1. Labor market equilibrium FE

2. Goods market equilibrium IS

3. Money market equilibrium LM

4. Putting the model together
1 Labor Market Equilibrium FE

- Labor market equilibrium - equates labor demand (MPN) and labor supply:

\[ ND = NS \]

- Put \( \bar{N} \) in the production function to get full employment output:

\[ \bar{Y} = AK^\alpha \bar{N}^{1-\alpha} \]

where \( K \) is determined by last period’s decisions and cannot change in the current period.

- On a graph with real interest on the verticle axis and real output on the horizontal axis, the FE line is verticle at \( \bar{Y} \).
• Shifts in $\bar{Y}$.
  
  – Change in $K$
  
  – Change in $A$
  
  – Change in $\bar{N}$ due to change in
    
    * MPN (capital or technology)
    
    * labor supply
2 Goods Market Equilibrium IS

2.1 Derivation of IS curve in r Y plane

- Goods market equilibrium determines $r$ such that $S = I$, where $S$ depends positively on $Y$.

$$Y = C \left( Y - T, Y^f - T^f, r, a \right) + I \left( r, A^e \right) + G$$

- Choose a value for $Y$ and label it $Y_0$. Locate the equilibrium $r_0$ in the $r$ $Y$ plane.

- To get another point, choose a different value for $Y$ and find the equilibrium $r$. 
The IS curve is the combination of $Y$ and $r$ necessary for goods market equilibrium.

Intuitively, if $Y$ increases, saving rises above investment. For savings to equal investment at the higher $Y$, the real interest rate must fall, increasing investment and reducing saving.

2.2 Shifts in the IS curve

- anything that shifts $I$ or $S$ other than $Y$.
- Generally shocks which raise spending shift IS right and shocks which decrease spending shift IS left.
– Rightward IS shifts – temporary increase in $G$, permanent increase in $A$, reduction in $T$ if agents are liquidity-constrained
3 Money Market Equilibrium LM

3.1 Derivation of LM curve in \( r \) \( Y \) plane

- Money demand depends on nominal interest, not real interest, so we need some assumption about expected inflation. Assume that \( \pi^e \) is fixed. Now movements in nominal rates are equivalent to movements in real rates.

- With \( \pi^e \) and \( P \) fixed, money market equilibrium determines \( r \) such that real money supply equals real money demand.

\[
\frac{M}{P} = L(r + \pi^e, Y).
\]
Choose a value for $Y$ and label it $Y_0$. Locate the equilibrium $r_0$ in the $r$ $Y$ plane.

To get another point, choose a different value for $Y$ and find the equilibrium $r$.

The LM curve is the combination of $Y$ and $r$, for fixed values of $\pi^e$ and $P$, necessary for money market equilibrium.

Intuitively, when $Y$ increases, money demand increases requiring an increase in $r$ to reduce money demand again.
3.2 Shifts in LM curve

- Change in real money supply due to a change in $P$ or $M$.

- Change in real money demand due to change in $\pi^e$ or transactions technology.
4  General Equilibrium Model of the Economy

4.1  Description

- A general equilibrium model requires all markets in the economy, labor, goods, and money (remember other asset markets are also in equilibrium given a fixed value for wealth) to be in equilibrium simultaneously.

- Graph and meaning of equilibrium.
  - What happens when three lines do not share a point?
  - Flexible prices and Classical model
  - Sticky prices and Keynesian model
• Examples of shocks

  – Temporary increase in $A$

  – Money supply increases

  – Government spending increases temporarily

  – $A^e$ increases
5 Summary

- IS curve is goods market equilibrium
  - requires that output fall as the real interest rate rises
  - shifts right when spending rises due to factors other than $r$ or $Y$

- LM curve is money market equilibrium
  - requires that output rise as the interest rate rises
  - shifts right when real money supply rises or when real money demand falls due to factors other than $r$ or $Y$
• FE is output when labor market is in equilibrium
  
  – vertical since equilibrium employment does not depend on the interest rate

  – shifts right when

  * equilibrium employment rises

  * capital stock rises

  * technology improves
• Short-run equilibria are different in Keynesian and Classical model
  
  – Equilibrium in classical model
    * intersection of FE and IS
    * price changes shifting LM to intersect at the same point
  
  – Equilibrium in Keynesian model
    * intersection of IS and LM
    * labor market can be out of equilibrium

• In the long run, equilibria are identical in Keynesian and classical models