

# Slides for International Finance

## Aggregate Demand and the SR (KO Chapter 16)

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# PREVIEW

- AA Curve
  - Review SR model of asset market equilibrium
  - $\uparrow Y \rightarrow \downarrow E$  (to maintain asset mkt eq)
- DD Curve
  - Develop SR model of output market equilibrium
  - $\uparrow E \rightarrow \uparrow Y$  (to maintain asset mkt eq)
- SR Model
  - both output market equilibrium and asset market equilibrium
  - Effects of temporary and permanent changes in monetary and fiscal policies.
  - Adjustment of the current account over time.
- IS-LM model
  - alternative perspective on the same results

# SR vs. LR Models

## LR models:

- all prices of inputs and outputs have time to adjust.
- predict future exchange rate tendencies
- suggest ways of thinking about how market participants form expectations

## SR models:

- some prices of inputs and outputs do not fully adjust
  - *labor contracts*
  - *costs of adjustment*
  - *imperfect information about market demand.*

## Goal:

- show how macroeconomic policies affect  $E$ ,  $Y$ , and  $CA$

# Short Run Equilibrium in Asset Markets

Consider two related asset markets:

**money market:**  $M/P = L(R, Y)$

$\uparrow Y \rightarrow \uparrow L \rightarrow (M/P < L) \rightarrow \uparrow R$

**foreign exchange market:**  $R = R^* + (E_e - E)/E$

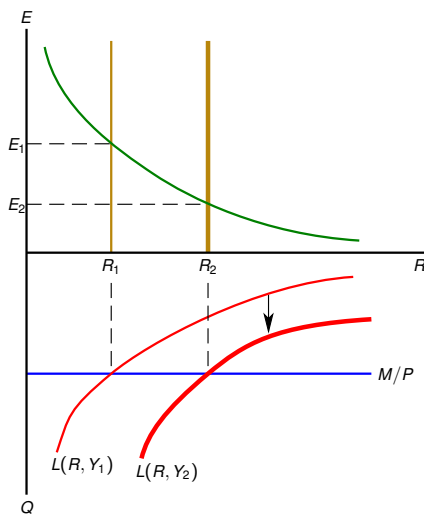
$\uparrow R \rightarrow \downarrow E$

**When income (production) increases:**

- the demand for real liquidity increases,
- driving up the domestic interest rate,
- causing an appreciation of the domestic currency.

Summary:  $\uparrow Y \rightarrow \downarrow E$

# Output and the Exchange Rate in Asset Market Equilibrium

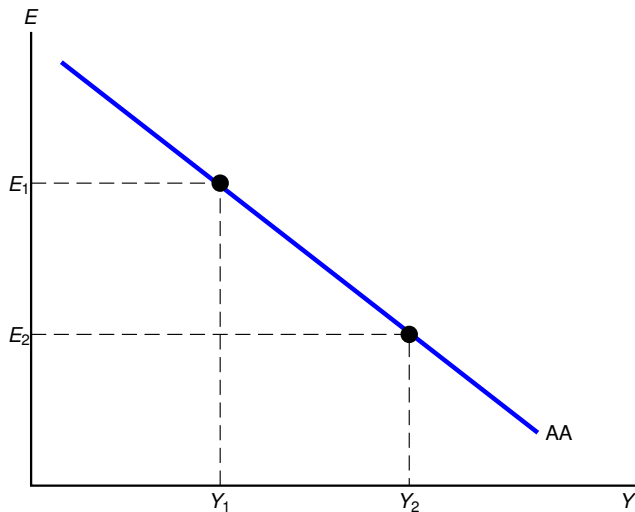


# Short Run Equilibrium in Asset Markets: AA Curve

**AA Curve:** Equilibrium in financial markets (money market and foreign exchange market).

The inverse relationship between output and exchange rates needed to keep the foreign exchange markets and the money market in equilibrium

# The AA Schedule

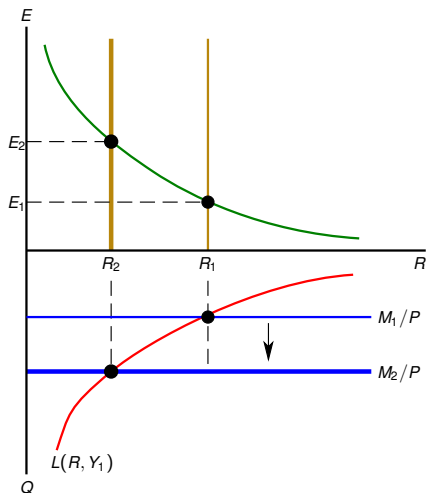


# Shifting the AA Curve

- 1  $\uparrow M \rightarrow \downarrow R$  (in the short run)  $\rightarrow \uparrow E$  (for every  $Y$ ): the AA curve shifts up
- 2  $\uparrow P \rightarrow \downarrow M/P \rightarrow \uparrow R \rightarrow \downarrow E$  (given  $Y$ ): the AA curve shifts down
- 3  $\uparrow L$  (exogenously)  $\rightarrow \uparrow R \rightarrow \downarrow E$  (given  $Y$ ): the AA curve shifts down
- 4  $\uparrow R^* \rightarrow$  foreign currency deposits more attractive  $\rightarrow \uparrow E$  (given  $Y$ ): the AA curve shifts up
- 5  $\uparrow E_e$ : if market participants expect the future domestic currency to be depreciated, foreign currency deposits become more attractive,  $\rightarrow \uparrow E$  (given  $Y$ ): the AA curve shifts up

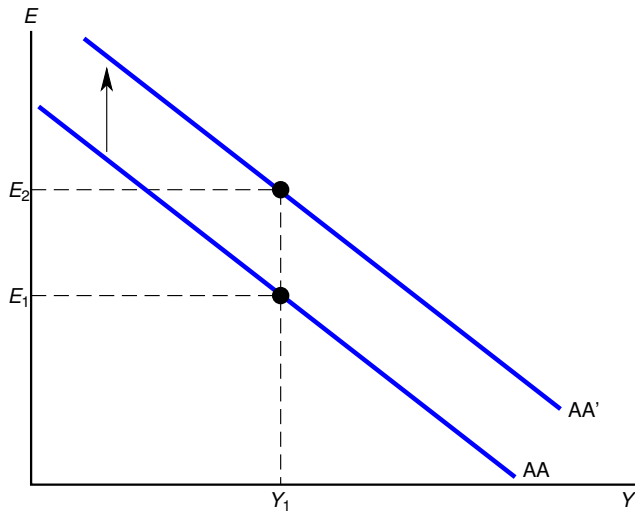


# $\uparrow M \rightarrow \uparrow E$ in Assets Markets

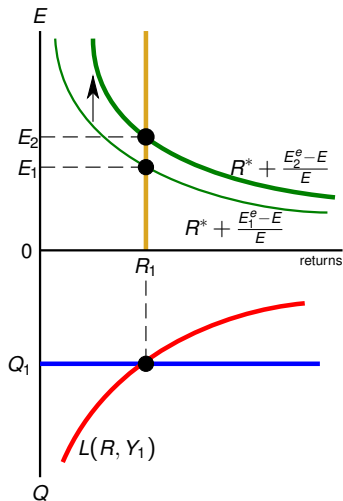
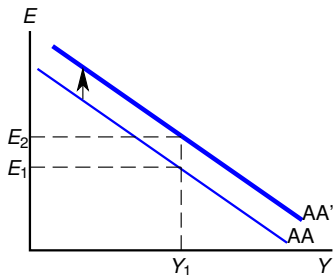


Compare KO 8 Figure 16-AAa

# $\uparrow M \rightarrow$ AA Shifts Up



$\uparrow E_e \rightarrow$  AA Shifts Up



# Determinants of Aggregate Demand

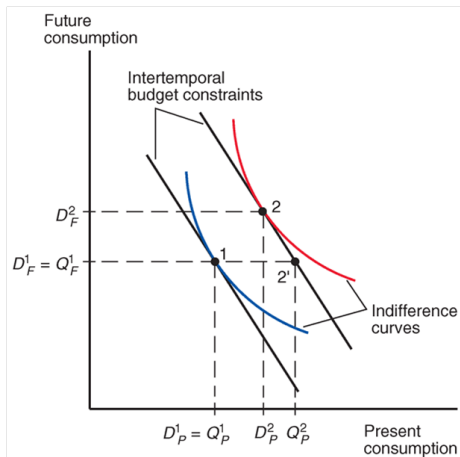
**Aggregate demand** the aggregate amount of goods and services that individuals and institutions are willing and able to buy

- C: consumption expenditure
- I: investment expenditure
- G: government expenditure (*purchases* of final goods and services)
- CA: net expenditure by foreigners (the current account)

# Determinants of Consumption Demand

- disposable income ( $Y_d = Y - T$ )  
 $\uparrow(Y-T) \rightarrow \uparrow C$  ( $mpc < 1$ )
- real interest rates  
theoretically indeterminate (conflicting income and substitution effects)  
empirically hard to detect  
we will ignore
- Wealth  
important theoretically and empirically  
nevertheless, we assume that wealth is relatively constant and thus a relatively unimportant consideration

# Income Shocks and Consumption



Source: KO 16A1-1

# Determinants of the Current Account

- disposable income ( $Y_d = Y - T$ )  
 $\uparrow(Y-T) \rightarrow \uparrow I_m$  ( $mpm < 1$ )
- real exchange rate ( $q = EP^*/P$ )  
theoretically indeterminant, but we assume:  
 $\uparrow q \rightarrow \uparrow Ex, \downarrow I_m \rightarrow \uparrow(Ex-I_m)$   
*expenditure shifting*: expenditure on domestic products rises, and expenditure on foreign products falls.

# Real Depreciation and the Current Account: More Details

**CA = EX - IM** the value of exports relative to the value of imports

**Real depreciation: a rise in  $q$  (i.e.,  $\uparrow EP^*/P$ )** prices of foreign products rise relative to the prices of domestic products.

- The volume of exports that are bought by foreigners rises.
- The volume of imports that are bought by domestic residents falls.
- The value of any given amount of imports in terms of domestic products rises (i.e., the relative price of imports rises, foreign products becomes relatively expensive)



# Marshall-Lerner Condition

## Real current account:

- $CA = EX - IM = EX - q \text{ } Im$
- measured in domestic goods
- Conflicting volume and valuation effects

## Marshall-Lerner Condition

- Condition for  $\uparrow q \rightarrow \uparrow CA$
- volume effects outweigh value effect
- need sum of export and import elasticities  $> 1$

$$\varepsilon_X + \varepsilon_M > 1$$

# SR Effect of Depreciation: Value Effects and Volume Effects

## SR volume effects

- volume of imports and exports is relatively fixed in SR

## value effects

- sticky prices:  $P$  and  $P^*$  relatively fixed in the short run
- pass through:  $\uparrow E \rightarrow \uparrow EP^*$  (imports cost more)
- $\uparrow (EP^*/P)$

## SR net effect

- domestic currency value of exports does not change.
- domestic currency value of imports rises
- $\downarrow CA$

# Depreciation and the Current Account: Elasticity Dynamics

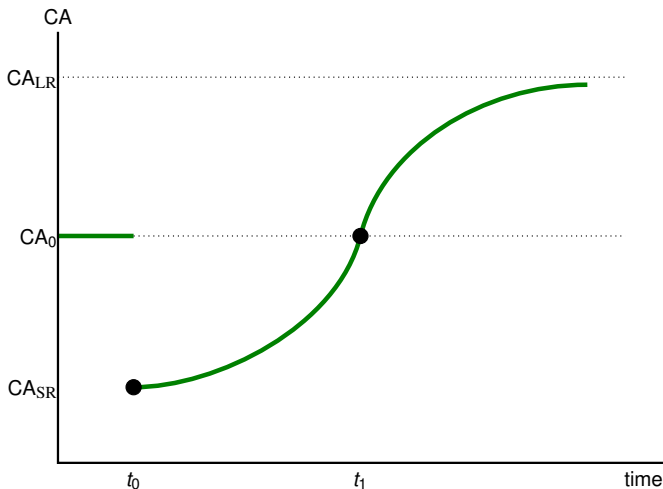
## SR net effect

- Initially volumes of imports and exports do not change much
- For example, contract obligations to buy fixed amounts of products may cause the volume effect to be small.
- → value effect may dominate the volume effect when the real exchange rate changes.

## Medium term net effect

- volumes gradually respond → the volume effect overcomes the value effect (eventually)
- evidence: in most countries, the volume effect dominates the value effect after one year or less.

# Depreciation and the Current Account: The J-Curve



Compare KO 8 Figure 16-18

# Exchange-Rate Pass Through

**Exchange-rate pass through:** the percentage by which import prices change when the value of the domestic currency changes by 1%.  
pass through may be less than 100% due

- price discrimination in different countries.
- price-setting firms may decide not to match changes in the exchange rate with changes in prices of foreign products

Pass through less than 100% dampens the effect of depreciation or appreciation on the current account.

- smaller decline in CA (smaller J-curve)
- but also: smaller volume effects

# Table 16A2-1: Estimated Price Elasticities for International Trade in Manufactured Goods

Country	$\eta$			$\eta^*$		
	Impact	Short-run	Long-run	Impact	Short-run	Long-run
Austria	0.39	0.71	1.37	0.03	0.36	0.80
Belgium	0.18	0.59	1.55	—	—	0.70
Britain	—	—	0.31	0.60	0.75	0.75
Canada	0.08	0.40	0.71	0.72	0.72	0.72
Denmark	0.82	1.13	1.13	0.55	0.93	1.14
France	0.20	0.48	1.25	—	0.49	0.60
Germany	—	—	1.41	0.57	0.77	0.77
Italy	—	0.56	0.64	0.94	0.94	0.94
Japan	0.59	1.01	1.61	0.16	0.72	0.97
Netherlands	0.24	0.49	0.89	0.71	1.22	1.22
Norway	0.40	0.74	1.49	—	0.01	0.71
Sweden	0.27	0.73	1.59	—	—	0.94
Switzerland	0.28	0.42	0.73	0.25	0.25	0.25
United States	0.18	0.48	1.67	—	1.06	1.06

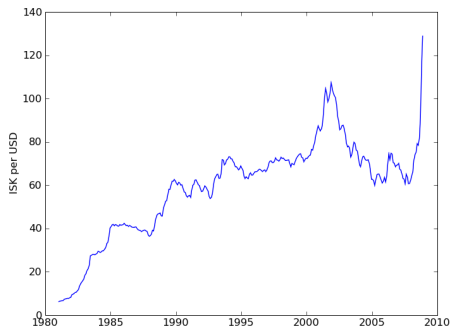
**Source:** Estimates are taken from Jacques R. Artus and Malcolm D. Knight, *Issues in the Assessment of the Exchange Rates of Industrial Countries*. Occasional Paper 29. Washington, D.C.: International Monetary Fund, July 1984, table 4. Unavailable estimates are indicated by dashes.

Source: KO 16A2-1

# Exchange Rates and Real Exchange Rates

- Nov 10, 2007
  - 59.92 Icelandic króna per USD
- Nov 10, 2008
  - 128.78 Icelandic króna per USD
- Depreciation over the period: 114.92%
- Inflation over the period: 15.90%
- HUGE real depreciation: 99.02%

# Depreciation in Iceland





# DD-AA model assumptions

- pass through rate is 100%: import prices in domestic currency exactly match a depreciation of the domestic currency.
- ML condition:
  - the volume effect dominates the value effect.
  - a real depreciation improves the current account

# Determinants of Aggregate Demand

- Determinants of the current account include:
  - Real exchange rate: an increase in the real exchange rate increases the current account.
  - Disposable income: an increase in the disposable income decreases the current account.

# Determinants of Aggregate Demand (cont.)

$I$ ,  $G$  and  $T$  are *exogenous*

- $G$  and  $T$  determined by political factors we do not model
- $I$  is determined by exogenous business decisions (for now)
  - (later we let  $I$  depend on the interest rate (i.e., on the cost of borrowing to finance investment)

Consumption =  $C(Y-T)$

Current account =  $CA(EP^*/P, Y-T)$

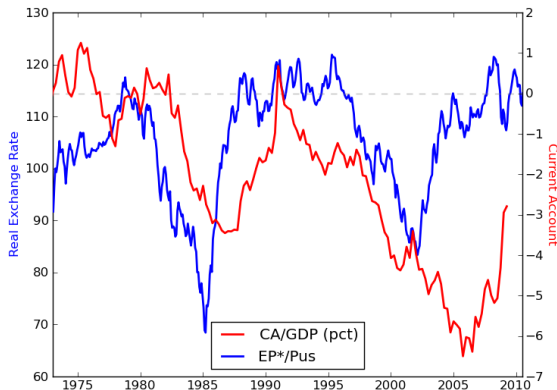
Therefore aggregate demand =  $C(Y-T) + I + G + CA(EP^*/P, Y-T)$

# Determinants of Aggregate Demand (cont.)

## Summarize the determinants of aggregate demand:

- $D = D(EP^* / P, Y-T, I, G)$
- $\uparrow q \rightarrow \uparrow CA \rightarrow \uparrow D$
- $\uparrow(Y-T) \rightarrow \uparrow C \rightarrow \uparrow D$  (even though  $\uparrow IM$ )  
 $mpm < mpc < 1$

# CA/GDP vs. $EP^*/P$ in the US



# Short Run Equilibrium for Aggregate Demand and Output

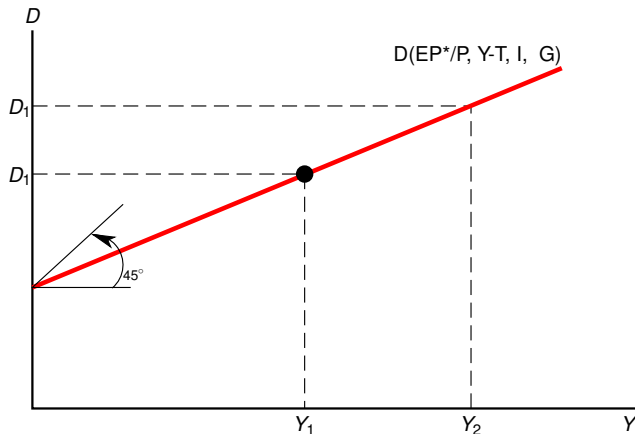
## Aggregate demand is a function of:

- the real exchange rate ( $EP^*/P$ )
- disposable income ( $Y-T$ )
- investment expenditure ( $I$ )
- government purchases of final goods and services ( $G$ )

**Equilibrium:** our aggregate output ( $Y$ ) equals the aggregate demand for our output ( $D$ )

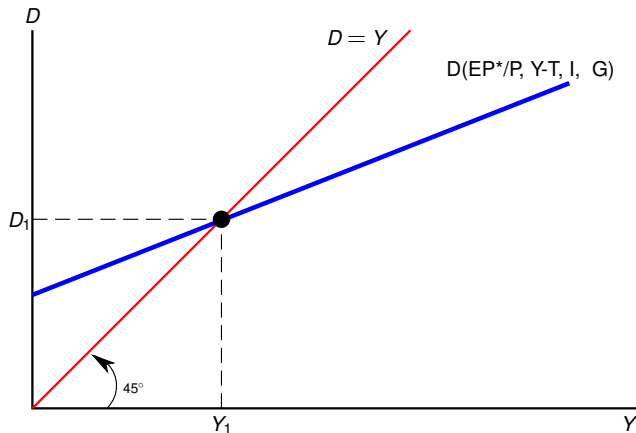
$$Y = D(EP^*/P, Y-T, I, G)$$

# Aggregate Demand as a Function of Output



Compare KO 8 Figure 16-1

# The Determination of Output in the Short Run



Compare KO 8 Figure 16-2

$AD > Y \rightarrow$  firms increase output;  $AD < Y \rightarrow$  firms decrease output



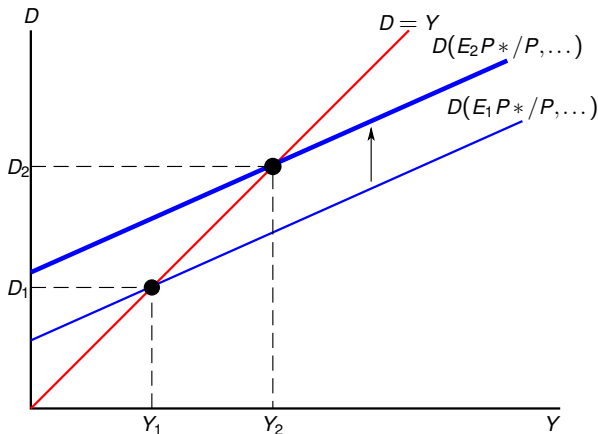
# Short Run Equilibrium and the Exchange Rate: DD Schedule

Q: How does E affect AD?

- A depreciation makes foreign goods and services relatively expensive (given domestic and foreign prices).
- Aggregate demand shifts toward domestic products.

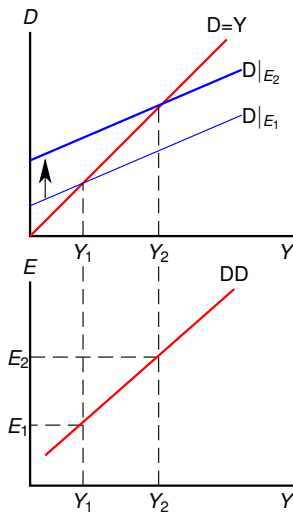
In equilibrium, production will increase to match the higher aggregate demand.

# Output Effect of $\uparrow E$ with Fixed Output Prices



Compare KO 8 Figure 16-3

# Deriving the DD Schedule



# Short Run Equilibrium and the Exchange Rate: DD Schedule (cont.)

## DD schedule

- shows combinations of output and the exchange rate at which the output market is in short run equilibrium (such that aggregate demand = aggregate output).
- slopes upward because a rise in the exchange rate causes aggregate demand and aggregate output to rise.

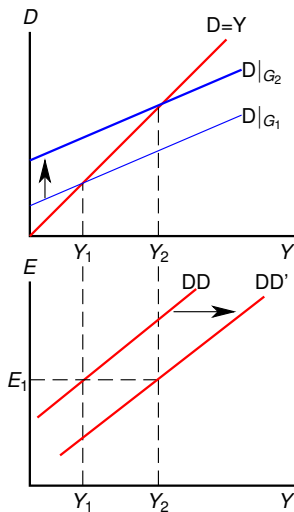
# Shifting the DD Curve

Changes in the exchange rate cause movements *along* the DD curve.  
Other changes cause *shifts* of the DD curve.

Exogenous  $\uparrow D \rightarrow$  DD shifts right:

- $\uparrow G \rightarrow \uparrow AD \rightarrow \uparrow Y.$
- $\uparrow I \rightarrow \uparrow AD \rightarrow \uparrow Y.$
- $\uparrow Cd \text{ (exog)} \rightarrow \uparrow AD \rightarrow \uparrow Y. \text{ (expenditure increase or switching)}$
- $\downarrow T \rightarrow \uparrow C \rightarrow \uparrow AD \rightarrow \uparrow Y.$
- $\downarrow P \rightarrow \uparrow q \rightarrow \uparrow CA \rightarrow \uparrow AD \rightarrow \uparrow Y.$
- $\uparrow P^* \rightarrow \uparrow q \rightarrow \uparrow CA \rightarrow \uparrow AD \rightarrow \uparrow Y.$

# ↑G Shifts the DD Curve to the Right



# Putting the Pieces Together: the DD and AA Curves

**Short run equilibrium:** a nominal exchange rate ( $E$ ) and a level of output ( $Y$ ) such that we are on both the DD and AA curves

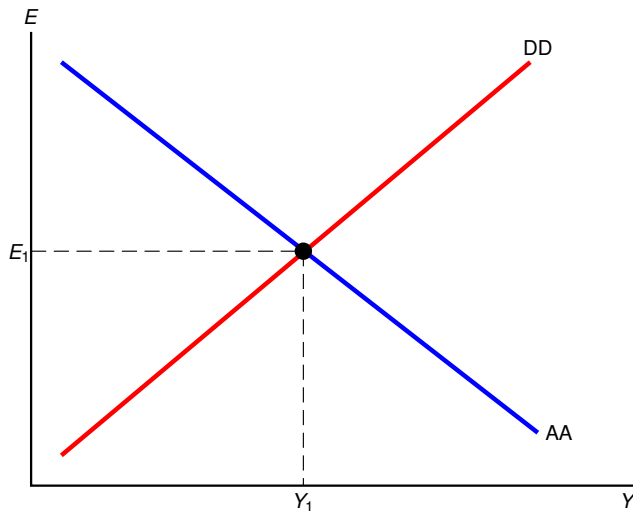
## DD curve

- output markets are in equilibrium on the DD curve
- $D = Y$  (aggregate demand equals aggregate output; equilibrium in the output markets)

## AA curve

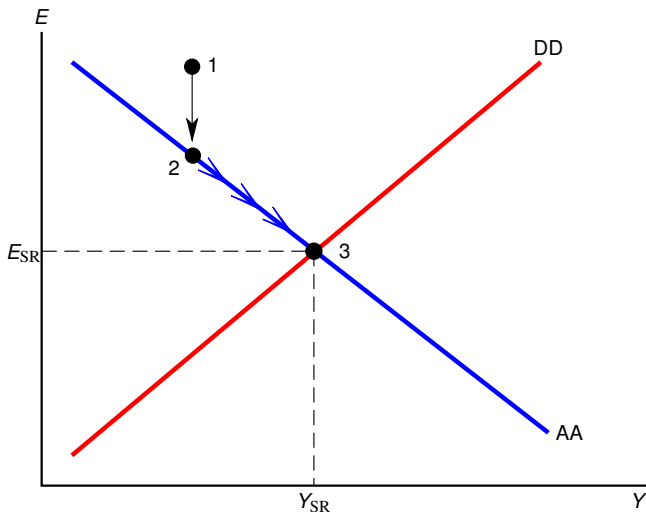
- asset markets are in equilibrium on the AA curve
- $R - R^* = (Ee - E)/E$  (interest parity; equilibrium in the foreign exchange markets)
- $M/P = L$  (real money supply equals real money demand; equilibrium in the money market)

# Short-Run Equilibrium in the DD-AA Model





# DD-AA Model: Very Short Run Disequilibrium Adjustment



# Temporary Changes in Monetary and Fiscal Policy

**Monetary policy:** the monetary authority (e.g., central bank) influences conditions in the money markets (e.g., the supply of monetary assets)

**Fiscal policy** the fiscal authority (e.g., treasury) influences aggregate demand via taxation and spending

**Temporary policy changes:**

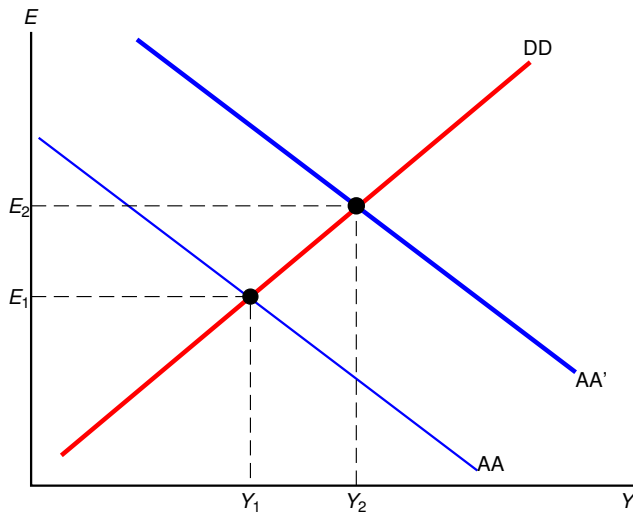
- expected to be reversed in the near future
- do **not** affect  $E_e$

# Impact of Temporary $\uparrow M$

**AA shifts up:**  $\uparrow M \rightarrow \downarrow R \rightarrow \uparrow E$

**Move along DD**  $\uparrow E \rightarrow \uparrow EP^*/P \rightarrow \uparrow D \rightarrow \uparrow Y$

# Temporary $\uparrow M$ : SR Effects



# Temporary Changes in Fiscal Policy

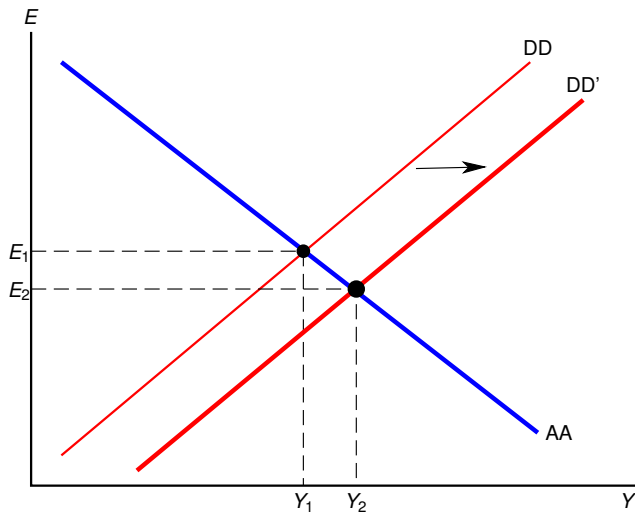
## Exogenous changes in aggregate demand

- *may* result from fiscal changes
- $\uparrow G \rightarrow \uparrow AD$  or  $\downarrow Tx \rightarrow \uparrow AD$
- $\uparrow AD \rightarrow$  equilibrium  $Y$  (at each  $E$ )
- i.e., the DD curve **shifts** right.

$\uparrow Y \rightarrow \uparrow L$

- increased demand of real monetary assets increases equilibrium interest rates,
- $\rightarrow \downarrow E$  (domestic currency appreciation)
- we **move along** the AA curve

# Temporary Fiscal Expansion: SR Effects



# How Big (Small?) Are Fiscal Multipliers?

**Robert Barro (WSJ, 2009):** Peacetime multipliers are essentially zero

**Christina Romer (2009):** Multiplier is around 1.5

**Difference:** 3.7 million jobs by the end of 2010

**Existing studies mainly confined to OECD countries:** Blanchard and Perotti (2002), Perotti (2004), Uhlig and Mountford (2005), Ramey (2008), Barro and Redlik (2009)

**Exception:** Ilzetzki, Mendoza, and Vegh (2009):

- 45 country panel (19 high-income, 26 developing)
- quarterly data (1960Q1 - 2007Q4)
- focus on the factors/characteristics that affect the size of the multipliers

# Fiscal Multipliers

**Question:** What is the impact on GDP of a \$1 increase in government expenditure?

**Impact Multiplier:**  $\Delta GDP_0 / \Delta G_0$

**Cumulative Multiplier**  $\sum_0^t \Delta GDP_t / \sum_0^t \Delta G_t$

**Long-run multiplier:** the cumulative multiplier once both impulse responses have died down.

Ilzetzki, Mendoza, and Vegh (2009) find characteristics matter:

- High income versus emerging/developing
- Fixed (predetermined) versus flexible exchange rate regimes
- Open versus closed
- High-debt versus low debt



## Policy conclusion:

Size of fiscal multipliers depends on key country characteristics:

- high income versus developing
- fixed versus flex
- closed versus open
- high debt versus low debt

**Worst combination:** developing, open, exchange rate flexibility  
→ Not much scope therefore for countercyclical fiscal policy

# Potential Output ( $Y_f$ )

## Potential output

- resources are used effectively and sustainably
- production is at the “potential” or “natural” level

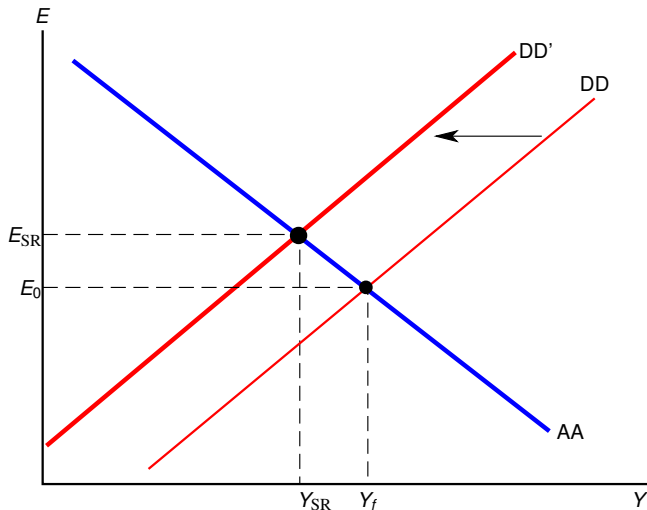
## Under utilization

- resources not used effectively, or
- resources are underemployed (e.g., high unemployment, few hours worked, idle equipment)
- → lower than normal production of goods and services.

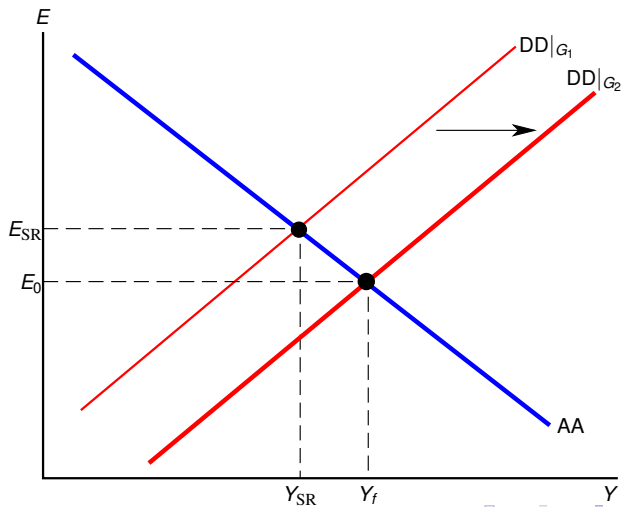
## Over utilization

- resources are not used sustainably
- resources are over-employed (e.g., unusually low unemployment, overtime hours, over-utilized equipment)
- → unsustainably high production of goods and services.

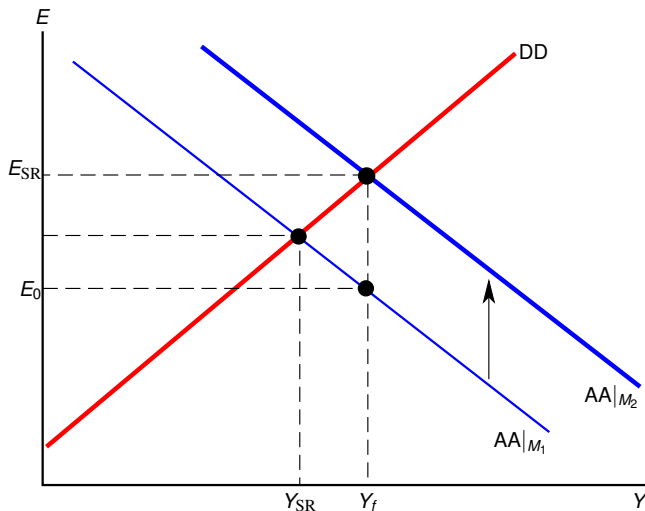
# Temporary Fall in Aggregate Demand: SR Effects



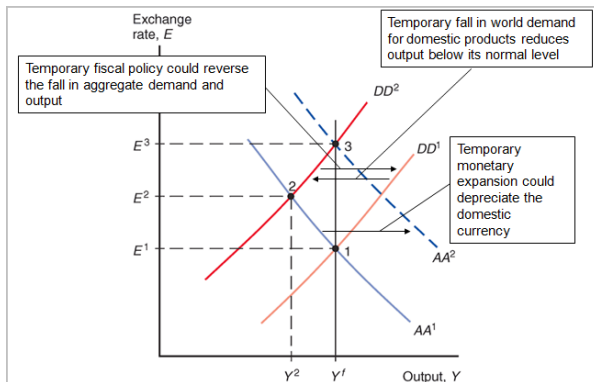
# $\uparrow G$ as Policy Response to Temporary $\downarrow D$



# $\uparrow M$ as Policy Response to Temporary $\downarrow D$

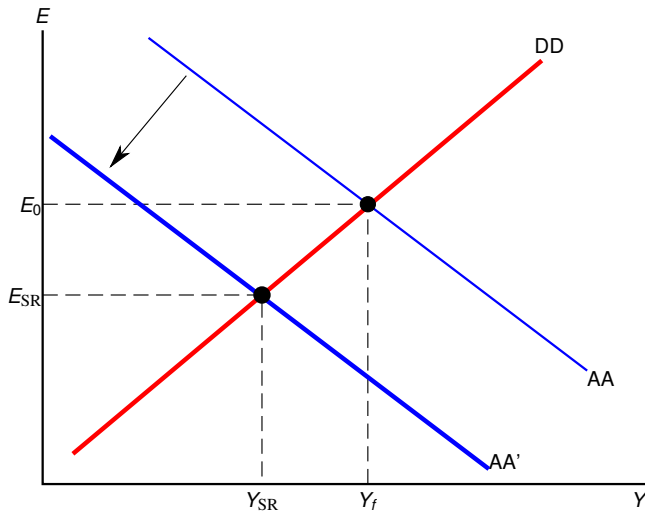


# Fig. 16-12: Maintaining Full Employment After a Temporary Fall in World Demand for Domestic Products

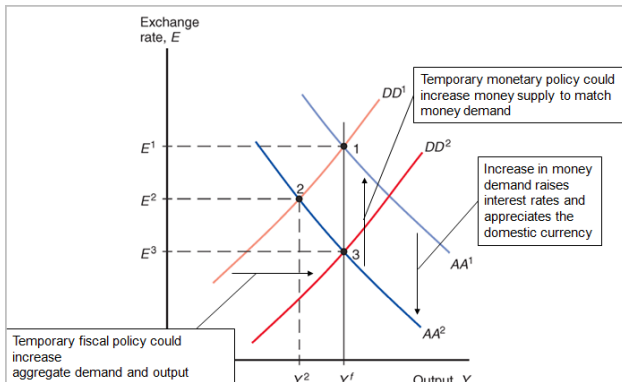


Source: KO Figure 16-12

# Temporary $\uparrow L$ : SR Effects



# Policies to Maintain Full Employment After $\uparrow L$



Source: KO Figure 16-13



# Policies to Maintain Full Employment: Difficulties

Our model suggests it is easy to maintain full employment.

In practice, it is difficult.

Expansionary fiscal and monetary policies may induce inflation and higher inflation expectations, preventing high output and employment. (Ignoring this leads to inflationary bias.)

# Policies to Maintain Full Employment: Difficulties

## Model assumptions:

- expectations *given*
  - but people may anticipate the effects of policy changes and modify their behavior.
- all prices sticky
  - workers may require higher wages if they expect overtime and easy employment
  - producers may raise prices if they expect higher wages and strong demand
- we know about the contractionary shock
  - *but economic measurement is difficult and and economic data hard to understand.*
  - *policy makers must guess the state of the asset markets and aggregate demand; they make mistakes.*

# Policies to Maintain Full Employment: Difficulties

## Model assumptions:

- policy changes are implemented immediately and have immediate effects
  - *but changes in policies take time to be implemented and to affect the economy.*
  - *expansionary policy may affect the economy after the the shock has dissipated.*
- policy choices not influenced by political or bureaucratic interests
  - but policies may be influenced by political or bureaucratic interests.

# US Economic Stimulus Act of 2008

**Feb 13, 2008**

- Bush signs into law

**Response to**

- 2007 subprime mortgage crisis and credit crunch
- increasing evidence of economic slowdown

**Tax rebates and investment incentives**

- \$152 B budget cost projected for 2008
- \$124 B additional cost over 10 years

**Evidence of substantial stimulus effect?**

- limited, but Broda and Parker (2008) find some evidence of increased household spending immediately following receipt of the rebate.

# China (PRC) Fiscal Stimulus 2008

## November 2008

- Announced \$586 B over two years

## Reaction to

- global economic crisis
- growth slowdown (perhaps to 6%, vs. 10% p.a.)
- factory closing and mass layoffs in the south

## Comment:

- G/Y in China low relative to EU and US

# American Recovery and Reinvestment Act of 2009 (ARRA)

CBO and the staff of the Joint Committee on Taxation estimated ARRA would increase budget deficits by \$787 billion between fiscal years 2009 and 2019.


Current CBO estimates: \$814 billion, about half in fiscal year 2010

# Effect of 2009 Stimulus on Employment and Output

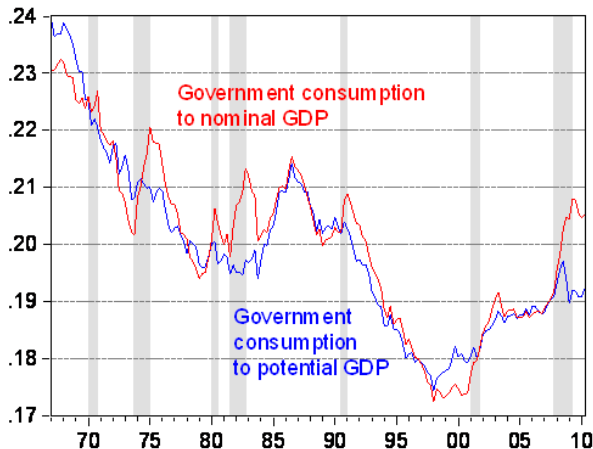
CBO's model-based estimates say ARRA:

- Raised the level of real (inflation-adjusted) gross domestic product (GDP) by between 1.7 percent and 4.5 percent,
- Lowered the unemployment rate by between 0.7 percentage points and 1.8 percentage points,
- Increased the number of people employed by between 1.4 million and 3.3 million, and
- Increased the number of full-time-equivalent (FTE) jobs by 2.0 million to 4.8 million compared with what those amounts would have been otherwise. (Increases in FTE jobs include shifts from part-time to full-time work or overtime and are thus generally larger than increases in the number of employed workers.)

The effects of ARRA on output and employment are expected to be largest during 2010.

Source: <http://cboblog.cbo.gov/?p=1326> 

## G/Y and G/Y<sub>f</sub> in the U.S.



Source: [http://www.econbrowser.com/archives/2010/10/the\\_everexpandi\\_1.html](http://www.econbrowser.com/archives/2010/10/the_everexpandi_1.html)



# Quantitative Easing

## Quantitative Easing (QE):

- policy to expand the high-powered money supply even when SR interest rates are unresponsive (e.g., already near zero)
- especially: substantial expansion of bank reserves (and thus the monetary authority's balance sheet)
- goals: ease credit; lower long bond rates; affect expectations
- term often used to include “qualitative easing” or “credit easing”

# Credit Easing

## Credit easing:

- monetary authority attempts to influence credit conditions by manipulating the *composition* of its balance sheet
- targets non-traditional assets, especially less liquid and riskier securities (including mortgage-backed securities, longer term Treasury issue)
- does *not* just target bank reserves

## QE 2:

- popular name for a second round of credit easing, especially as initiated in the US in November 2010
- Federal Reserve committed to purchase an additional \$600B in longer-term Treasuries by mid-2011, acquiring about \$75B per month

# Permanent Changes in Monetary and Fiscal Policy

**“Permanent” shock:** changes expectations about the future exchange rate

# Permanent Changes in Monetary Policy

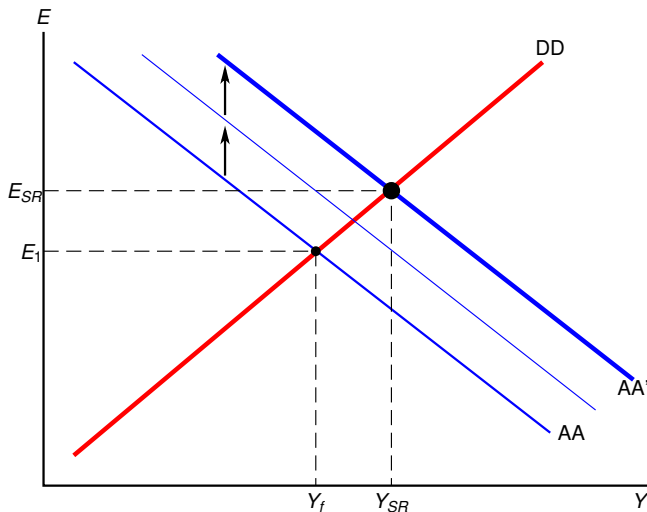
## Permanent $\uparrow M$

- 1 makes people expect future depreciation of the domestic currency (increases the expected rate of return on foreign currency deposits at each  $E$ )
- 2 causes  $\uparrow M/P$  and  $\downarrow R$  (in the short run)

## Two forces for depreciation combine:

- $E$  rises more than when expectations are constant (see our static expectations results).
- the AA curve shifts up more than the case when expectations are held constant.

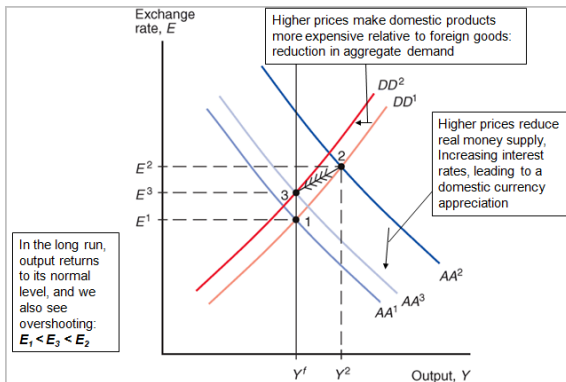
Permanent  $\uparrow M \rightarrow \uparrow E_e$  and  $\downarrow R$  (in SR).



# Effects of Permanent Changes in Monetary Policy in the Long Run

- With employment and hours above their normal levels, there is a tendency for wages to rise over time.
- With strong demand of goods and services and with increasing wages, producers have an incentive to raise prices over time.
- Both higher wages and higher output prices are reflected in a higher level of average prices.
- What are the effects of rising prices?

# Fig. 16-15: Long-Run Adjustment to a Permanent Increase in the Money Supply



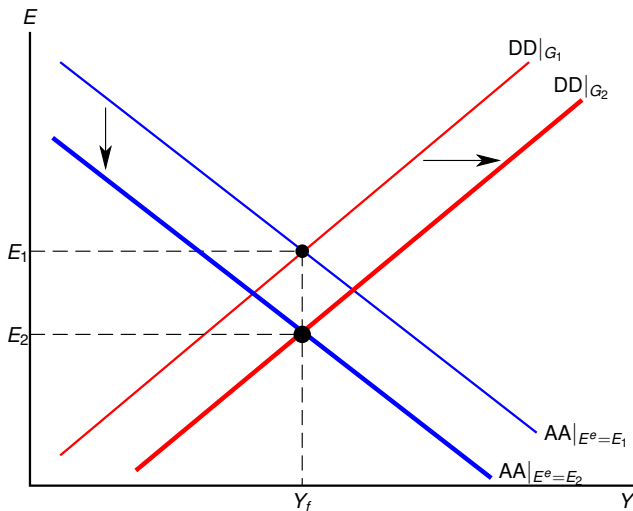
Source: KO Figure 16-15

# Permanent Fiscal Expansion

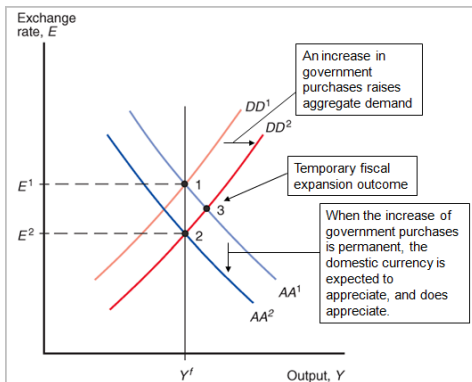
- Permanent change in fiscal stance
  - increase in  $G$  or decrease in  $T$
  - Changes aggregate demand
- subject to usual qualifications



# Effects of a Permanent Fiscal Expansion



# Fig. 16-16: Effects of a Permanent Fiscal Expansion



Source: KO Figure 16-16

# Permanent Fiscal Expansion

- SR effects
  - does up demand  $\rightarrow$  up  $Y$ ?
  - No:  $E$  appreciates  $\rightarrow$  real  $E$  appreciates
- $E$  appreciates (permanent shock)
  - How much does  $E$  appreciate?
- Enough to restore  $D=Y_f$ 
  - (to see, think LR)

# Permanent Fiscal Expansion (LR)

## LR outcomes and SR outcomes are the same!

- $M=M_0$ ,  $Y = Y_f$ ,  $R=R^*$
- so  $P$  is unchanged!
- But then  $D(EP^*/P, Y-T, I, G)=Y_f$
- $\rightarrow \uparrow G$  must “crowd out” private demand through CA!

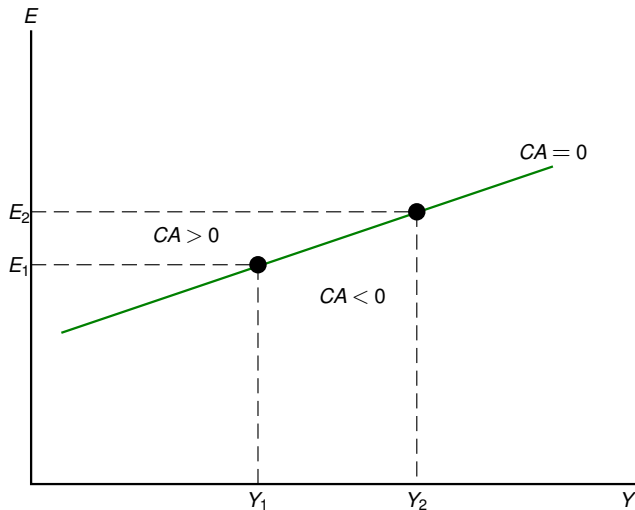
Twin deficits once again

# Macro Policy and CA

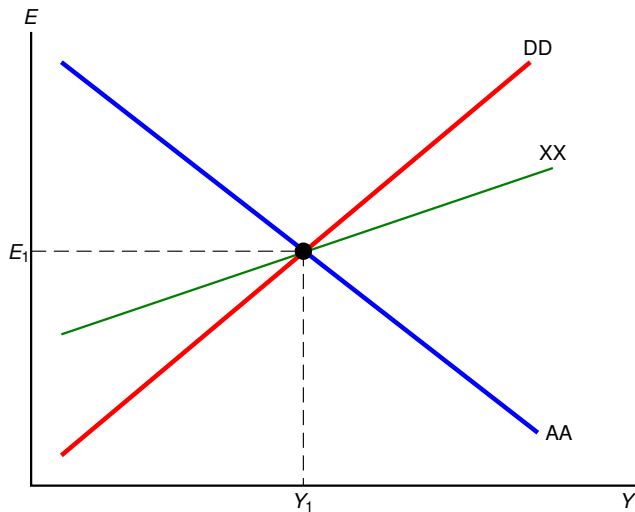
## XX curve:

- (Y,E) combinations for a **constant** CA
- E.g., CA is constant at its desired level X
- To keep CA constant,  $\uparrow Y$  must be offset by  $\uparrow E$ : the XX curve slopes upward.
  - As Y increases, the current account declines, cet. par.
  - As E increases, the current account improves, cet. par.

# Macroeconomic Policy and the Current Account



# AA, DD, and XX



# Why XX is Flatter than DD

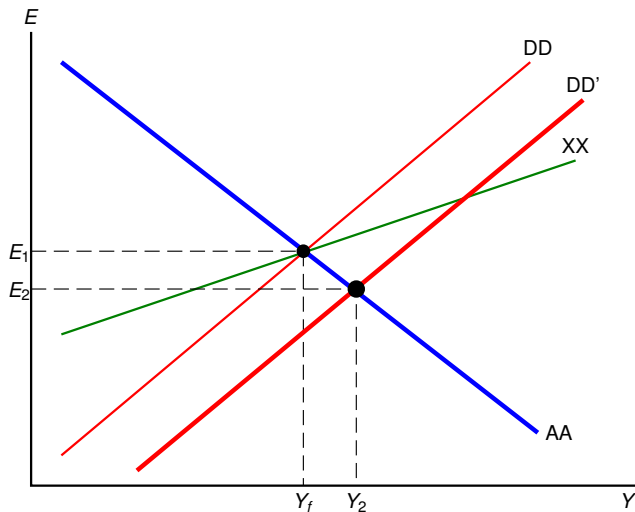
- To keep the current account constant, the domestic currency must depreciate as income and output increase
  - the XX curve slopes upward.
- To keep the goods market in equilibrium, domestic income must rise as our currency depreciates
  - the DD curve slopes upward.
- Which is flatter?
  - Start with  $CA = X$
  - Raise  $E$  and  $Y$  so that  $CA=X$  (still on XX)
  - No change in AD via CA, but up AD and AS due to up  $Y$ ,  $\rightarrow$  excess supply
- so DD is above XX



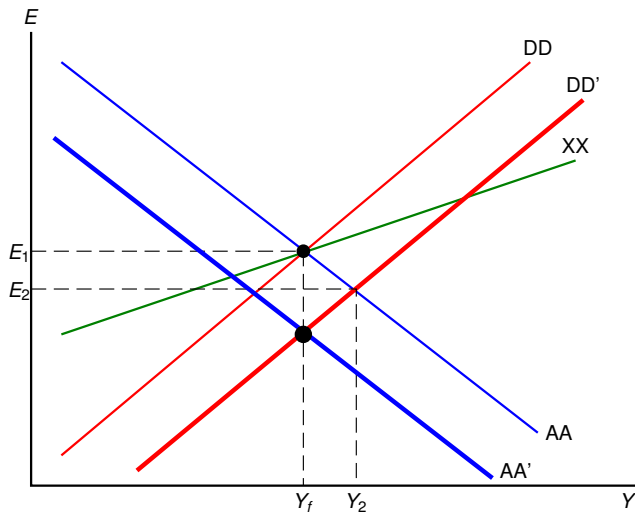
# Macroeconomic Policies and the Current Account (cont.)

- Policies affect the current account through their influence on the value of the domestic currency.
  - An increase in the quantity of monetary assets supplied depreciates the domestic currency and often increases the current account in the short run.
  - An increase in government purchases or decrease in taxes appreciates the domestic currency and often decreases the current account in the short run.

# Temporary Fiscal Expansion and the Current Account



# Permanent Fiscal Expansion and the Current Account

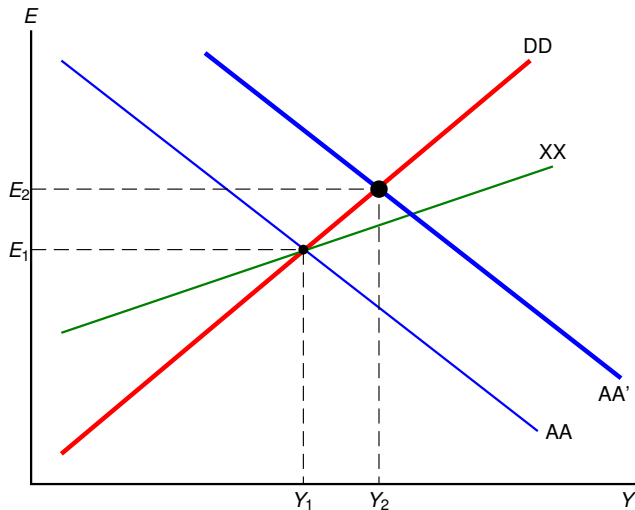


$$\uparrow M \rightarrow \uparrow CA$$

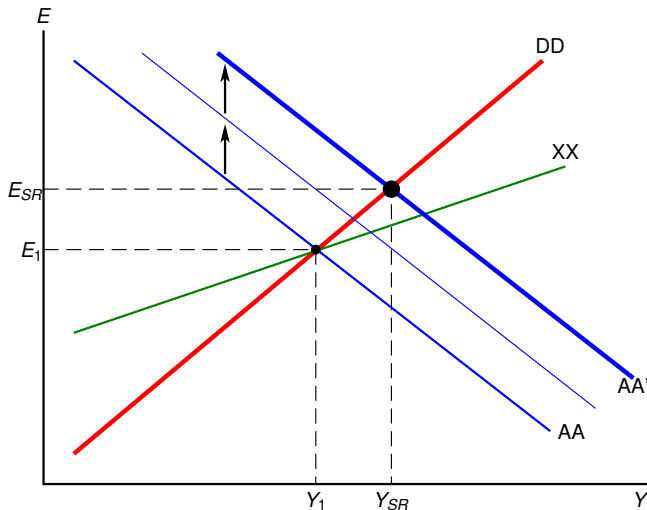
## Increase in the money supply

- shifts up the AA curve
- causes a *movement along* the DD curve, which is steeper than XX
- $\rightarrow$  depreciates the domestic currency
- $\rightarrow \uparrow CA$

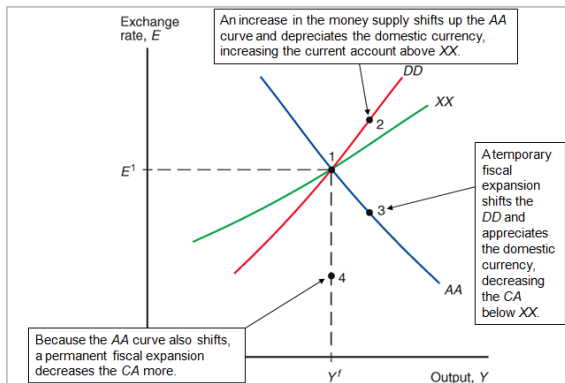
# Temporary Monetary Expansion and the Current Account



# Permanent Monetary Expansion: the Short Run



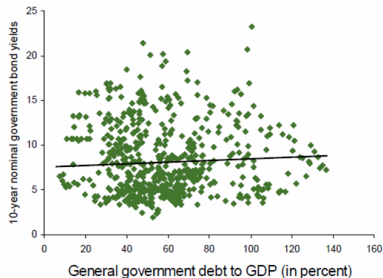
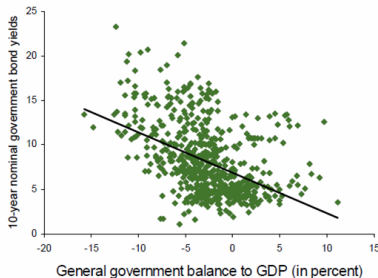
# Summary: Macroeconomic Policy and the Current Account



Source: KO Figure 16-17b

# Bond yields (missing part of our story)

## Correlation of Government Bond Yields with Fiscal Variables



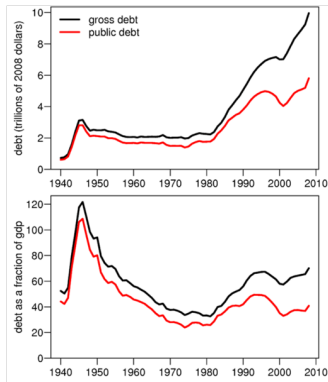
Source: IMF staff estimates.

Note: Sample of 34 countries over 1980-2007. Excludes outliers, defined as cases with an absolute distance from the mean exceeding three standard deviations; data for Japan are also excluded.

Source: IMF 2009, Global Financial Stability Report

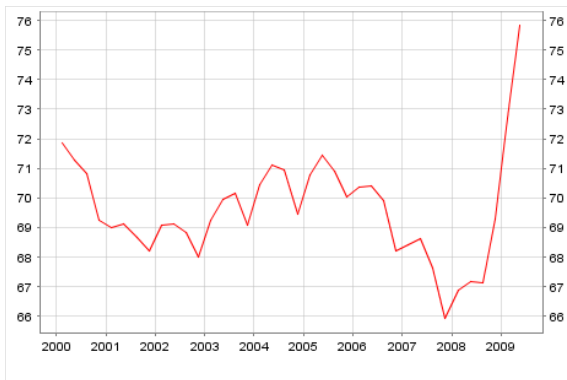


# US: Debt and Debt/GDP



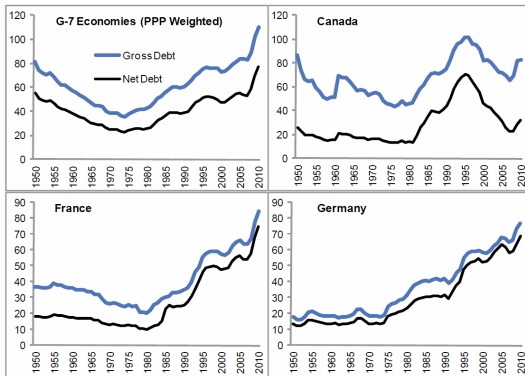
Source: Wikipedia

# Eurozone: Debt/GDP



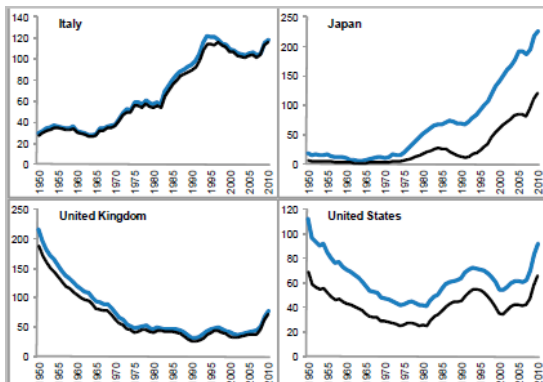
Source: ECB 16-85

# Developed Countries: Debt/GDP



Source: <http://www.imf.org/external/pubs/ft/spn/2010/spn1013.pdf>

# Developed Countries: Debt/GDP



Source: <http://www.imf.org/external/pubs/ft/spn/2010/spn1013.pdf>

# Interest Rates

- Our DD-AA model assumed investment expenditure is exogenous.
- Some parts of investment clearly respond to interest rate
  - Residential fixed investment
- Investment projects funded by saved or borrowed funds
  - interest rate represents the (real) opportunity cost
  - A higher interest rate means less investment expenditure.
- But see Chetty (2004 REStud)

# Interest Rates

- Other expenditure may depend on the interest rate.
  - A higher interest rate makes saving more attractive and consumption expenditure (on domestic and foreign products) less attractive.
- But there are conflicting income and substitution effects
- And the effect of the interest rate appears to be much larger on investment expenditure than it is on consumption expenditure and imports.

# Interest Rate Sensitive Aggregate Demand

Government purchases are exogenous.

Investment is a function of the real interest rate.

Current account is a function of the real exchange rate, disposable income and the real interest rate.

Consumption is a function of disposable income and possibly the real interest rate.

$$D = C(Y - T, R - \pi^e) + I(R - \pi^e) + G + CA(EP^*/P, Y - T, R - \pi^e)$$

Or more simply:

$$D = D(EP^*/P, Y - T, R - \pi^e, G)$$

# Interest Rates

- Treat expected inflation as exogenous for now
  - $I = I(R)$   $I' < 0$
  - $R = R^* + Ee/E - 1$
  - $I = I(R^* + Ee/E - 1)$
- Now up  $E \Rightarrow$  down  $R \Rightarrow$  up  $I$  (extra stimulus)
  - DD flatter
  - Also:  $R^*$  and  $Ee$  become shift factors for DD curve



# IS-LM Model

- Instead of relating exchange rates and output, the IS-LM relates interest rates and output.
- In equilibrium, aggregate output = aggregate demand

$$Y = D(EP^* / P, Y - T, R - \pi^e, G)$$

- In equilibrium, interest parity holds
  - $R = R^* + (E_e - E) / E$
  - $E(1 + R) = ER^* + E_e$
  - $E(1 + R - R^*) = E_e$
  - $E = E_e / (1 + R - R^*)$

# IS Curve

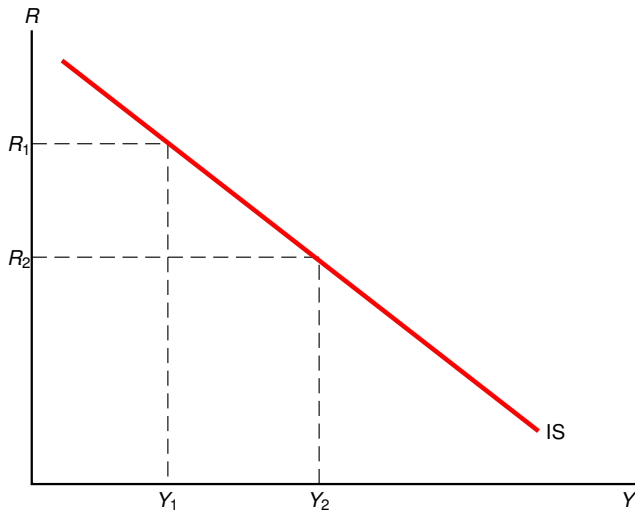
$$Y = D(E^e P^* / P(1 + R - R^*), Y - T, R - \pi^e, G)$$

Exogenous:  $E^e$ ,  $P^*$ ,  $P$ ,  $R^*$ ,  $T$ ,  $\pi^e$ , and  $G$ .

**Commodity markets are in equilibrium along the IS curve.**

- combinations of interest rates and output such that aggregate demand equals aggregate output.
- $\downarrow R \rightarrow \uparrow I$  (and possibly  $C$  and  $M$ )  $\rightarrow \uparrow AD \rightarrow \uparrow Y$ .
- The IS curve slopes down.

# IS Curve



# LM Curve

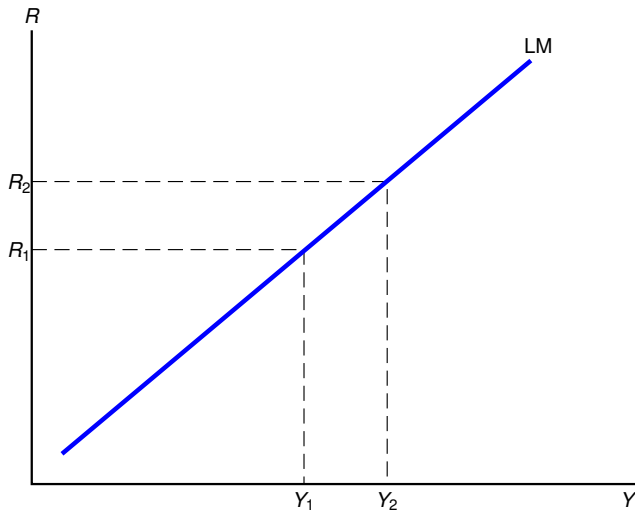
**The money market is in equilibrium along the LM curve.**

- $M_s/P = L(R, Y)$
- combinations of interest rates and output such that the money market is in equilibrium, given exogenous  $P$  and  $M$

**The LM curve slopes up.**

- $\uparrow Y \rightarrow \uparrow L \rightarrow \uparrow R$  (in equilibrium)

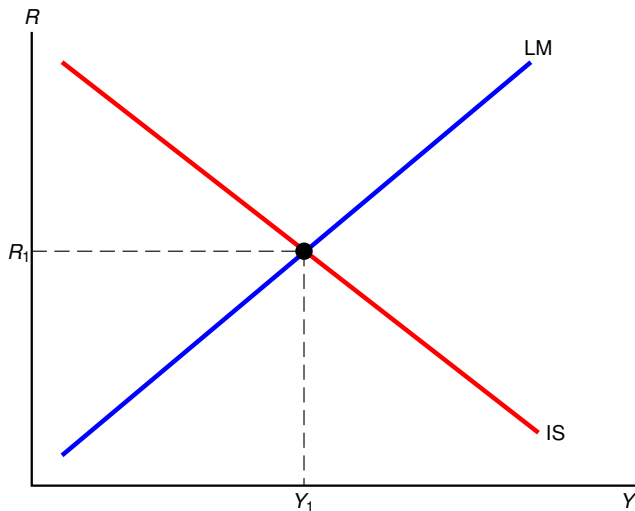
# IS Curve



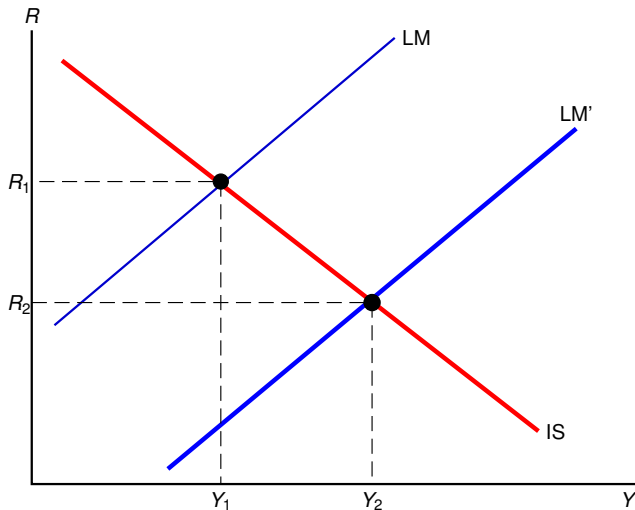
# Equilibrium in the IS-LM Model

Commodity markets are in equilibrium along the IS curve.  
Money market is in equilibrium along the LM curve.  
Both markets are in equilibrium where the two curves intersect.

# Equilibrium in the IS-LM Model

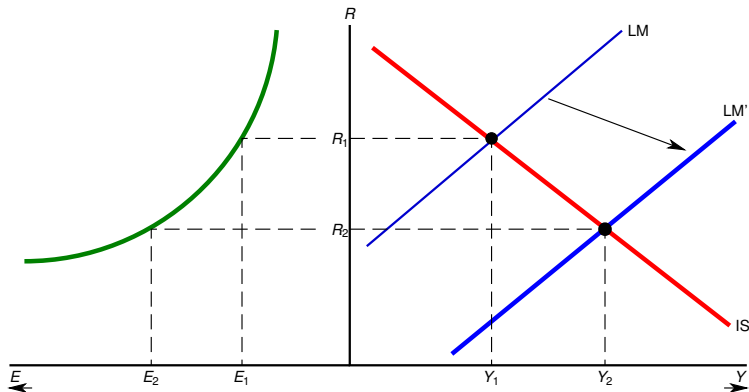


# Effects of Temporary Changes in the Money Supply



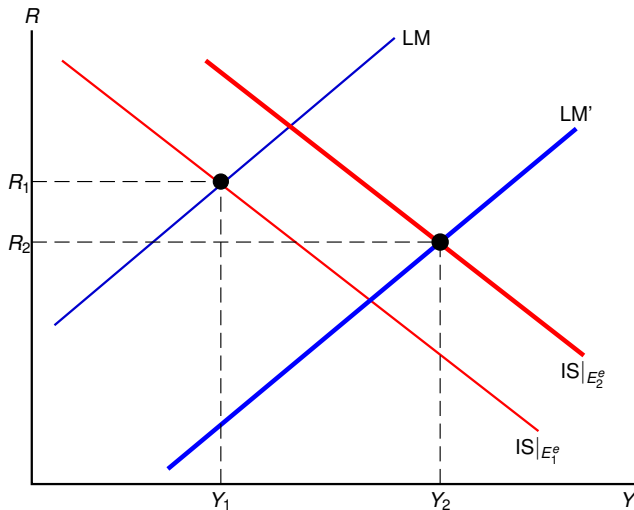


# Effects of Temporary Changes in the Money Supply

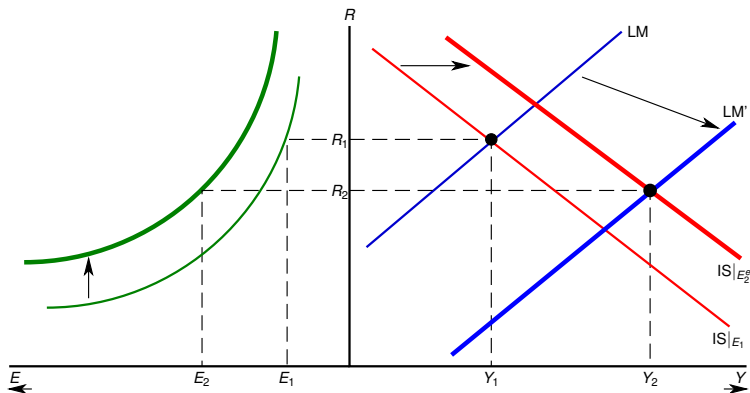


Compare: KO Figure 16-ISLM01

# SR Effects of Permanent $\uparrow M$ (IS-LM)

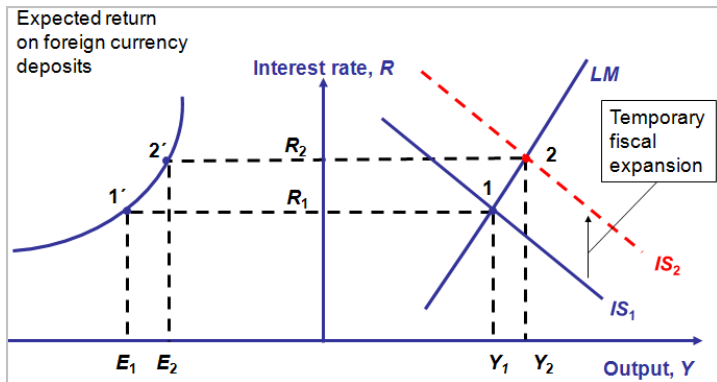


# SR Effects of Permanent $\uparrow M$ (IS-LM)



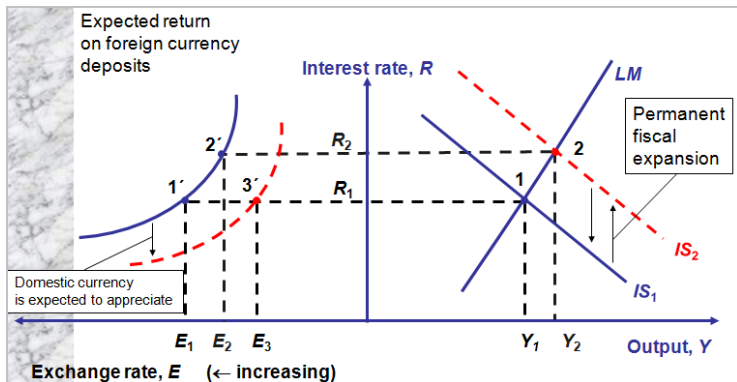
Compare: KO Figure 16-ISLM02

# Effects of Temporary Changes in Fiscal Policy



Source: KO Figure 16-ISLM03

# Effects of Permanent Changes in Fiscal Policy



Source: KO Figure 16-ISLM04

# Summary

- Aggregate demand ( $D$ ) responds to disposable income ( $Y-T$ ) and the real exchange rate ( $q=EP^*/P$ ).
- The AA illustrates asset markets equilibrium: ( $Y,E$ ) combinations such that  $M/P=L$  and interest parity holds.
- The DD curve illustrates goods market equilibrium: ( $Y,E$ ) combinations such that  $D=Y$

# Summary

- In the DD-AA model, we assume the Marshall-Lerner condition is satisfied
  - so a depreciation of the domestic currency improves the current account and increases aggregate demand)
  - in reality we may have a J-curve, where CA initially deteriorates because the value effect initially dominates the volume effect.

# Summary: Temporary Policy Shocks

- Temporary  $\uparrow M \rightarrow$  temporary  $\uparrow Y$  and temporary  $\uparrow E$
- Temporary  $\uparrow G \rightarrow$  temporary  $\uparrow Y$  and temporary  $\downarrow E$



# Summary: Permanent Policy Shocks

- Permanent  $\uparrow M \rightarrow$  temporary  $\uparrow Y$  and temporary overshooting, with permanent  $\uparrow E$
- Permanent  $\uparrow G \rightarrow$  no change in  $Y$  but permanent  $\downarrow E$

# Summary: IS-LM

- The IS-LM model compares interest rates with output.
- The IS curve illustrates  $(Y, R)$  combinations such that  $D=Y$
- The LM curve illustrates  $(Y, R)$  combinations such that  $M/P=L(R, Y)$
- The IS-LM model gives basically the same results
  - tends to underplay  $E_e$
  - captures interest rate effects on  $D$ , which our model ignored