LABOR MARKET

Noninstitutional civilian population is the number of people potentially available for civilian employment = Labor force + Out of the labor force

Labor force = either working + looking for work

Out of the labor force = neither working nor looking for work – working at home or housewives etc.

Therefore, participation rate = Labor Force
= Labor force + Out of the labor force

Labor force = employed + unemployed

A. Movements in Unemployment

The effect of movements in the aggregate unemployment rate on the welfare of individual workers

The effect of the aggregate unemployment rate on wages.

Periods of higher unemployment are associated with much lower proportions of unemployed workers finding jobs

Since employed workers face a higher probability of losing their jobs

Unemployed workers face a lower probability of finding jobs; equivalently, they can expect to remain unemployed for a longer time.

B. Wage Determination – Workers based

Workers are typically paid a wage that exceeds their reservation wage.

This is the wage that would make them indifferent between working or being unemployed. In other words, most workers are paid a high enough wage that they prefer being employed to being unemployed.

Wages typically depend on labor market conditions.

↓ Unemployment rate → ↑ Wages
A lower unemployment rate would mean that firms would find it difficult to find acceptable replacement workers.

At the same time, it is easier for workers to find other jobs.

- Therefore, workers have a strong bargaining power and can ask for higher wages

**Unemployment rate \rightarrow Wages**

A higher unemployment rate would mean that firms would find it easy to find acceptable replacement workers.

At the same time, it is difficult for workers to find other jobs.

- Therefore, workers have a weak bargaining power and can ask for lower wages

**Nature of the Job**

The required skills can be high or low level. If training cost are minimum replacement would be easier and bargaining power of workers become weaker. Example: McDonalds crew versus Microsoft programmers

**C. Efficiency Wages – Firm based**

If workers are paid only their reservation wage, they will be indifferent to staying or leaving. In this case, many of them will quit, and the turnover rate will be high.

- \( \uparrow \) Wages \( \rightarrow \) \( \downarrow \) Turnover & \( \uparrow \) productivity
1. **WAGES, PRICES AND UNEMPLOYMENT**

\[ W = P_e \cdot F(u, z) \]

\[- , +\]

ξ The expected price level \( P_e \)

ξ The unemployment rate \( u \).

ξ Catchall variable \( z \) that stands for all other variable that may affect the outcome of wage settings

A. **Expected Price Level**

ξ Firms and workers care about *real wages*, not nominal wages

  o If workers expect the price level – the price of the goods they buy – to double, they will ask for a doubling of their nominal wage.

  o If firms expect the price level – price of the goods they sell – to double, they will be willing to double the nominal wage.

    ▪ Therefore, an increase in the expected price level leads to an increase in the nominal wage, in the same proportion.

ξ The reason why wages depend on the *expected price level*, \( P_e \), rather than on *actual price level* is because wages are set in nominal terms, and when they are set, the relevant price level is not yet known.

B. **Unemployment rate**

ξ The minus ( - ) sign under \( u \) indicates that an increase in the unemployment rate decreases wages.
C. **Other factors**

ξ Unemployment insurance or unemployment benefits increase the *reservation wage* of unemployed workers and so they would hold out for higher wages.

- Unemployment benefits, \( z \rightarrow \uparrow \text{ wages} \)

2. **PRICE DETERMINATION**

\[
Y = AN
\]

ξ Where \( Y \) is output

ξ \( N \) is unemployment

ξ \( A \) is labor productivity

- Assumption that output per worker is constant and equal to \( A \). Therefore, \( A = 1 \)

\[
Y = N
\]

ξ The production function \( Y = N \), implies the cost of producing one more unit of output is the cost of employment one more worker, at wage, \( W \).

ξ The marginal cost of production – the cost of producing one more unit of output – is equal to \( W \).

ξ However, the price of that unit of output would not be equal to the marginal cost (not perfectly competitive). Therefore, the equation is adjusted to give;

\[
P = (1 + \mu) W
\]

ξ \( (1 + \mu) \) is the markup of the price over cost
3. **STRUCTURAL RATE OF UNEMPLOYMENT**

A. **Wage Setting Relation**

\[ W = P \times F(u, z) \]

Divide both sides by the price level

\[ \frac{W}{P} = F(u, z) \]

Wage determination implies a negative relation between real wage, \( W/P \), and the unemployment rate, \( u \).

- \( \downarrow \) Unemployment rate \( \rightarrow \uparrow \) Real Wages Chosen by wage setters
  - Higher unemployment weaker the bargaining power of workers

B. **Price-Setting Relation**

\[ \frac{P}{W} = (1 + \mu) \]

Invert both sides

\[ \frac{W}{P} = \frac{1}{(1 + \mu)} \]
The firm wants increase markup, $\mu$. Your real wage does not change much. You are still paid the same nominal wage, and the product produced by the firm is, at most, a small part of your consumption basket.

If ALL firms increase markup $\rightarrow$ *Constant nominal wage* $\rightarrow$ $\downarrow$ real wage

Note: the real wage implied by price setting is $1/(1+\mu)$; it does not depend on the unemployment rate.
4. **EQUILIBRIUM REAL WAGES AND UNEMPLOYMENT**

\[ F(\text{un}, z) = \frac{1}{(1 + \mu)} \]

Equilibrium unemployment rate is called the natural rate of unemployment. However, the positions of the wage-setting and price-setting curves, depend on both \( z \) and \( u \).

Increase in unemployment benefits, \( z \)

- This would shift the wage setting curve up and the economy moves along the price-setting curve.

Therefore, at a given unemployment rate, ↑ higher unemployment benefits → ↑ real wage.

- Resulting in:
Unemployment rate is needed to bring the real wage back to what the forms are willing to pay

Economists call this the discipline device

A less stringent enforcement of existing anti-trust legislation

- Markup shifts the price-setting curve and the economy moves along the wage-setting curve

Therefore, equilibrium unemployment;

- Firms increase their prices given the wage → Real wage → unemployment is required to make workers accept this lower real wage → natural rate of unemployment
5. FROM UNEMPLOYMENT TO EMPLOYMENT

\[ U = \frac{U}{L} = \frac{L - N}{L} = 1 - \frac{N}{L} \]

ξ The level of unemployment, U, equals the labor force, L, minus employment N

ξ \[ L = N + U \rightarrow U = L - U \]

ξ Rearranging this:

\[ N = L (1 - u) \]

ξ Therefore the natural level rate of unemployment is

\[ N_n = L (1 - u_n) \]

ξ Since we know that \( Y = N \) from before

\[ Y_n = N_n = L (1 - u_n) \]

ξ Therefore since \( u_n = 1 - \frac{Y_n}{L} \)

\[ F \left( 1 - \frac{Y_n}{L}, z \right) = \frac{1}{L} \cdot \frac{1}{1 + \mu} \]
Assume that the expected price level is equal to the actual price level

1. The real wage chosen in wage setting is a decreasing function of the unemployment rate

2. The real wage implied by price setting is constant

3. Equilibrium in the labor market required that the real wage chosen in wage setting to be equal to the real wage implied by price setting. This determines the unemployment rate

4. This equilibrium unemployment rate is known as the natural rate of unemployment

5. Associated with the natural rate of unemployment is a natural rate of employment and a natural level of output.
6. AGGREGATE SUPPLY

The difference in this chapter is that we do not impose this additional assumption i.e. price level is equal to the expected price level in the medium run but will typically not be equal to the expected price level in the short run.

\[ P = P_e \times (1 + \mu) \times F(u, z) \]

Since \( N = Y \) from above

Therefore:

\[ u = 1 - \frac{Y}{L} \]

\[ P = P_e \times (1 + \mu) \times F(1 - \frac{Y}{L}, z) \]
↑ Output - ↑ price level

1. An increase in output leads to an increase in employment: ↑ \( Y \rightarrow ↑ N \)

2. The increase in employment leads to a decrease in unemployment and, therefore, to a decrease in the unemployment rate: ↑ \( N \rightarrow ↓ u \)

3. The lower unemployment rate leads to an increase in the nominal wage: ↓ \( u \rightarrow ↑ W \)

4. The increase in the nominal wage leads to an increase in the prices set by the firms and therefore, to an increase in the price level: ↑ \( W \rightarrow ↑ P \)

↑ Expected price level - ↑ actual price level

1. If wage setters expect the price level to be higher, they set a higher nominal wage: ↑ \( P_e \rightarrow ↑ W \)

2. The ↑ nominal wages leads to ↑ costs, which leads to ↑ prices set by firms and a higher price level – ↑ \( W \rightarrow ↑ P \)

Aggregate Supply Curve

When output is above the natural level of output, the price is higher than expected:

- If \( Y \) is to the right of \( Y_n \), \( P \) is higher than \( P_e \).
When output is below the natural level of output, the price level is lower than expected

- If Y is to the left of Y_n, P is lower than P_e.

Suppose the expected price level increase from P_e to P’e.

- At a given level of output, Y_n and corresponding given unemployment rate, the increase in the expected price levels leads
  - \( \uparrow W - \uparrow P \)
  - So at any level of output, prices are higher – Aggregate supply curve shifts from AS to AS’

7. **AGGREGATE DEMAND**

**IS relation**

\[
Y = C(Y - T) + I(Y, i) + G
\]

**LM Relation**

\[
\frac{M}{P} = Y \cdot L(i)
\]
Note: Equilibrium in financial markets requires that the supply of money equal the demand for money – LM relation

- Changes in the real money stock that came from changes in nominal money supply, $M$, made by the Fed.

- Changes in the real money stock $M/P$ can also come from changes in the price level $P$. 
10% increase in price level $P$ (increases bottom - decreases $M/P$) has the same effect on the real stock as a 10% decrease in the stock of nominal money $M$ (decrease top - decreases $M/P$)

- Both leads to a decrease in real money stock

IS Curve is drawn for given values of $G$ & $T$.

- An increase in the interest rate leads to decrease in output as the diagram above shows – $i - i'$ leads to decrease from $Y_n - Y'$

- Note: LM curve is drawn for a given value of $M/P$ – any changes in $M$ or $P$ would result in the LM curve to shift

  - Therefore, $\uparrow$ price level from $P - P' \rightarrow \downarrow M/P \rightarrow$ LM curve shifts up

    - NOTE: A monetary contraction $\downarrow$ nominal stock, $M$ and $\downarrow$ $M/P$ BUT it would shift the AD to the left unlike price, which merely makes the economy, move along the current AD curve.

- Now, at given level of output, the lower real money stock leads to an increase in the interest rate. The economy moves from $A$ to $A'$. the interest rate increase from $i$ to $i'$, and output decreases from $Y$ to $Y'$.

Any variable other than the price level shifts either IS curve or the LM curve also shifts the aggregate demand relation.

Example would be a decrease/increase in government spending – decrease in output as a result of a shift of AD to the left.

Contractionary monetary policy – decrease nominal money – decrease output as a result of a shift
Aggregate Relation

\[ Y = Y (M, G, T) \]
\[ P \]
\[ (+, +, -) \]

Note: Output increase with increases in \( M/P \) and Government spending and decreases with \( T \).

A. **Equilibrium in the Short Run**

\[ P = P_e * (1 + \mu) * F(1 - Y, z) \]

AS Relation

AD Relation

\[ Y = Y (M, G, T) \]
\[ P \]
\[ (+, +, -) \]

Note: Equilibrium depends on value \( P_e \) – since \( P_e \) determines the position of AS curve.
ξ The equilibrium is the intersection of AS and AD curves at point A. There is no reason why, equilibrium output, Y should be equal to the natural level of output.

B. Equilibrium in the Medium run

ξ As Output exceeds the natural level of output – the expected price level would be lower than the current price level – the price level wage setters would expect higher nominal wages (Pe – P'e). This results in AS shifting to AS'.

ξ This movement would continue till output reaches Yn where P = Pe – since there is no reason now to change wage setters expectations of the price level.
8. **SENARIOS**

1. **Monetary expansion**

Dynamics of Adjustment

\[ \text{If price level did not change, the increase in nominal money would shift the LM curve down to } \text{LM}'' \text{. So, if the price level did not change – as was our assumption – the equilibrium would be the intersection of IS and LM}'' \text{, or point B.} \]
However, due to change in price in the short run, $P$ to $P'$. the increase in price shifts the LM curve upwards from LM’’ to LM’, partially offsetting the effect of the increase in nominal money

The net effect:

- Increase in nominal money – push LM to LM’’
- Increase in price level – push LM’’ to LM’

  Therefore, the equilibrium is $A'$ in the short run and finally ends up at $A$ in the medium run as illustrated above to price wage setters expectations increasing prices till curve shifts back to LM.

  Note: This is what is called the Neutrality of money

- In the short run, a monetary expansion leads to an increase in output and a decrease in interest rate and increase in price level
- In the medium run, in increase in nominal money is reflected entirely in a proportional increase in price level. The increase in nominal money has no effect on output or on the interest rate.
2. **A decrease in the budget deficit**

Government is running a budget deficit and decides to reduce it by decreasing its spending from $G$ to $G'$, while leaving taxes, $T$, unchanged.

This would shift aggregate demand from $AD$ to $AD' \downarrow$ Output $Y_n \rightarrow Y'$

*In the short run:*
  
  - The equilibrium moves from $A$ to $A'$; output decreases and price level decrease from $P$ to $P'$.

*In the Medium Run:*
  
  - As long as output is below natural level of output, AS curve would keep on shifting down. Therefore, AS would move to $AS''$ and the economy reaches point $A''$ – output $Y_n$

Note: Like a increase in nominal money, a reduction in the budget deficit does not affect output forever. Eventually, the output returns to its natural level. However, at point $A'' - \downarrow$ Price & $\downarrow$ interest rate
ξ The reduction in budget deficit → IS curve to shift to IS′ and economy moves from A to B – prices held constant.

ξ In the short run:

ξ However, since prices do change in response to decrease in output – ↓ prices
→ ↑ Real money stock \((M/P)\) and the LM curve shifts to \(LM'\), and economy moves from B to \(A'\) –

   o Note: Now output and interest are both lower than before the fiscal contraction but investment may or may not increase in the short run as ↓ output → ↓ investment but ↓ interest rate → ↑ investment
In the medium run:

- As output remains below the natural level of output, the price level continues to decline, lading to further increase in real money stock and shifting LM till output return to Yn or economy equilibrium is A’.

**Effect on the Yn = C(Yn – T) + I(Yn, i) + G**

- Income and taxes are unchanged – consumption is not affected
- Government spending is lower than before
- Investment is higher than before the deficit by exactly the amount of the decrease in G
  - Note: medium run, reduction in budget deficit unambiguously leads to a decrease in the interest rate and an increase in investment
3. **Changes in the Price of Oil**

The effect on the natural rate of unemployment when the price of oil increases.

The price-setting relation is represented by the horizontal line at \( W/P = 1/(1+\mu) \).

The initial natural employment rate is \( Un \). An increase in the markup leads to a downward shift of the price-setting line, from PS to PS'.

- \( \Uparrow \) Markup \( \rightarrow \downarrow \) real wage implied by price setting
- \( \Uparrow \) Equilibrium moves from A to A' – Real wage is lower and natural unemployment is higher since getting workers to accept \( \downarrow \) real wage requires an \( \Uparrow \) unemployment
- \( \Uparrow \) Unemployment \( \rightarrow \downarrow \) employment \( \rightarrow \downarrow \) output (assume \( Y = N \) – from above)
Short Run – aggregate Supply relation

\[ P = P_e \times (1 + \mu) \times F(1 - Y, z) \]

\( \xi \) In the short run:

- The increase in the price of oil shows up as an increase in the markup \( \mu \).
- This leads firms to increase price level at any level of output and hence AS curve shifts up. The new equilibrium is B from A, output is lower equal the new lower natural level of output \( Y'n \) and price level equals the expected price level, \( P_e \).
- In the short run only the AS shifts as AD remains constant due to the balancing out effect of the increases and decreases of consumption & investment are affected by increasing oil prices.

\( \xi \) In the medium run

- Although output has fallen, natural level of output has fallen even more.
- At point \( A' \), output \( A' \) is still above the new natural level of output, \( Y'n \), so \( AS' \) shifts to \( AS'' \) and equilibrium at \( A'' \).
Note: the end result is an output is at a lower level than before the oil price increases but at a new natural level of output, Y’n at a higher price level than before.

9. **SHORT RUN VERSUS THE MEDIUM RUN**

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<th>SHORT RUN</th>
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<td>Decrease</td>
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<td>(small)</td>
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<td>(Small)</td>
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