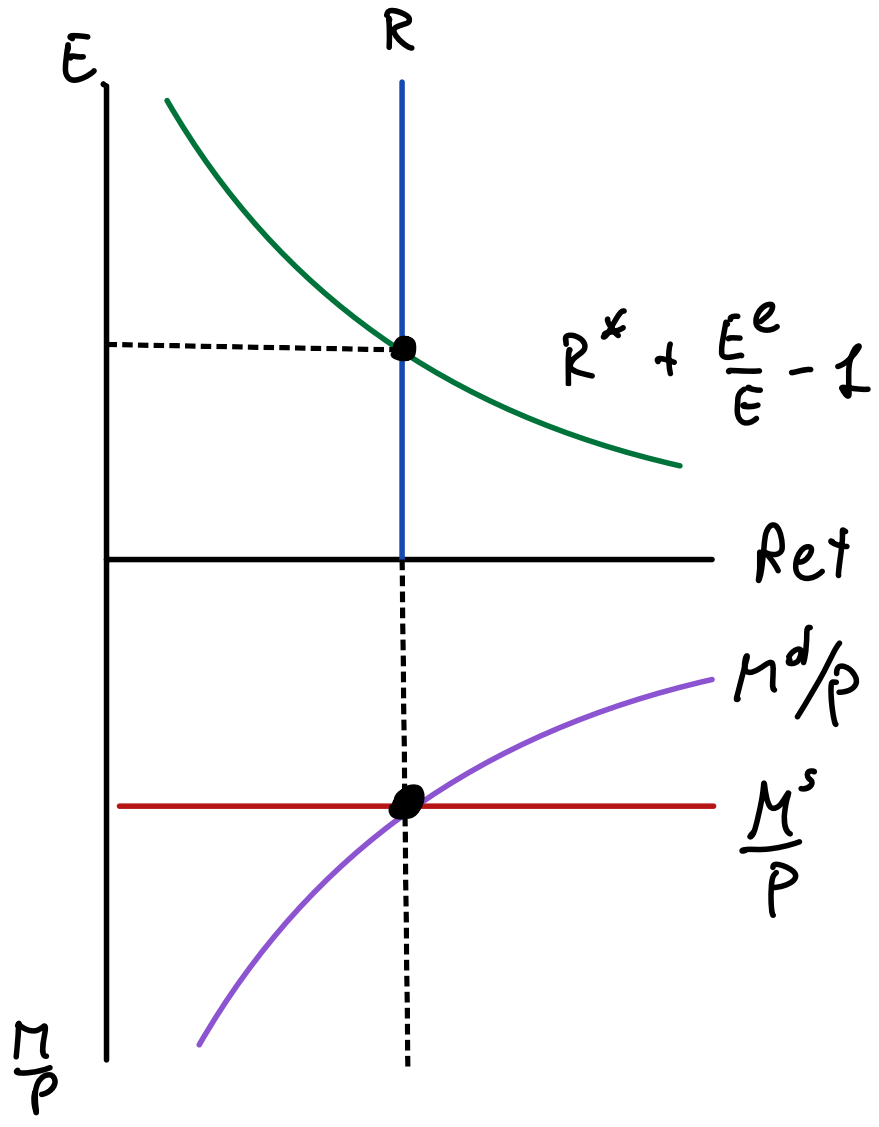
Variable	Description	Equation	Type of equation
E	Exchange rate	$R = R^* + \frac{E^e - E}{E}$	Equilibrium condition
R	Domestic interest rate	$M^d/P = \mathrm{L}(R, Y)$	Behavioral equation
M^d	Money demand	$M^d = M^s$	Equilibrium condition

AA Curve

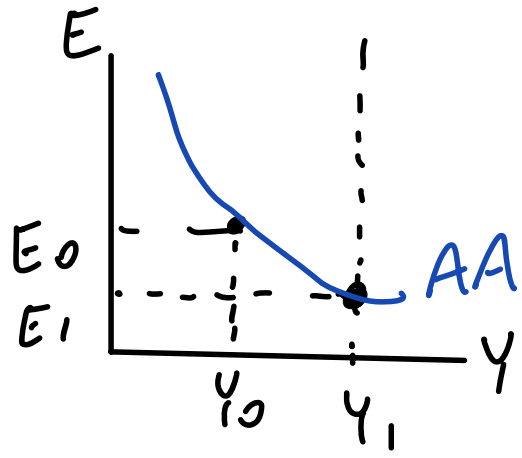
$$\text{(UIP):} \qquad R = R^* + \frac{E^e}{E} - 1$$

$$\text{(MS)} = \text{(MD)}: \qquad \frac{M^s}{P} = \underset{(-)\ (+)}{\mathrm{L}(R, Y)}$$

Y EXO, E ENDO } FIND E FOR GIVEN Y



AA Curve

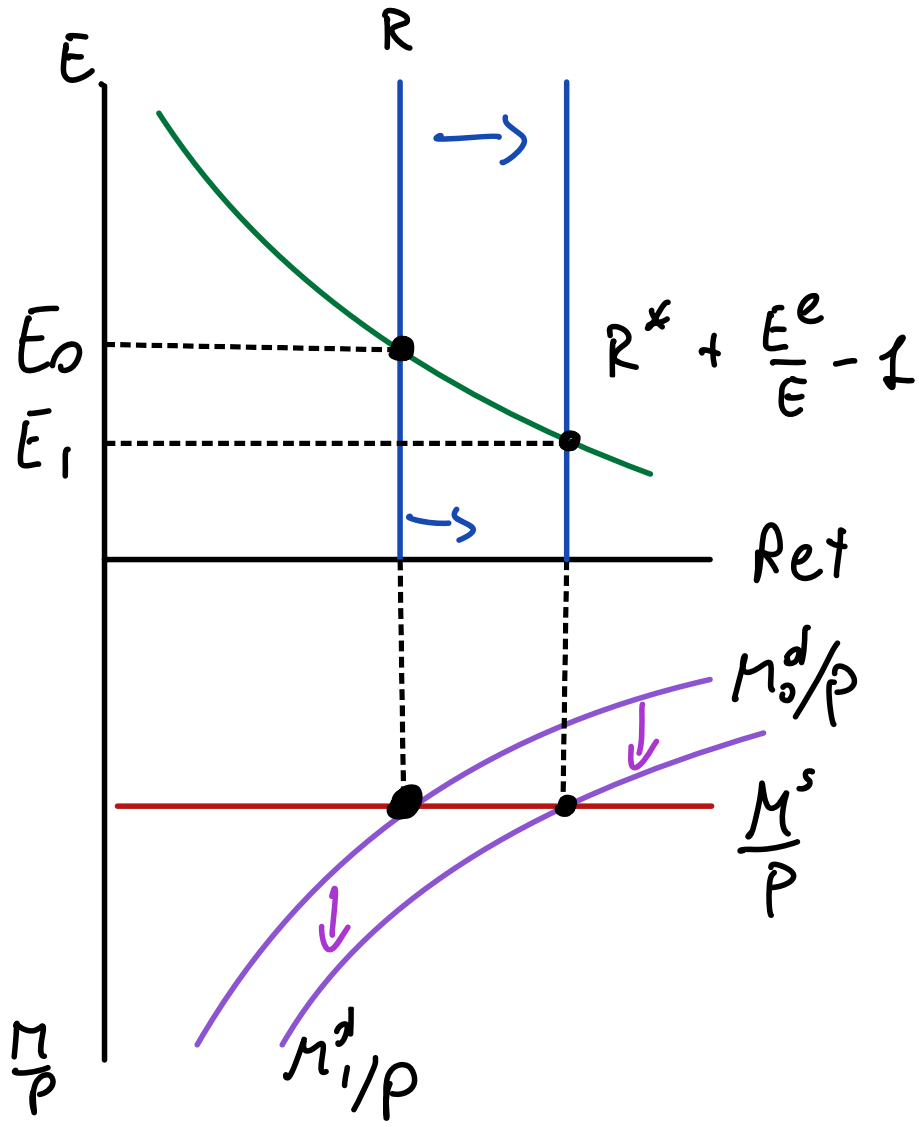


$$\text{(UIP):} \qquad R = R^* + \frac{E^e}{E} - 1$$

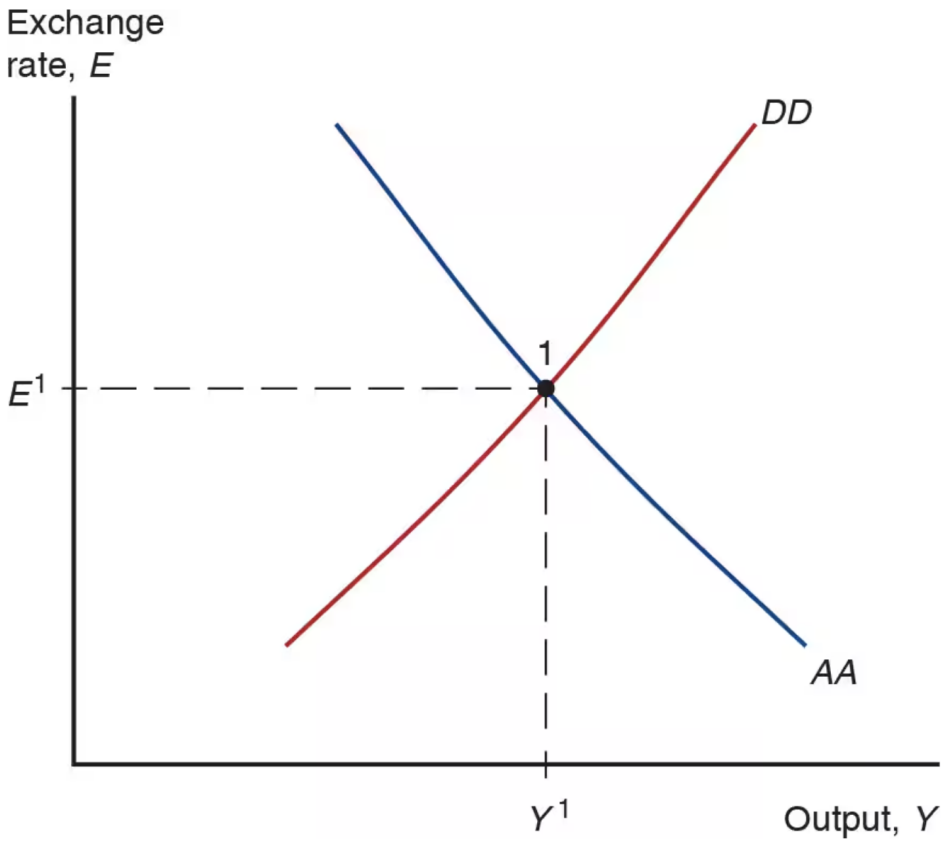
$$\text{(MS)} = \text{(MD)}: \qquad \frac{M^s}{P} = \underset{(-)\ (+)}{\mathrm{L}(R, Y)}$$

(Y_0, E_0) WITH $Y_1 > Y_0$

(Y_1, E_1) $E_1 < E_0$



Short-run Equilibrium in *AA-DD* model



GOODS

E EXO

MM + FX

Y EXO

COMBINE

Y, E ARE BOTH ENDO

Example: DD Schedule

$$\underset{(+)}{\mathrm{C}}(Y_D) = 1 + 0.75Y_D$$

$$\mathrm{EX}(\underset{(+)}{q}, \underset{(+)}{Y^*}) = 0.15 + 0.5q + 0.1Y^*$$

$$\mathrm{IM}(\underset{(-)}{q}, \underset{(+)}{Y_D}) = 0.1 - 0.2q + 0.12Y_D$$

$$Y_D = Y - T$$

$$q = \frac{EP^*}{P}$$

How to find the DD schedule

EQ. COND FOR GOODS:

$Y = D$

$Y = C + I + G + CA$

$Y = 1 + 0.75(Y-T) + I + G +$

$+ 0.15 + 0.5q + 0.1Y^*$

$- 0.1 + 0.2q - 0.12(Y-T)$

Example: DD Schedule

$$\underset{(+)}{\mathrm{C}}(Y_D) = 1 + 0.75Y_D$$

$$\mathrm{EX}(\underset{(+)}{q}, \underset{(+)}{Y^*}) = 0.15 + 0.5q + 0.1Y^*$$

$$\mathrm{IM}(\underset{(-)}{q}, \underset{(+)}{Y_D}) = 0.1 - 0.2q + 0.12Y_D$$

$$Y_D = Y - T$$

$$q = \frac{EP^*}{P}$$

- CAN SOLVE FOR E TO GET EXPLICIT

E = FUNCTION OF Y.

How to find the DD schedule

$$Y = 1 + 0.75(Y - T) + I + G + 0.15 + 0.5q + 0.1Y^* - 0.1 + 0.2q - 0.12(Y - T)$$

$$Y = 1 + 0.15 - 0.1 + I + G + (0.75 - 0.12)(Y - T) + (0.5 + 0.2)\frac{EP^*}{P} + 0.1Y^*$$

Example: AA Schedule

- CAN SOLVE FOR E TO GET:

E = FUNCTION OF Y

$$R = R^* + \frac{E^e - E}{E}$$

$$\frac{M^d}{P} = \frac{M^s}{P}$$

$$\frac{M^d}{P} = \mathrm{L}(\underset{(-)}{R}, \underset{(+)}{Y})$$
$$= 1.1 - R + 0.05Y$$

How to find the AA schedule

$$\frac{M^s}{P} = \frac{M^d}{P}$$

$$\frac{M^s}{P} = 1.1 - R + 0.5Y$$

$$\frac{M^s}{P} = 1.1 - R^* - \frac{E^e}{E} + 1 + 0.5Y$$

Example: AA Schedule

$$R = R^* + \frac{E^e - E}{E}$$

$$\frac{M^d}{P} = \frac{M^s}{P}$$

$$\frac{M^d}{P} = \mathrm{L}(\underset{(-)}{R}, \underset{(+)}{Y})$$
$$= 1.1 - R + 0.05Y$$

- CAN SOLVE FOR E TO GET:

E = FUNCTION OF Y

How to find the AA schedule

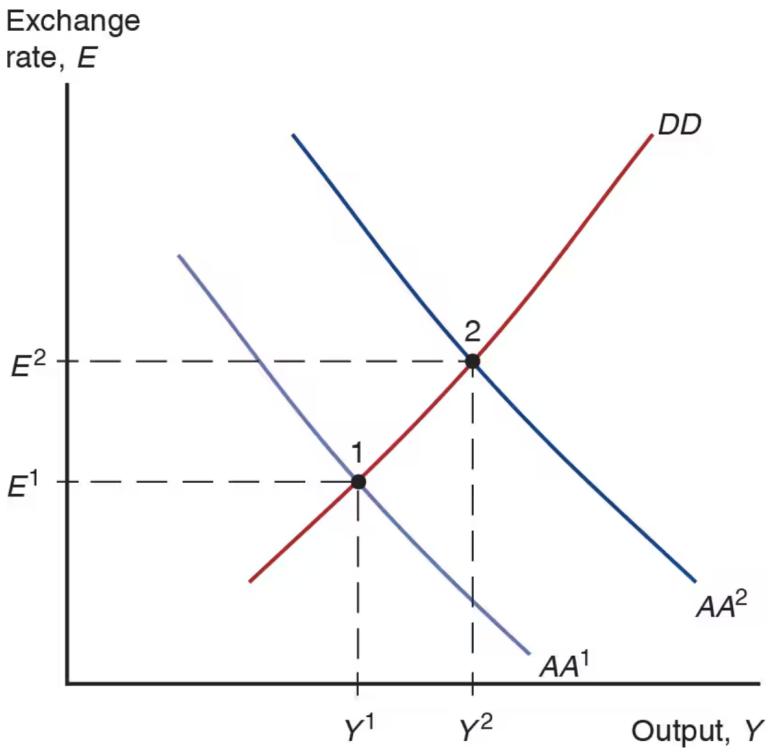
$$\frac{M^s}{P} = 1.1 - R^* - \frac{E^e}{E} + 1 + 0.5Y$$

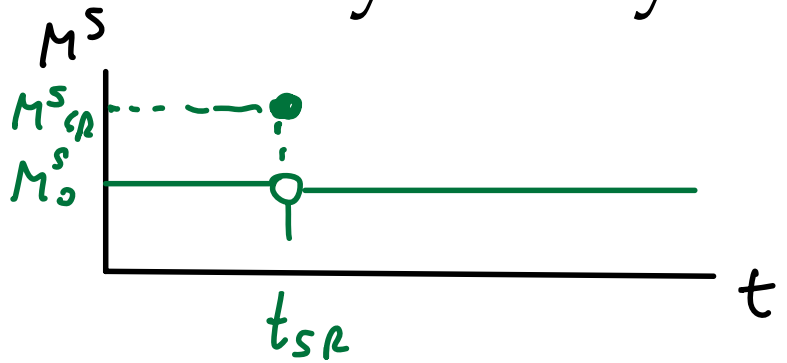
SOLVE FOR E:

$$E^e/E = 1.1 - R^* + 1 - M^s/P + 0.5Y$$

$$E = \frac{E^e}{1.1 - R^* + 1 - M^s/P + 0.5Y}$$

Temporary Change in Monetary Policy





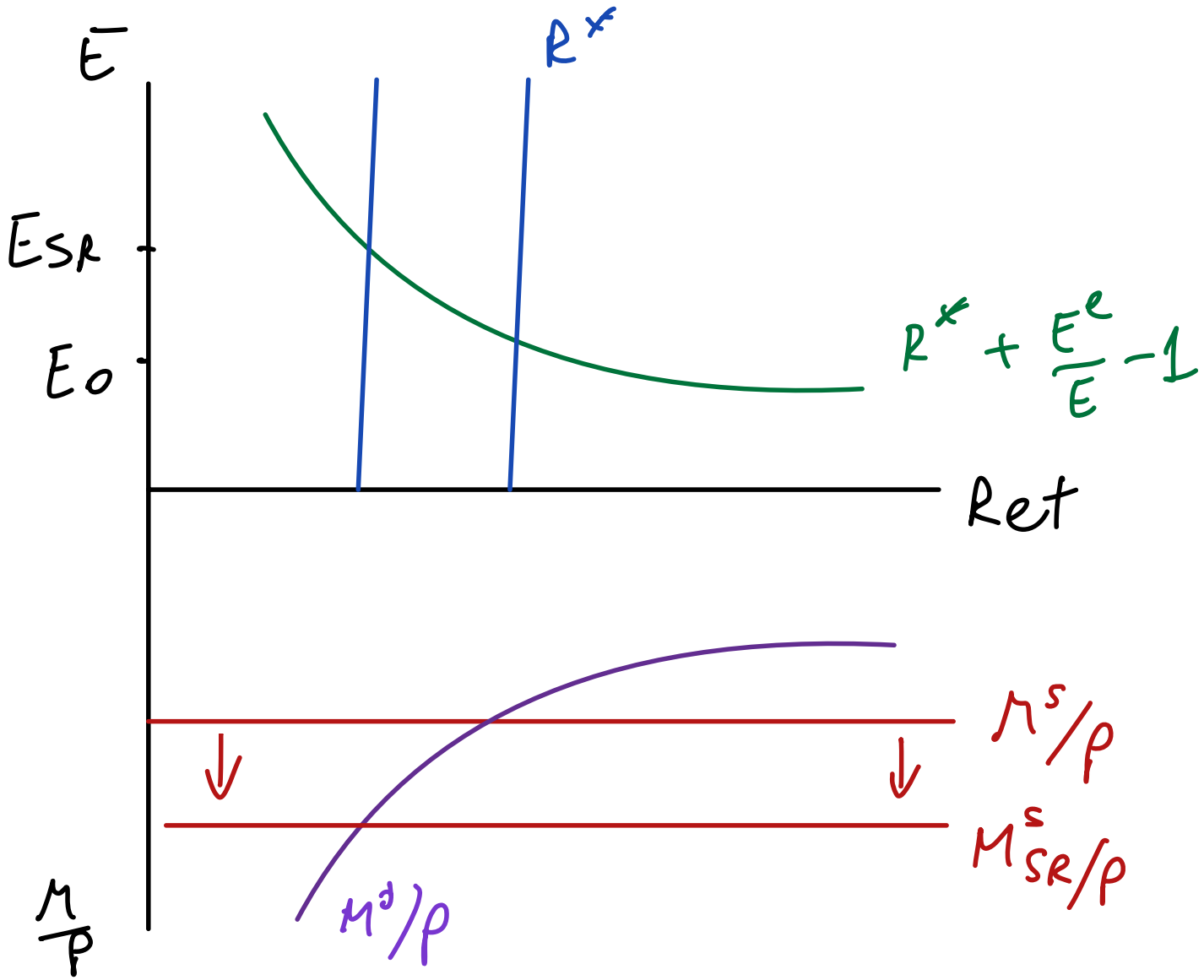
TEMPORARY SHOCKS

- KEEP LONG RUN E UNCHANGED $\Rightarrow$ $E^e_{SR} = E_{LR}$ UNCHANGED
- $P_{SR} = P_0$ FIXED

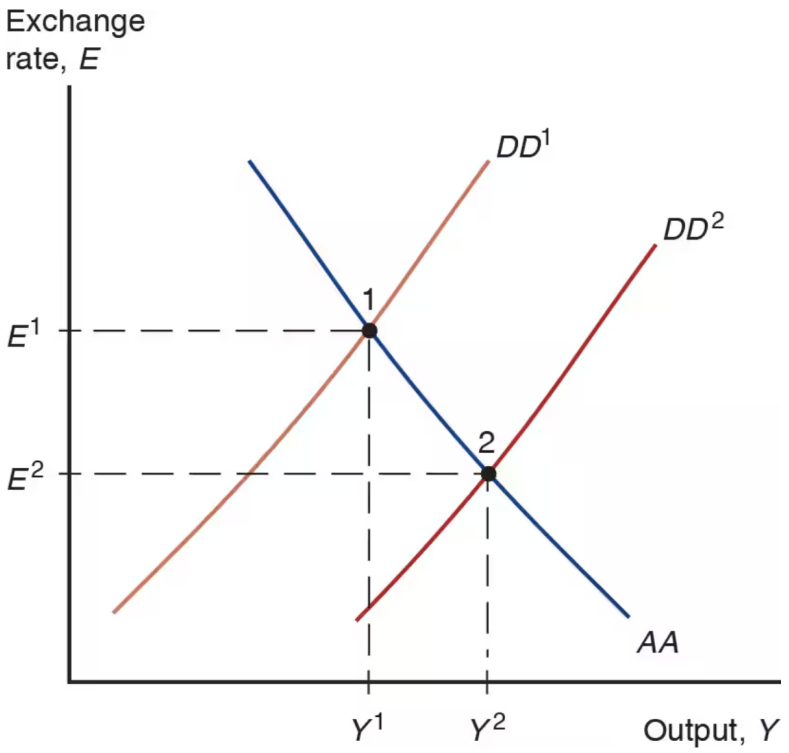
$M^S \uparrow$

LEADS TO

$E \uparrow$



Temporary Change in Fiscal Policy



G↑ IN SR ONLY

D↑ Y↑ FOR ANY $\bar{E}$

=> DD SHIFTS TO THE RIGHT

Example: DD Schedule

$$\underset{(+)}{\mathrm{C}}(Y_D) = 1 + 0.75Y_D$$

$$\mathrm{EX}(\underset{(+)}{q}, \underset{(+)}{Y^*}) = 0.15 + 0.5q + 0.1Y^*$$

$$\mathrm{IM}(\underset{(-)}{q}, \underset{(+)}{Y_D}) = 0.1 - 0.2q + 0.12Y_D$$

$$Y_D = Y - T$$

$$q = \frac{EP^*}{P}$$

- Plug in given C, EX, IM, Y_D, q into the equilibrium condition for the goods market $Y = C + I + G + \mathrm{EX} - \mathrm{IM}$ to get:

$$Y = 1.05 + 0.63(Y - T) + 0.7\frac{EP^*}{P} + I + G + 0.1Y^*$$

- Solve for E to get the DD curve:

$$E = \frac{1}{0.7}\frac{P}{P^*}\left(-1.05 + 0.37Y + 0.63T - I - G - 0.1Y^*\right)$$

Example: AA Schedule

$$R = R^* + \frac{E^e}{E} - 1$$

$$\frac{M^d}{P} = \frac{M^s}{P}$$

$$\frac{M^d}{P} = \mathrm{L}(\underset{(-)}{R}, \underset{(+)}{Y}) = 1.1 - R + 0.05Y$$

- Plug in UIP into money market equilibrium condition:

$$\frac{M^s}{P} = 1.1 - \left(R^* + \frac{E^e}{E} - 1\right) + 0.05Y$$

- Solve for E to get the AA curve:

$$E = \frac{E^e}{2.1 - \frac{M^s}{P} - R^* + 0.05Y}$$

Full AA-DD Model

$$\text{DD Schedule:} \quad Y = \text{C}(Y - T) + I + G + \text{CA}(EP^*/P, Y - T, Y^*)$$

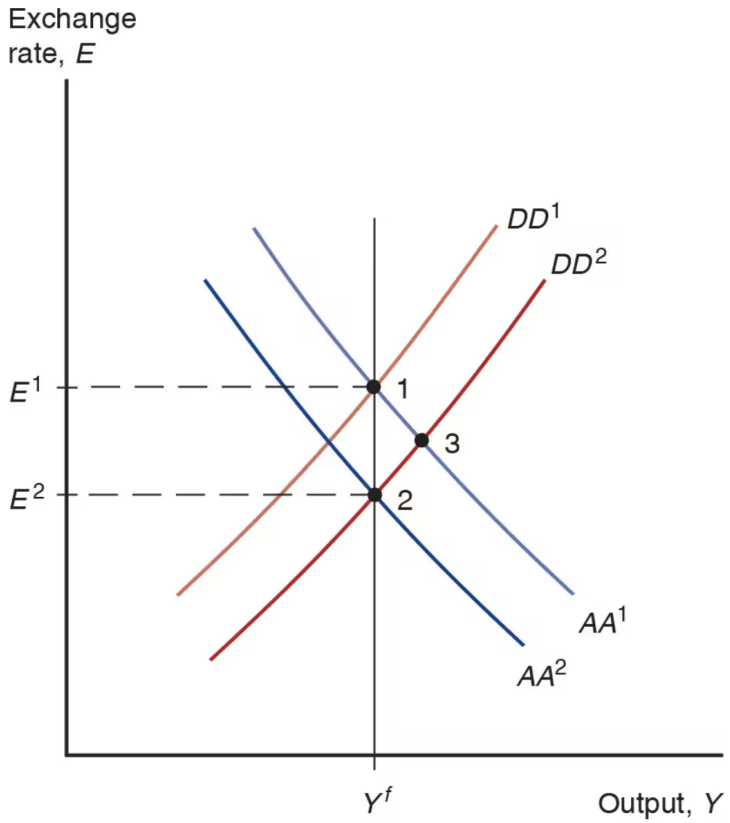
$$\text{AA Schedule:} \quad \frac{M^s}{P} = \text{L}\left(R^* + \frac{E^e}{E} - 1, Y\right)$$

$$\text{Phillips Curve:} \quad \pi = \pi^e + \alpha(Y - Y^f)$$

$$\text{Definition of inflation:} \quad \pi_t = \frac{P_t}{P_{t-1}} - 1$$

$$\text{Definition of expected inflation:} \quad \pi_t^e = \frac{P_{t+1}^e}{P_t} - 1$$

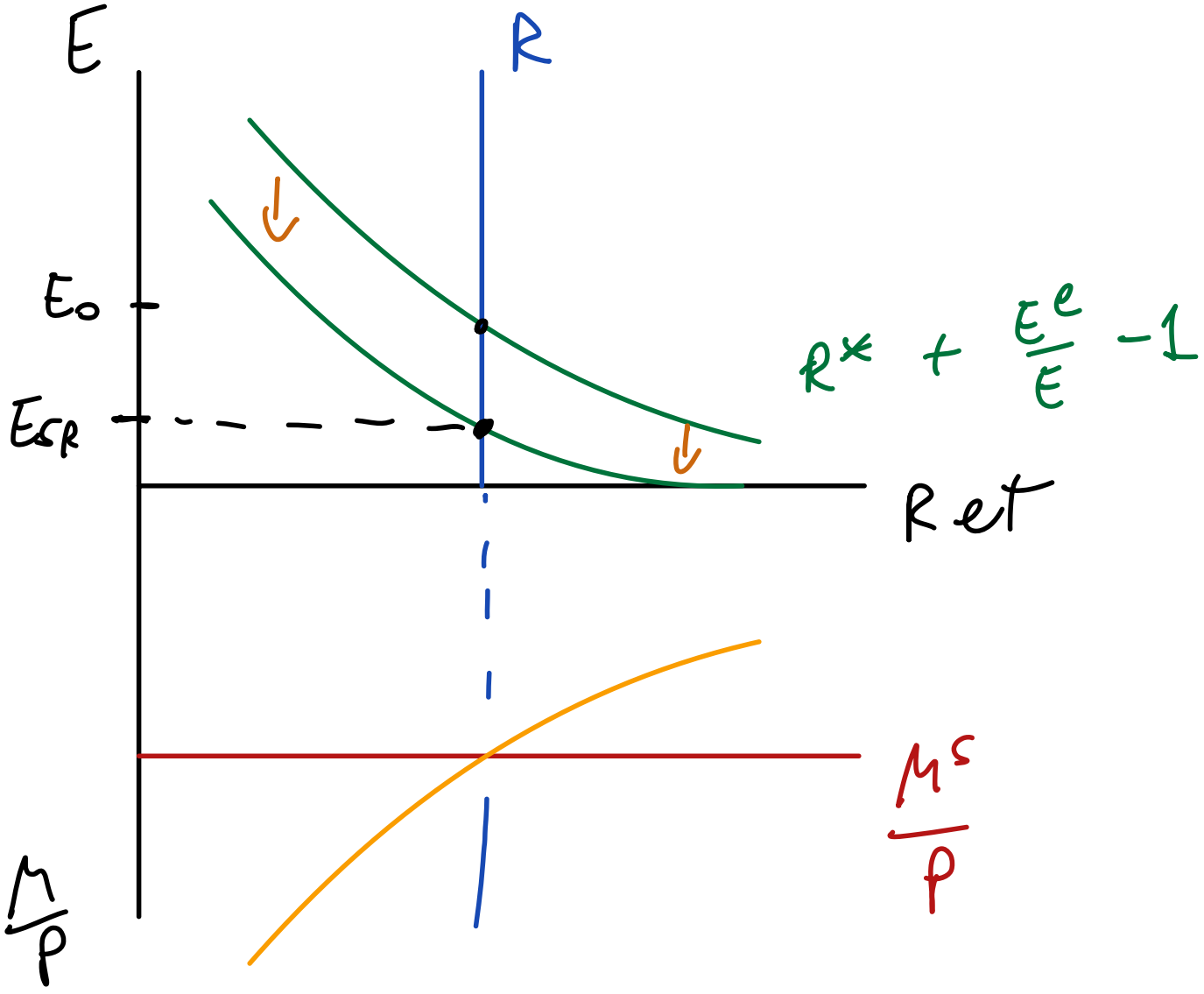
Permanent Shifts in Fiscal Policy



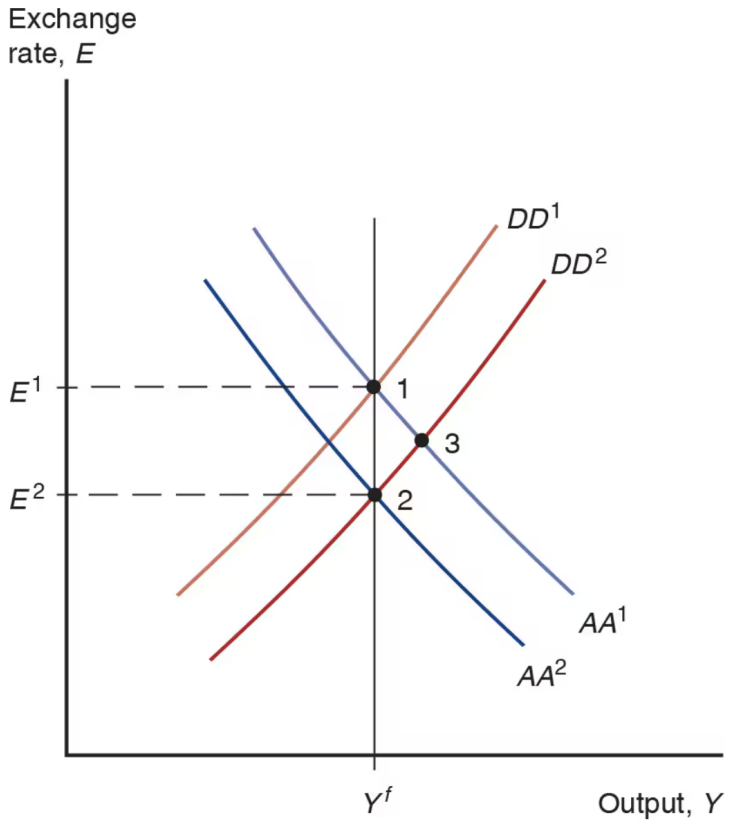
G↑ PERMANENTLY

=> D↑ => Y↑ => DD SHIFTS TO THE RIGHT

$$(AA): \frac{M^S}{P} = L\left(R^* + \frac{E^e - E}{E}, Y\right)$$

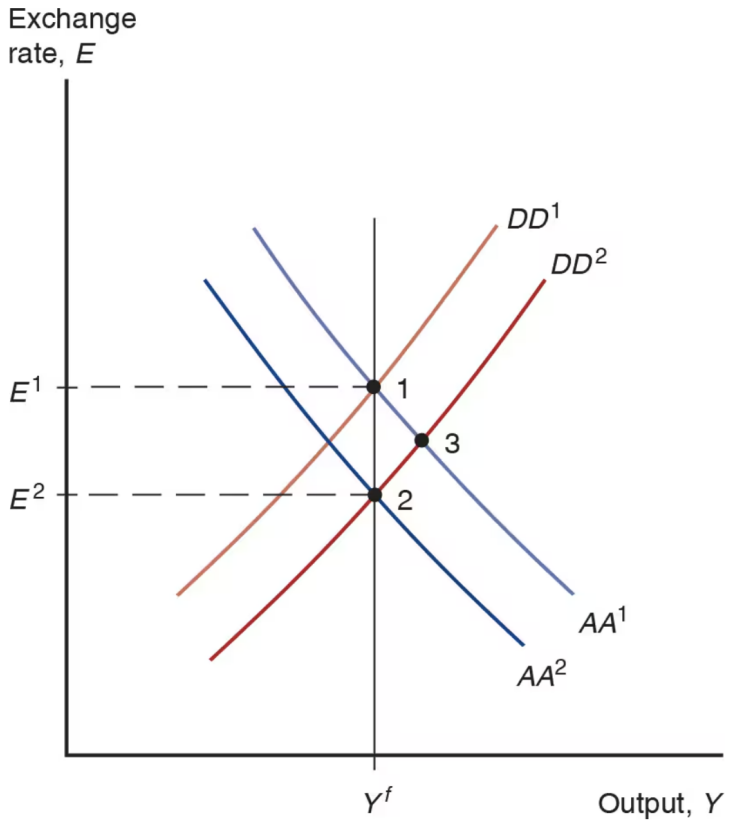

E
R
E_0
E_{cR}
$R^* + \frac{E^e}{E} - 1$
R et
$\frac{M^s}{P}$
$\frac{M}{P}$

Permanent Shifts in Fiscal Policy



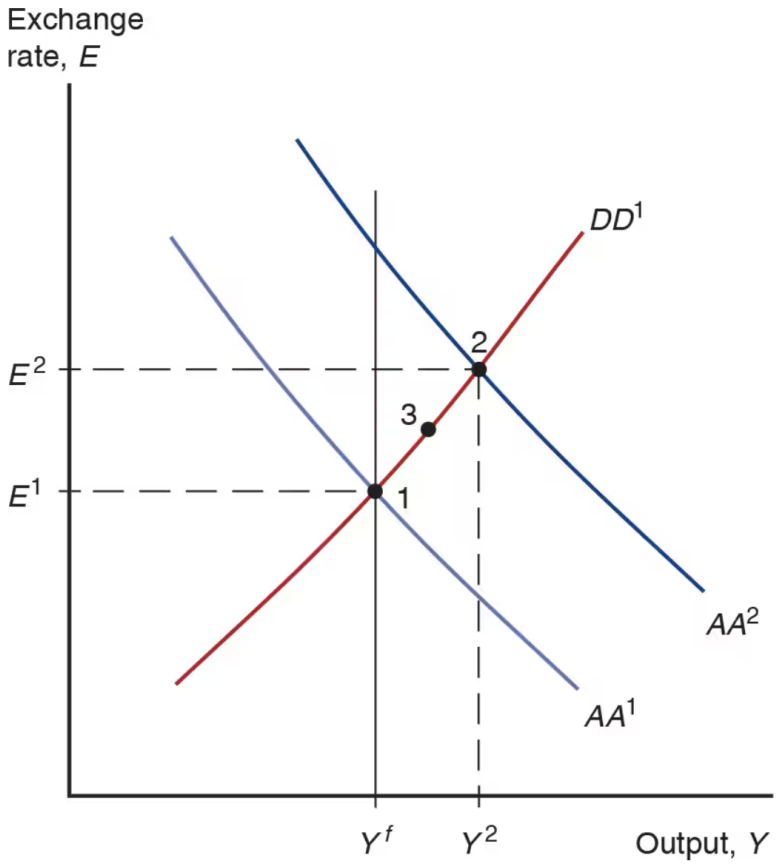
- Start in a medium run equilibrium at point 1 with $R_0 = R^*$ and $E_0^e = E^1$
- Increase in G shifts DD to the right
- At point 3, exchange rate is lower than E_1
- Since the shift in DD is permanent, appreciation at point 3 is also expected to be permanent
- E^e must also go down
- Lower E^e shifts AA down
- But how much?

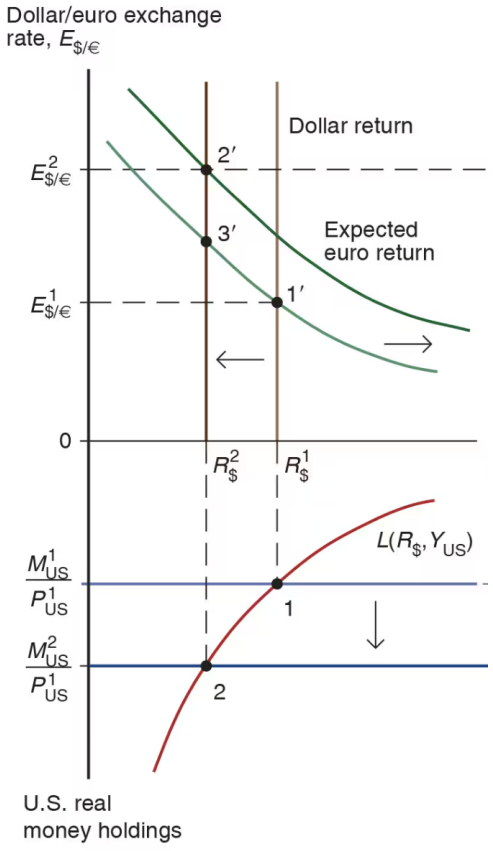
Permanent Shifts in Fiscal Policy



- There are no more shifts expected to occur, E^e remains constant
- Real money supply is constant
- Long run real money demand must stay unchanged
- Then P never changes
- MS=MD implies R does not change
- UIP implies E does not change either
- If Y must be equal to its original level Y^f, AA^1 must shift to AA^2

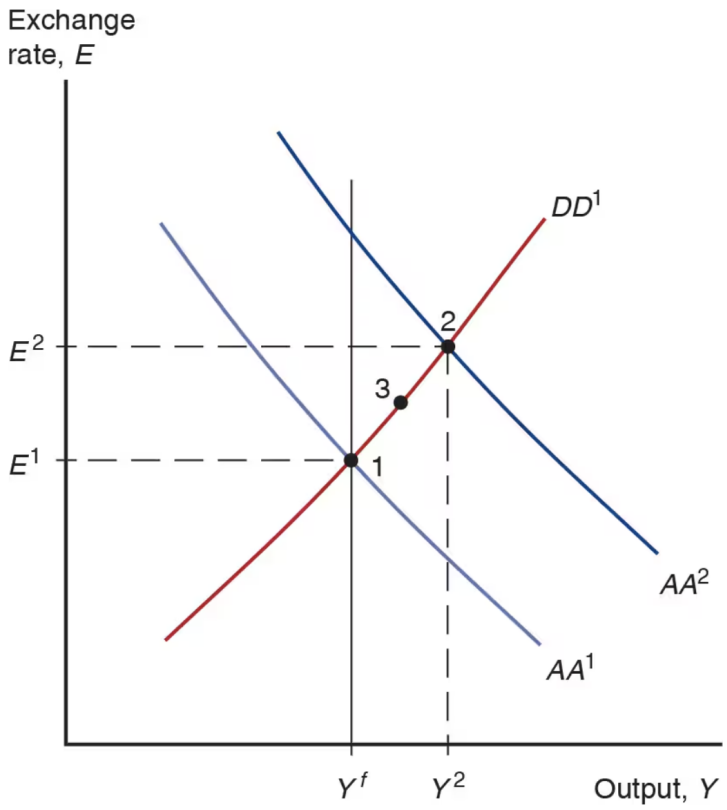
Permanent Shifts in Monetary Policy

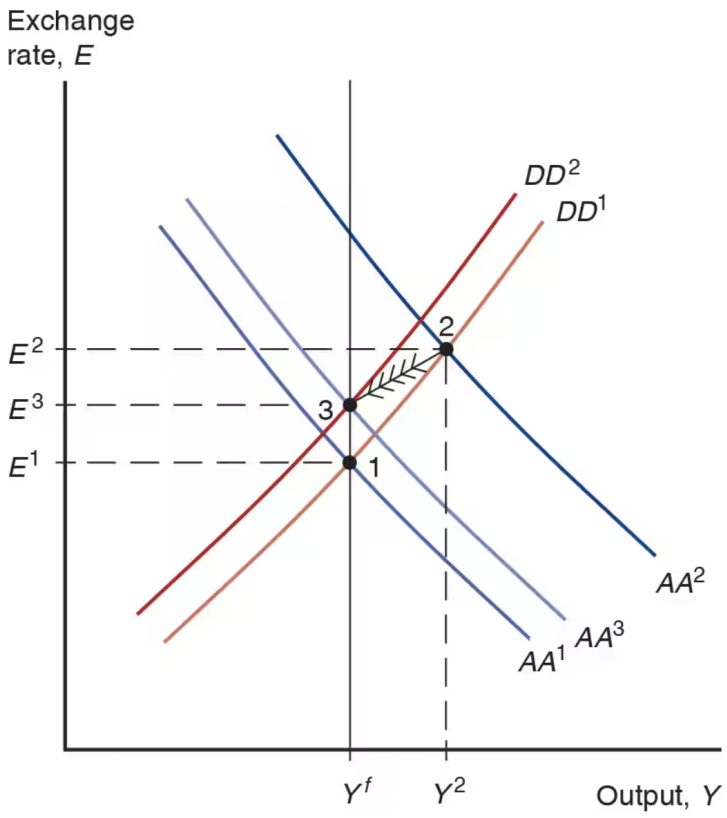




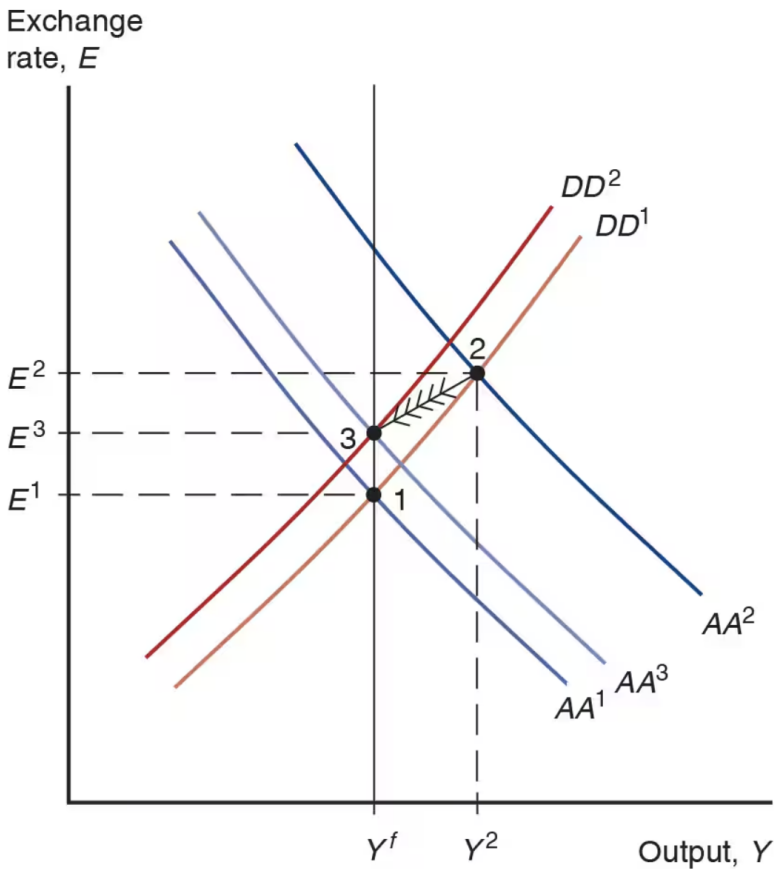
(a) Short-run effects

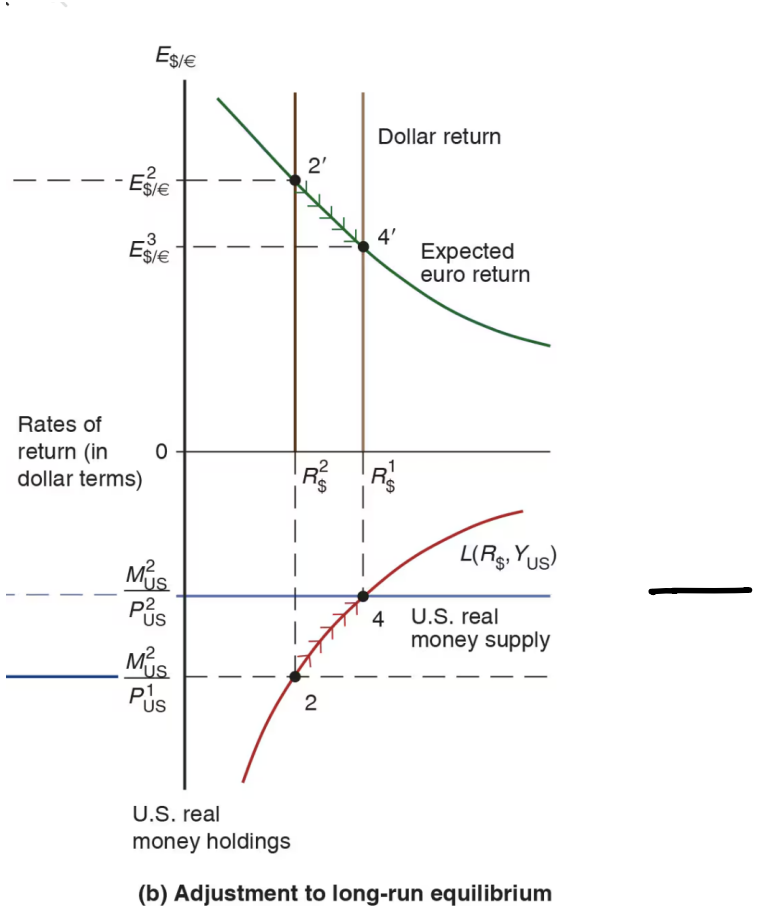
Permanent Shifts in Monetary Policy





Permanent Shifts in Monetary Policy





(b) Adjustment to long-run equilibrium

DD Schedule with Tariffs

IMPORT TARIFFS - "AD VALOREM" → PROPORTIONAL

$$IM = q \times VOLUME$$

- IM: UNITS OF DOM GOOD
- q: CHANGE OF UNITS
- $VOLUME$: IN UNITS OF FOREIGN GOOD

$$IM(q, Y-T)$$
$$(-) \quad (+)$$

$$= q \times VOLUME(q, Y-T)$$
$$(-) \quad (+)$$

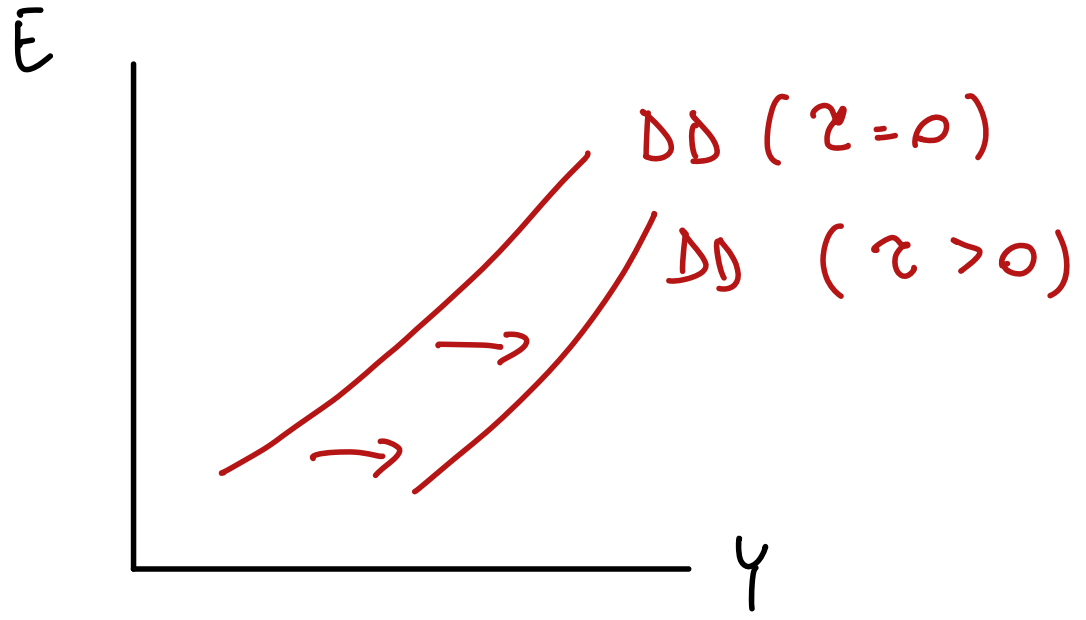
$$= q \, VOLUME\left(\frac{EP^*}{P}, Y-T\right)$$

$$IM = q \times VOLUME\left(\frac{EP^{*}(1+\tau)}{P}, Y - T\right)$$

AD VALOREM TARIFF

$$IM = IM\underset{(-)}{(}q\underset{(-)}{,}\ Y-T\underset{(+)}{,}\ \tau\underset{(-)}{)}$$

$$Y = C + I + G + EX - IM\underset{(-)}{(}\tau)$$



DD SHIFTS TO THE RIGHT WHEN τ GOES UP