

Econ 1220

Factors of production : (i) Natural resources
(ii) Labor
(iii) Capital e.g. warehouse, garbage trucks, weaving machines

GDP: the market value of all final goods and services produced in the country during the period.

Final goods and services: \times intermediate good, consumption good
- cotton fabrics
- leather

(1) Usage? for sell or for producing other goods

(2) produced in the country but sold overseas

(3) evaluated at the market prices

(4) produce in 2013, sell in 2014 \rightarrow count as 2013 GDP

Expenditure Approach

(1) Consumption : expenditure on consumption of goods and services

(2) Investment : (a) residential properties

(b) capital goods in the first hand market

(c) changes in inventory (produced but not yet sold)

 Not financial investment (transfer of ownership)

(3) Government purchase of goods and services

 government purchase of goods and services

 DO NOT count transfer payments

(4) Net Export (NX)

$$\Rightarrow GDP = C + I + G - NX$$

govt purchase of capital goods $\Rightarrow I$ (China)

$\Rightarrow G$ (US)

E.g. RMB appreciates relative to USD.

$$RMB 100 = USD 14$$

$$RMB 100 = USD 16 \quad \downarrow$$

Appreciation $\Rightarrow \uparrow$ GDP in USD

$$\frac{GDP_t - GDP_{t-1}}{GDP_{t-1}} \times 100\% \quad \text{growth rate from } t-1 \text{ to } t$$

Rule of 70 : $GDP(1+g\%)^n = GDP \times 2$

$$n \ln(1+g\%) = \ln 2$$

$$n = \frac{\ln 2}{\ln(1+g\%)}$$

$$= \frac{0.7}{g\%} = \frac{70}{g}$$

Real $GDP_t = \text{Quantity}_t \times \text{Price base year}$

Per capita $GDP = \frac{GDP}{\text{Population}}$

Unemployment Rate

US:

Working Age population = 16+

$$\text{Labor Force Participation Rate} = \frac{\text{Labor Force}}{\text{Working Age population}} \times 100\%$$

Employed Persons: working for pay or profit in the last 7 days

Unemployed Persons:

have not worked for pay or profit in the last 7 days

And have sought for work in the last 30 days

$$\text{Unemployment Rate} = \frac{\text{Number of unemployed persons}}{\text{Labor Force}} \times 100\%$$

HK: Working age = 15+ discouraged workers \Rightarrow unemployed

Underemployed Persons: involuntarily work for less than 35 hrs during the last 7 days and [sought additional work in the last 30 days / available for additional work in the last 7 days]

E.g. employed: 25, unemployed: 5

$$UR = \frac{5}{25+5} \times 100\% = 16.7\%$$

If 1 person is considered as discouraged

$$\Rightarrow UR = \frac{4}{25+4} \times 100\% = 13.8\%$$

Labor force $\downarrow \Rightarrow UR$ drops

\Rightarrow Labor market is not improving

Price Index and Inflation - Deflation

Price Index in time period t = $\frac{\text{Market Value } t}{\text{Market Value at Base period}} \times 100$

Rate of change of price level = $\frac{\text{Price Index } t - \text{Price Index } t-1}{\text{Price Index } t-1} \times 100\%$

Real income = $\frac{\text{Nominal Income}}{\text{Market value of the basket}} = \frac{\text{Nominal Income}}{\text{CPI}}$

$r \equiv i - \pi$ (real = nominal - inflation)

i-bond: interest rate (i) = inflation rate

Deflation: \Rightarrow price of products ↓

\Rightarrow ↓ firm's profit if costs are fixed

\Rightarrow firms can go bankrupt, investment (I) ↓

\Rightarrow unemployment ↑, consumption (C) ↓

\Rightarrow GDP ↓

Real interest rate ↑

\Rightarrow real cost of borrowing ↑

\Rightarrow firms less willing to borrow and make investment

$\Rightarrow I \downarrow \Rightarrow$ GDP ↓

e.g. Giordano \$100 T-shirt

borrow \$1000

Repay \$1100

$\frac{1100}{100} = 11$ T-shirts

Deflation, shirt = \$10

$\frac{100}{100} = 13.75$ T-shirts

Inflation. 多借钱, real cost of borrowing ↓

Suppose we have \$1, 1) buy a good now

2) save at 10% and buy something priced at 1.05.

$$\text{real} = \frac{1.10}{1.05} - 1 \Rightarrow r = \frac{(1+i)}{(1+\pi)} - 1$$

$$1+r = \frac{1+i}{1+\pi}$$

$$\tilde{r} = r + \pi + r\pi$$

Frictional Unemployment

- due to job matching process

↑ unemployment benefit:

- may not accept offers

- wait longer to see if there are better offers

Structural Unemployment

- change in the structure of the economy

Cyclical Unemployment

- S-T

Natural Rate of Unemployment

Full-employment : actual rate = natural rate

In reality, will not adopt comparative advantage.

1) Employment: Domestic firms in US may not be able to compete with the ones from China \Rightarrow shut down, layoff workers

2) National security

3) protect infant industry

4) unfair trade practices : to increase the competitiveness

- subsidies, restrictions, manipulating exchange rate

Law of one price : $P_{\text{US}} \cdot e = P_{\text{Yen}}$

E.g. Suppose 1USD = 110yen Price of backpack = USD \$100

Should sell 11000 Yen in Japan

However if yen depreciates \Rightarrow 1USD = 120 yen

price of backpack in Japan = $120 \times 100 = 12000$ yen (more expensive)

\Rightarrow Reduce export from US to Japan

\Leftarrow encourage import from Japan to US

\uparrow US trade deficit towards Japan.

Last decade: Yen appreciates toward USD (improve US trade deficits)
 ⇒ deflation and weak GDP growth since the mid-90s.

Saving .

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

$$NX = Y - (C + I + G)$$

⇒ output > domestic consumption > 0 (trade surplus)

⇒ output < domestic consumption < 0 (trade deficit)

$$\text{National saving} = Y - C - G$$

$$= (Y - T + TR - C) + (T - TR - G)$$

private saving

$Y - T + TR$ (disposable income)

$Y - T + TR - C$ (saving)

public saving

⇒ Tax as source of income ,

expenditure as transfer payment and
government purchase

budget surplus if $T - TR - G > 0$

budget deficit if $T - TR - G < 0$

(issue sovereign debt)

$$(Y - C - G) - I = NX$$

National saving > I (trade surplus)

National saving < I (trade deficit)

high saving, spending less, buy less imported goods, $NX > 0$

low saving, spending more, buy more, $NX < 0$

budget deficit, drives down national saving
 ⇒ trade deficit

Endogenous variable , exogenous variables . *Ceteris Paribus*

Positive Analysis , Normative Analysis (value judgement)
(adopt in econ) People should save more.

Correlation ρ $-1 \leq \rho \leq 1$

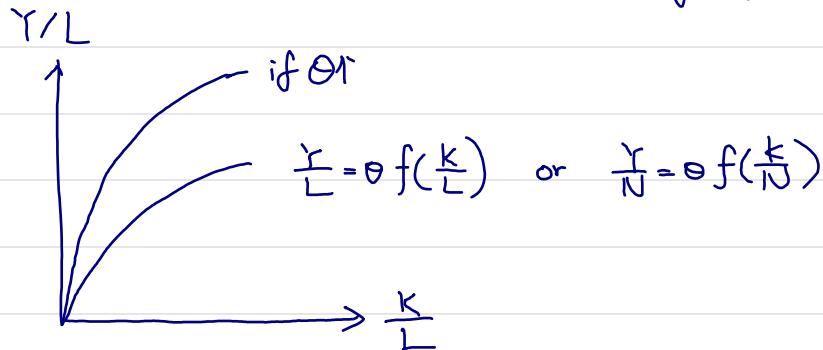
$\rho \in (0, 1]$, positive correlation (time \uparrow , score \uparrow)
 $\rho \in [-1, 0)$, negative correlation
 $\rho = 0$, no correlation

Natural Resources
Capital
Labor } Production Technology \rightarrow Aggregate Output (Real GDP)
 $Y = \Theta f(K, N)$

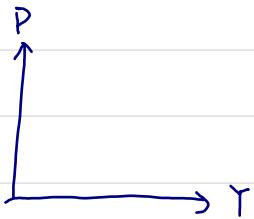
Marginal product of K and N are positive but diminishing

$\Theta \uparrow$: positive productivity shock , improved education , good weather

$\Theta \downarrow$: bad weather or disaster , shortage of raw materials



4 major markets in the economy:



Labor market \rightarrow AS

Output market \rightarrow AD

Variable funds market

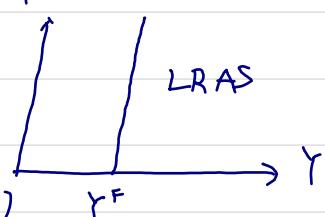
Market for Money \rightarrow AD

Full employment output

$$Y^F = \Theta f(K, N^F)$$

endogenous variable: Y, N

exogenous variable: Θ, K (constant throughout the year)



Aggregate Supply:

$$\text{Real wage } w = \frac{w}{P} \frac{\text{(nominal wage)}}{\text{(price index)}}$$

$w = H(B)$ bargaining power of the labor

$$B \uparrow \Rightarrow w \uparrow$$

Unemployment rate is low, labor has higher bargaining power

Unemployment rate is high, labor has lower bargaining power

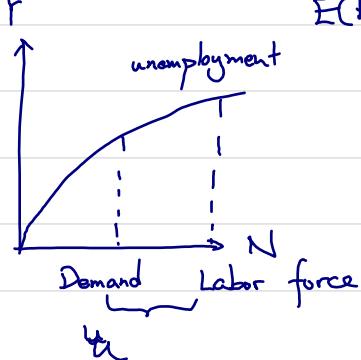
Sticky nominal wage, LR nominal wage is flexible

$$\begin{aligned} \text{Expected nominal profit} &= E(P) Y - w \cdot N - \text{other nominal costs} \\ &= E(P) \cdot \Theta f(k, N) - w N - \text{other nominal costs} \end{aligned}$$

Profit maximizing employment:

Marginal revenue of labor = marginal cost of Labor

$$E(P) \frac{\Delta Y}{\Delta N} = w$$

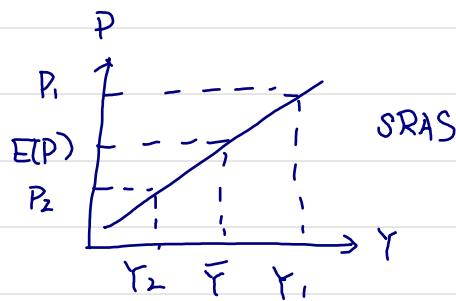


A) Deriving

Given $E(P)$ and W , firms will determine their profit maximizing employment and output levels.

Case 1 $P_1 > E(P) \Rightarrow$ profit turns out to be higher
willing to hire more workers
 $N \uparrow \Rightarrow Y \uparrow$

Case 2 $P_2 < E(P) \Rightarrow$ profit turns out to be lower
hire less and produce less
 $N \downarrow \Rightarrow Y \downarrow$



Exogenous variables

B) Shifting

Real value of assets held by households \uparrow

Reason

\uparrow in real wealth
 \Rightarrow Labor supply \downarrow
 \Rightarrow bargaining power \uparrow
 $\Rightarrow W \uparrow$
 \Rightarrow Profit \downarrow produce less
 $\Rightarrow Y \downarrow$

left

Preference for leisure \uparrow

Labor supply \downarrow
(rest same as above)

left

Working Age population \uparrow

Labor supply \uparrow
 \Rightarrow bargaining power \downarrow $W \downarrow$
 \Rightarrow Profit \uparrow produce more
 $\Rightarrow Y \uparrow$

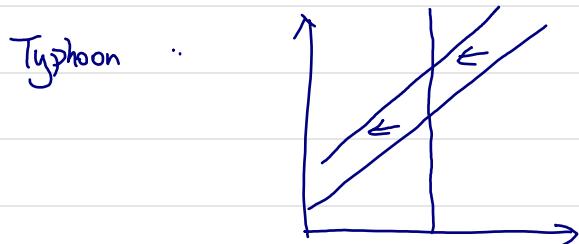
right

Capital Stock	Profitability ↑ produce more ⇒ Y↑	right
Positive productivity shock	Profitability ↑ produce more ⇒ Y↑	right
Legislation or size of the labor union that ↑ B	B↑ w↑ ⇒ profit ↓ produce less ⇒ Y↓	left

Since $E(P) \cdot \frac{\Delta Y}{\Delta N} = w$ if $w \uparrow$
 $E(P) \cdot \frac{\Delta Y}{\Delta N} < w$
 $\frac{\Delta Y}{\Delta N} \uparrow$
 $\Rightarrow N \downarrow$

Factors shifting SRAS and LRAS are the same

except for the last one



Given price level

Negative productivity shock ⇒
 \Rightarrow profitability ↓, choose to produce less
 \Rightarrow output ↓
 \Rightarrow SRAS shifts to the left

Keynesian Approach: nominal wage is sticky, price level is flexible

If price level is flexible



Money

(medium of exchange)

Liquidity : liquid , illiquid (takes a long time to convert it into cash)

M_1 : Currency + Demand Deposits (checking account deposits)

M_2 : M_1 + Savings and Time Deposits

Monetary Policy:

expansionary and contractionary

(stimulate the economy) (fight inflation, slow down the expansion)

Central Bank is responsible for the Monetary Policy

Open Market Operations : (1) buys or sells the existing Government debt securities
(2) plan to increase or decrease the interest rate

① Reserve of a commercial bank: Vault cash , Deposits at the central bank
Required Reserve ratio : 10% keep 10% of the \$100 deposit.
\$90 is excess reserve.

② Interbank Loan interest rate: HIBOR, SHIBOR , Federal Fund Rate
— short term in nature

When banks have sufficient reserves , less necessity to borrow
⇒ interbank loan interest rate will drop

When banks lack sufficient reserves, it is more likely to borrow
⇒ interbank loan interest rate will rise.

③ (a) Open Market Purchase

buys existing Government Debt Securities from the public
— pay the households via the household's checking accounts.

Central Bank can pay the commercial banks by:

cash or raising the deposit of the commercial bank
at the Central Bank.

Either way, reserves and M₁ (checking account deposit) will increase

As commercial banks now have more reserves, demand from interbank loan ↓

⇒ interbank loan interest will drop

(b) Open Market Sales:

sells existing Government Debt securities to the public —
households can pay the Central Banks by writing checks to
the Central Bank.

Thus, the checking account deposits of the households at the commercial
banks will decrease.

The commercial banks can pay the Central Bank by either cash or
reducing their own deposits at the Central Bank.

Either way, the reserves of the commercial banks and M₁ will decrease

As commercial banks now have less reserves, demand for loan ↑

⇒ interbank loan interest will go up.

Money Creation Process

- (i) The Central Bank purchased \$100 worth of government debt securities, pays the households \$100 by cash. The household will in general deposit the \$100 into the commercial bank that he/she has an account say HSBC.
- (ii) HSBC lend out the \$90 extra reserves.
For example, it lends to another household who borrows \$90 to buy books.
The bookstore receives \$90 and in general deposit the \$90 into the commercial bank.
- (iii) Hang Seng Bank receives \$90. It receives an extra cash of \$90 and deposit of \$90

Increase the total amount of $\$ \text{initial} \times \frac{1}{RR}$

The functions of money

- (1) Medium of Exchange
- (2) Unit of Account
- (3) Store of value
- (4) Standard of deferred payment

Saving behavior of households

$$\text{Disposable income} = Y + TR - T$$

$$C = a + b(Y + TR - T)$$

b: marginal propensity to consume

1-b: marginal propensity to save

MPC

MPS

→ supply of loanable
funds Market

→ Demand for Money
in the Market for Money

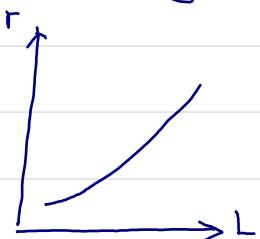
Factors affecting the saving-consumption decisions

- ↑ LT real interest rate saving ↑ consumption ↓ higher return on saving
- ↑ current real disposable income saving ↑ consumption ↑ allocate part of the income to S & C
- ↑ real value of assets held by households saving ↓ consumption ↑ feels richer, consume more
- ↑ preference for immediate consumption saving ↓ consumption ↑ prefer to consume more and save

Loanable Funds Market (in a closed economy) $r - L$ space

Market for Money

$r - m$ space



$$m = \frac{M}{P} = \frac{\text{amount of money in nominal terms}}{\text{general price level}}$$

Supply of Loanable Funds and the Demand for Money

$r \uparrow \Rightarrow$ saving ↑, consumption ↓

positive correlation between r & quantity of private saving

negative correlation between r & consumption

\Rightarrow supply upward sloping, demand downward sloping

↑ government purchase Supply of Loanable Fund Market ↓ (public saving ↓)

Demand in the Market for Money (Not applicable)

budget surplus \Rightarrow ↑ public saving

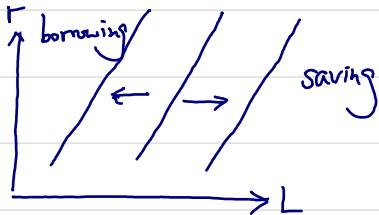
budget deficit \Rightarrow ↓ public saving

Treasury Bills, Treasury Notes, Treasury Bonds

Fiscal Policy : use of government budget to affect the Macro-economy

Expansionary : \uparrow in government expenditure, \downarrow in government revenue

Contractionary : \downarrow in government expenditure, \uparrow in government revenue



Demand for Lendable Funds

— comes from the firms in the private sector

$L-T$ real interest $\uparrow \Rightarrow$ cost of borrowing $\uparrow \Rightarrow \downarrow$ profit \Rightarrow less willing to borrow
 \Rightarrow demand curve is downward sloping



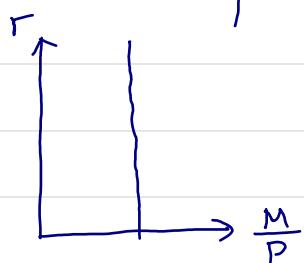
(a) \uparrow expected real cost of production L^d shifts left Investment generates less real profit

(b) $\uparrow \theta$, L^d shifts right, K are expected to produce more

Supply of money

money in nominal terms, M^S , (primarily determined by the Central Bank)

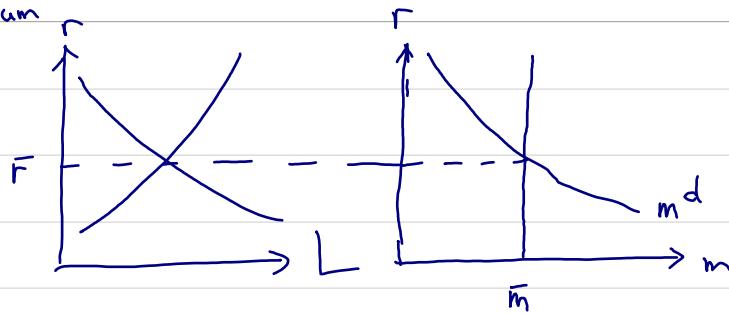
independent of the long-term interest rate



$\uparrow M^S$, shift towards right, money supply in real terms

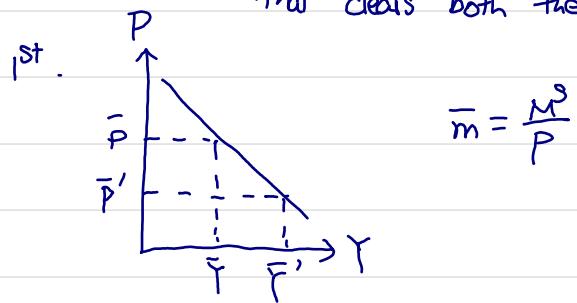
$\uparrow P$, shift towards left, money supply in real terms \downarrow

Equilibrium

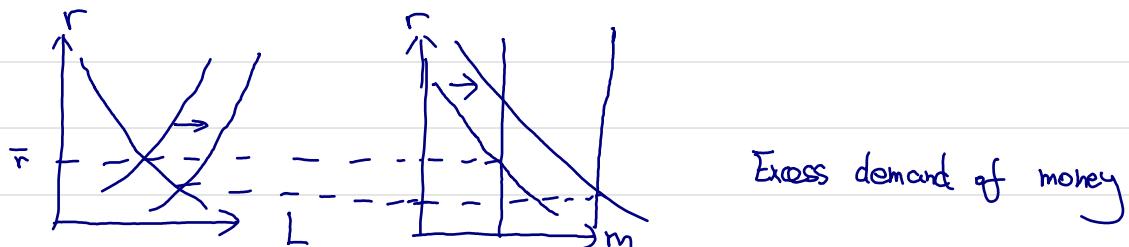


Aggregate Demand Curve

Given the aggregate income level \bar{Y} , find the general price level that clears both the loanable funds market and market for money.



2nd - Suppose income level rises from \bar{Y} to \bar{Y}'
 $\Rightarrow L^s \uparrow, m^d \uparrow$



3rd : general price level drops , $m^s = \frac{M^s}{P} \uparrow$, m^s shifts to the right

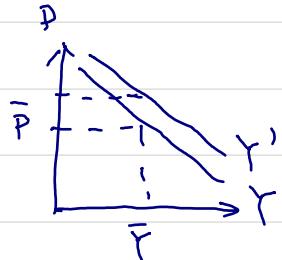
\Rightarrow Inverse relation between \bar{Y} and P ,

\Rightarrow AD curve is downward sloping.

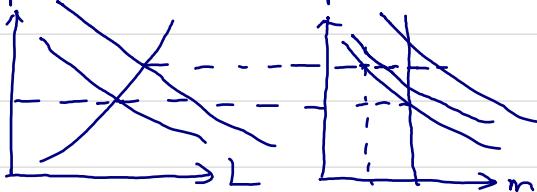
Factors that shift the AD curve

- (1) ↑ in expected productivity of capital good

Given initial \bar{Y} and \bar{P} , $\bar{m} = \frac{M^s}{P}$



Or: $L^d \uparrow$ shortage of money



$P\uparrow, m\downarrow$

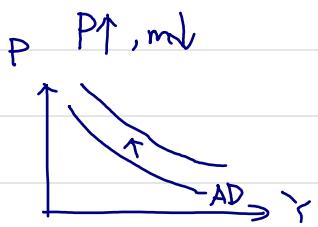
For each and every Y , $P\uparrow$, AD shifts to the right

- (2) ↑ real value of assets held by households

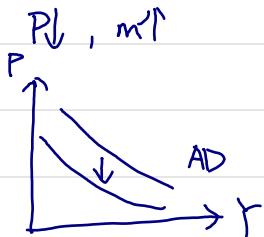
Save less, consume more

$\Rightarrow L^s \downarrow, m^d \uparrow$

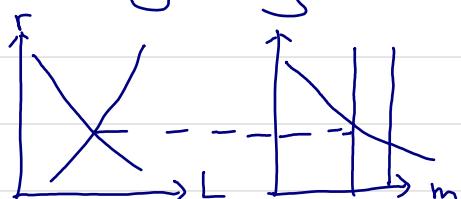
Case 1, m^d small increase



Case 2, m^d large increase



- (3) Monetary Policy - $\uparrow M^s \Rightarrow m^d \uparrow$



$P\uparrow, m^s \downarrow \text{ AD} \uparrow$

- (4) Fiscal Policy - $\uparrow G$

$L^s \downarrow, r \uparrow \Rightarrow P\uparrow, m^s \downarrow \text{ AD} \uparrow$

⊗ $\uparrow G = \uparrow T$ machines

$\Rightarrow \downarrow I$

Crowding Out Effect

$\uparrow G$ crowds out private Investment

SR Keynesian Model

Output Market

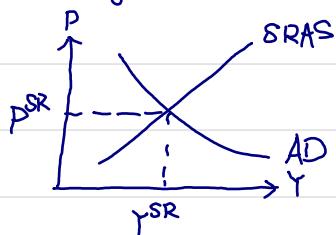
Supply of Loanable funds = Demand of Loanable Funds

$$\begin{matrix} \swarrow & \searrow \\ \text{Private Saving} & \text{Public Saving} \\ (Y-T+TR) - C + T - G - TR = I \end{matrix}$$

Equilibrium in output market can be written as $Y = C + I + G$

$\begin{matrix} \nearrow \text{supply} \\ \searrow \text{demand} \end{matrix}$

⇒ If the loanable funds market is in equilibrium, the output market must also be in equilibrium.



LR equilibrium

Case 1 $Y^SR > Y^F$

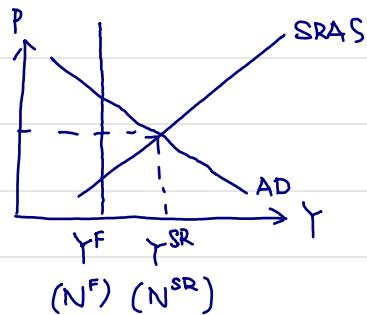
(expansion) Actual UR < NRU

bargaining power ↑

Nominal wage ↑

less profitable, produce less

SRAS shift to the left



Case 2 $Y^{SR} < Y^F$

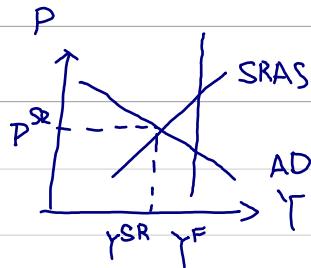
$UR > NRU$ (cyclical)

bargaining power \downarrow

Nominal Wage \downarrow

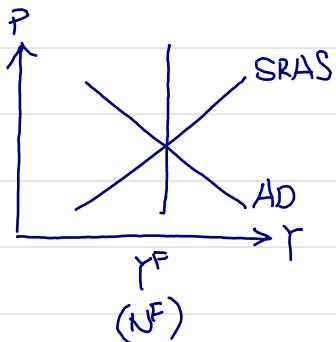
profitable \uparrow

SRAS shifts to the right



\Rightarrow As long as the output in the short-run deviates from the full employment output, SRAS curve will gravitate towards the full employment output regardless of P.

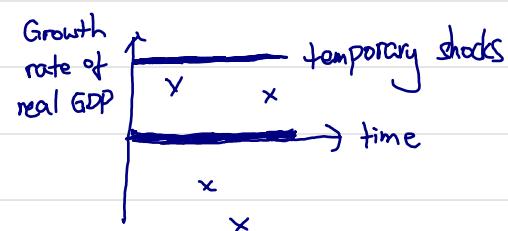
$\Rightarrow Y^F \Leftrightarrow LRAS$ curve



$LRAS + AD \rightarrow LR$ equilibrium \rightarrow LT trend

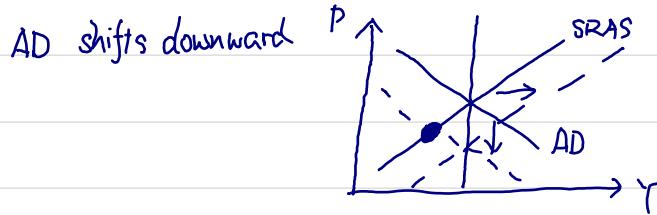
$SRAS + AD \rightarrow SR$ equilibrium \rightarrow business cycles

LT trend



Recession

↑ real cost of raw materials will go up



natural effect

{ Output ↓ , P↑ , unemployment rate rises
When the contract is renewed, bargaining power ↓ , lower nominal wage
Profit ↑ , firms will expand and produce more
SRAS shifts to the right

Stabilization Policies

Assume a negative AD shock

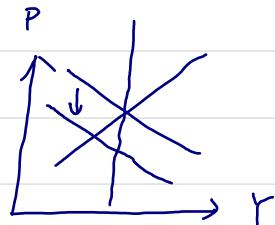
It takes a long time to move to the Y^F .

⇒ Adopting expansionary fiscal or monetary policy.

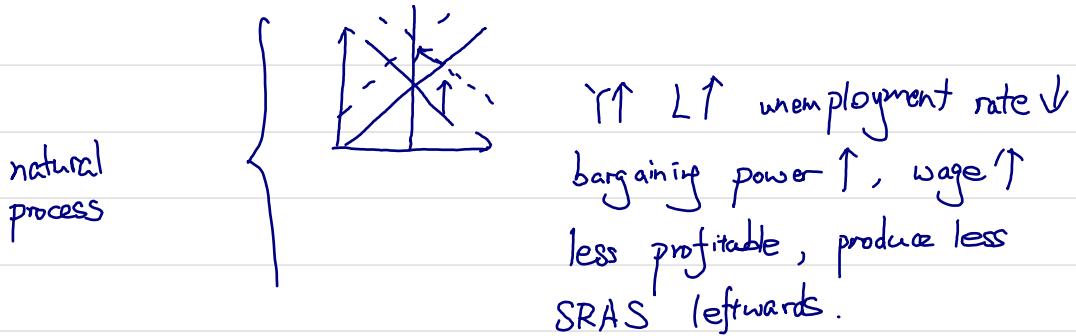
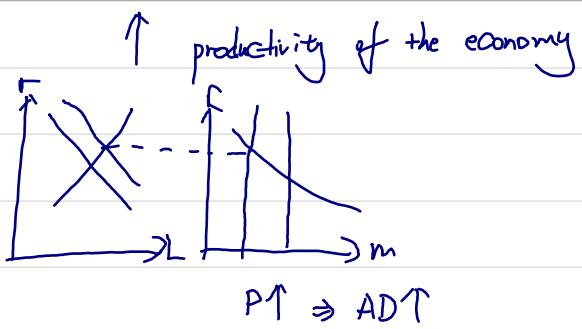
(i) $\uparrow G$

(ii) $\uparrow M$

⇒ AD shifts upward



Economic Expansion.



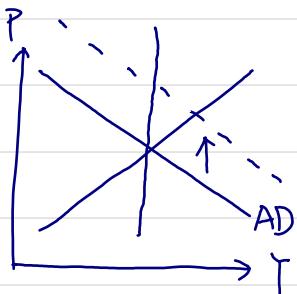
Stabilization Policy

(i) $\downarrow G$

$L^s \uparrow, R \downarrow, m \uparrow, \downarrow AD$

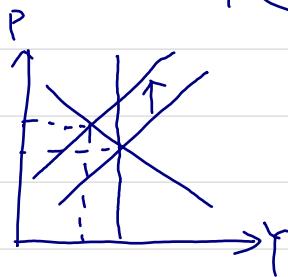
(ii) $\downarrow M$

$\Rightarrow m \downarrow, P \downarrow, m \uparrow, \downarrow AD$



Stagflation : Recession associated with inflation

oil exporting countries : reduce supply



SRAS \uparrow

$\Rightarrow Y \downarrow, P \uparrow$, unemployment rate \uparrow

\Rightarrow bargaining power \downarrow wage \downarrow

\Rightarrow profitable, produce more

\Rightarrow SRAS \rightarrow

However, adopt contractionary monetary policy.

M↓

$\Rightarrow m \downarrow, P \uparrow$

$\Rightarrow F$ inconsistent, $P \downarrow, m \uparrow$

AD shifts downward

Ultimately, $\bar{P} \uparrow \bar{P}'$, Y^S further decreases

\Rightarrow inflation with recession

Long term Economic growth

(i) full employment level \uparrow , working age population \uparrow

(ii) Capital accumulation K

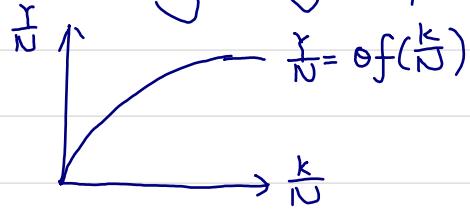
facilitate the flow of funds from the savers to the firms

(iii) $OI \uparrow$ {
↑ quality of the workforce

↑ production technology

Difference between capital accumulation and $\uparrow \theta$.

coz of diminishing marginal product



holding N constant, $\uparrow K$
(a) \uparrow output / labor
(b) marginal product of capital
is diminishing

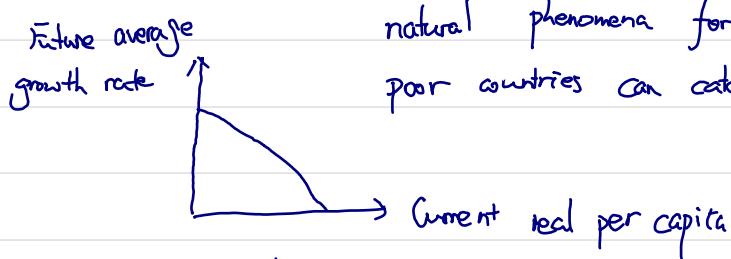
(i) $\uparrow K$

shifting along the curve

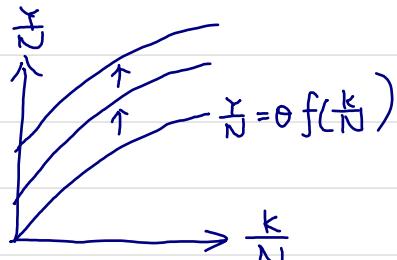
growth rate of the GDP/labor will slow down

natural phenomena for an advanced to slow down its growth rate

poor countries can catch up over time.



(ii) $\uparrow \theta$



Hence, the growth rate of the economy does not necessarily decrease as the country becomes richer.

Subprime Crisis and the Great Recession

Causes of the Subprime Crisis

- (1) Low interest rate since 2002
- (2) Securitization (Mortgage Backed Securitization)

In general, mortgage loans are long-term in nature. \Rightarrow LT interest rate.

($>$ ST interest rate)

Pool of the mortgage loans will allow the commercial bank to receive \$12M

The commercial bank can issue debt securities to sell the ownership of the mortgage loans.

Benefit: (a) converting long term mortgage loans to cash

(b) • origination fee

- fees for the service of collecting the installment payment and transferring the payment to the holders.

(3) Risky activities and Incentive problems of financial institutions.

Risky activities of IBanks

E.g. Lehman Brothers and Bear Sterns

(a) MBS can get LT interest rates

(b) IBanks borrow ST loans, they will have to pay ST interest rate. ($ST \text{ paying} < LT \text{ salary}$)

(c) Borrow ST funds to finance the purchase of MBS.
(cost of borrowing $<$ interest of MBS)

"rolling over the debt"

borrow \$118M at an annual interest rate of 2%,

repay $\$118M(1+2\%) = \$120.36M$

However, it only receives \$12M.

Thus, it is still short of $\$120.36M - \$12M = \$108.36M$

IBank has to borrow new ST loans to repay the old ST loans.

If IBank can keep on rolling over, after 20 years when all the long-term mortgage loans mature, it will be able to repay all the ST loans and have some profit left.

In fact, even the lower quality borrowers - subprime borrowers are in general less credit worthy borrowers.

(4) Immediate Trigger

Fed started to raise the Federal Fund's Rate quite aggressively.

⇒ Borrowers started to have difficulties repaying the mortgage.

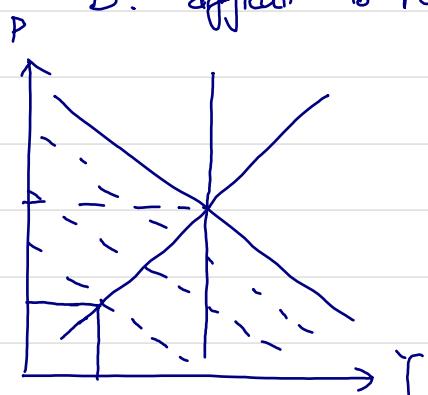
⇒ could not repay their mortgage installment payment

⇒ refused to lend new S-T loans

⇒ IBank could not roll over the debt, and go bankrupt.

Macro-econ Effects

- A. significant drop in stock prices
 - B. more reluctant to extend new mortgage loans, reducing the demand for property, \downarrow property price.
 - C. prefer to hold more reserves $\downarrow M^s$
 - D. difficult to raise funds $\downarrow L^d$
- $\left. \begin{matrix} \uparrow L^s \\ \downarrow M^d \end{matrix} \right\} \text{real value of asset} \downarrow$



deflation $P \downarrow$

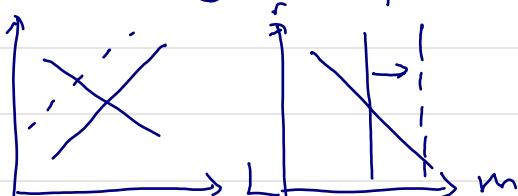
$r \downarrow$ cyclical unemployment

A. Monetary Policies

- * Zero interest rate (OMP) (Dec. 2008 - Dec. 2015)
 - \Rightarrow by ST govt debt securities (T-bill)
 - \Rightarrow Federal Fund Rate dropped to 0.

* Quantitative Easing

- Large scale purchase of debt securities



$P \uparrow$ significantly (restore equilibrium)
 $AD \uparrow$

B. Fiscal Policy

$$: \quad \uparrow G \quad L^s \downarrow \quad P \uparrow \quad AD \uparrow$$