ECO102

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1 GDP and Savings

- Economy is officially in recession after 2 consecutive quarters of economic activity contractions
- Goal is to smooth fluctuations in SR
  - Using fiscal and monetary policy, we can smooth out the bumps in the business cycle and shift aggregate demand
  - Inflation is related to the business cycle in SR
- Promote growth in the LR
  - Inflation related to MS
- GDP is the measure of a country's economic input throughout a specific period of time (usually a year)
  - Market value of all **final goods** produced in an economy
- A final good is sold to the final user (won't be further processed or resold)
- An intermediate good is sold to firms that use them to produce final goods (not counted part of GDP)

ONLY FINAL GOODS ARE COUNTED AS PART OF GDP

1.1 3 ways to measure GDP

1. Value added approach
2. Expenditure approach
3. Income approach

1.1.1 Value added approach

For each firm, compute

SELL PRICE - INTERMEDIATE PRICE

and then add them up (final prices added)

Example 1. A sells \$200 of wheat to B, who uses it to make flour and sell it to C for \$400, who uses the flour to make bread and sell it for \$1000.

$$Y = (\$1000 - \$400) + (\$400 - \$200) + (\$200 - \$0) = \$1000$$

1.1.2 Expenditure approach

The equation for expenditure approach is given by

$$Y = C + I + G + X - IM$$

where Y represents GDP, C represents consumption spending, I represents investment spending, G represents government spending, X represents exports and IM represents imports.

Things to include in expenditure approach

Consumption

- Durable and non-durable consumption
- Services

Do NOT include income tax, newly built housing, household production.

Investment

- Depreciation of assets
- Newly built housing
- Inventory investment
- Capital stock (stuff used for production)

Do NOT include stocks, bonds or firms buying other firms.

Government expenditure

- Government consumption
- Investments

Do NOT include transfer payments (these are for income approach) or interest payments

Net exports

If imports are consumed, then the subtracting of imports can be cancelled out with the adding of the value of the imports to other factors of expenditure approach.

1.1.3 Income approach

$$Y = \text{Factor payments } + \text{Non-factor payments}$$

Factor payments include:

- Wages
- Profits
- Interest
- Rent

Non-factor payments include:

- Indirect taxes (including subsidies)
- Depreciation

For an example of how to calculate GDP, visit this link:
`https://notability.com/n/1eCHlhSId5Y7JqT6C7NWsM`

1.2 Real GDP

- Real GDP is GDP measured using current output but with a base year's prices
- Since prices increase with inflation, real GDP measures true growth

1.3 Savings

Income has two usages: consumption or savings. This makes sense. If you get 1000 and choose to spend 500 of it, then the only other option is the save the other 500, either in a bank account, under your mattress, etc. Let's analyze savings for two different types of economies: closed and open..

1.3.1 Closed economy savings

The definition of a closed economy is no trade, meaning $NX = 0$. Then

$$Y = C + I + G$$

There are two parts to national savings: Public savings (denoted S_{public}) and private savings (denoted $S_{private}$).

Public savings Public savings are government savings. How does the government make money? Through taxes (T). What does the government spend the money on? They spend it on G and transfers to the people Tr. Then we can determine that

$$S_{public} = T - G - Tr$$

Private savings Private savings are from households. Let Y represent their total income (GDP calculation equivalence). What do households spend their money on? On C and taxes. However, they also get transfers from the government, so private savings is calculated as

$$S_{private} = Y - T - C + Tr$$

Since national savings is the total amount of savings in the economy, then

$$\begin{aligned} S_{national} &= S_{private} + S_{public} \\ &= Y - T - C + Tr + T - G - Tr \\ &= Y - C - G \end{aligned}$$

If we look at the equation for GDP of a closed economy

$$\begin{aligned} Y &= C + I + G \\ Y - C - G &= I \end{aligned}$$

This we can see that in a closed economy, national savings is equal to investment. This means that investments are funded by national savings.

1.3.2 Open economy savings

In an open economy, things get a bit trickier because open economics allow trade ($NX \neq 0$). This means

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

Let's define a new concept: net foreign investment (NFI), which is the difference between national savings and investment. When dealing with the flow of funds, we use NFI, which is the net outflow of funds into a country. Similar to NX right? Actually...they're the same thing. Treat outflows as a flow of capital out of the country, so investments abroad, and treat inflows as a flow of capital into the country, so foreigners' investments.

$$NFI = \text{outflows} - \text{inflows}$$

It should also be noted that in an open economy,

$$S_{national} \neq I$$

because of in-/outflows of money finances. We can see this by manipulating the GDP equation.

$$\begin{aligned} Y &= C + I + G + NX \\ Y - C - G &= I + NX \end{aligned}$$

In other words, $S_{national} = I + NX$, so

$$\begin{aligned} S_{national} &= I + NX \\ S_{national} - I &= NX \\ NFI &= NX \end{aligned}$$

Also, if $NFI > 0$, then outflows $>$ inflows $\rightarrow$ Capital outflow = trade surplus
If $NFI < 0$, then outflows $<$ inflows $\rightarrow$ Capital inflow = trade deficit

1.4 Aggregate expenditure and its models

In this section, let's first define a new concept: the concept of disposable income. Disposable income is income after taxes and is denoted Y^D. If incomes rise, then disposable incomes rise, which causes people to spend more and quantity sold increases. Remember that your spending is another person's income, so this increase in quantity sold causes incomes to go up *again*, and the cycle continues. There are 3 models that we are going to explore: the simple model,

government model and the general model.

1.4.1 Simple model

In the simple model, we assume that G and NX are equal to 0.

$$Y = C + I$$

This means that GDP is wholly dependent on consumption and investments. Let's first look at consumption. Consumption has two parts to it: autonomous expenditure and induced. Autonomous consumption, denoted $\overline{C}$ is the level of consumption that is independent of disposable income. This means that consumption can be modelled as

$$C = \overline{C} + MPC \cdot Y^D$$

where MPC stands for "marginal propensity to consume". Marginal propensity to consume is defined as the amount of each extra dollar gained that will be spend. For example, if you gain an extra dollar and your MPC is 0.5, then you will spend 50 cents and the rest will be saved. Obviously

$$MPS = 1 - MPC$$

where MPS is marginal propensity to save.
As for investment, we always assume planned investment to be autonomous, so we have

$$I = \overline{I}$$

Let it be known that planned investments are NOT the same as actual investments. Actual investments also take into account unplanned investments because of uncertainty that surrounds sales and the actual market.
If actual investments $<$ planned investments $\Rightarrow$ actual inventories $>$ planned inventories since too much was produced, so unplanned investments < 0
If actual investments $>$ planned investments $\Rightarrow$ actual inventories $<$ planned inventories since too little was produced, so unplanned investments > 0
There are 3 factors of investment:

1. Interest rate
    - As interest rate rises, investment decreases
2. Expected future GDP and production capacity

- if we expect sales to increase, then have to invest more to anticipate
- if expect sales to stay same, then only have to invest to maintain the current level of production

3. Inventories
    - Can be negative
    - Sales fluctuation causes uncertainty surrounding investment

Now that we have defined C and I, we can define a new concept: aggregate expenditure. Aggregate expenditure is the total spending of the economy, so ideally, AE = Y, however, if the economy spends more than the equilibrium level of GDP, then an inflation ensues. Similarly, if the economy spends less than equilibrium level, recession ensues. With the simple model,

$$AE = C + I$$
$$AE = \overline{C} + \overline{I} + MPC \cdot Y$$

Notice how instead of Y^D, we have Y instead. That's because when consumers pay no tax, they get the full Y so $Y = Y^D$ in the simple model.

1.4.2 The multiplier

The multiplier is an interesting concept that relates the total change in AE to the change in Y. Imagine that $\overline{I}$ increases by 10. This will cause AE to rise by 10, which means Y will rise by 10. When Y rises, then consumption will rise, which as we know from earlier will set in motion a cycle that causes Y to continuously rise by a decreasing amount each round. The reasoning why each round of increase causes less increase in Y is because of the $MPC \rightarrow$ because every increase in GDP means that people will spend some of it and save some it. As the GDP grows and grows continuously, the total amount of GDP increase can be modelled as

$$\Delta Y = \Delta\overline{AE} \cdot \frac{1}{1 - MPC}$$

The reason why it's autonomous AE is because...how do you increase GDP if you keep $\overline{I}$ constant? Increase MPC? That would only cause the multiplier to increase, the multiplier being

$$\frac{1}{1 - MPC}$$

1.4.3 AE model with Government

Now we're going to assume $G \neq 0$. Recall that government spending is derived from how much they make from taxes. While government spending itself is autonomous ($\overline{G}$), the amount that they tax affects consumer spending through Y^D. Let $\overline{G} = T = tY$ where t is the tax rate at which the government collects taxes. Then

$$Y^D = Y - tY = (1-t)Y$$

Plugging this into our AE function, we get

$$\begin{aligned} AE &= C + I + G \\ &= \overline{C} + MPC \cdot Y^D + \overline{I} + \overline{G} \\ &= \overline{C} + \overline{I} + \overline{G} + MPC(1-t)Y \end{aligned}$$

With this new function, we get a new multiplier for this model:

$$Multiplier = \frac{1}{1 - MPC(1-t)}$$

1.4.4 AE model with government and trade

Now we're going to add NX. Recall that NX has 2 components: Exports (X) and Imports (M). X is dependent on foreign national income so it's always autonomous ($\overline{X}$). M is often induced and people spend money on imports, which is why M depends on national income. Now we have 2 new equations:

$$X = \overline{X}$$

$$M = \overline{M} + MPM \cdot Y$$

where MPM represents the marginal propensity to import.
Adding these to our general AE function:

$$AE = \overline{C} + \overline{I} + \overline{G} + \overline{X} - \overline{M} + MPC(1-t)Y - MPM \cdot Y$$

We also get a new multiplier:

$$Multiplier = \frac{1}{1 - MPC(1-t) + MPM}$$

1.5 Aggregate demand and supply model

1.5.1 Aggregate Demand

The basis of this model is the AE models that we analyzed above: as AE increase, AD increases by the same amount. When AD shifts out, then Price increases but quantity...decreases. Why is this? There are 2 reasons:

1. Wealth effect
    - As aggregate expenditure increases, prices increase, which causes inflation
    - Inflation devalues money - people have less purchasing power and are less "wealthy"
    - Scale back on consumption and Y decrease
2. Interest rate effect
    - If prices increase, then purchasing power decreases $\rightarrow$ the public increases money holdings and interest rate rises (less money for people to borrow)
    - If interest rates increase, investment decreases and Y will decrease (multiplier effect)

When the price shifts, the entire AE curve shifts, which will affect how is total quantity demanded but NOT the entire AD curve $\rightarrow$ this is because AD shifts from other reasons.
AD shifters:

- Change in expectations
- Change in wealth
- Size of existing stock of physical capital (K)
- Fiscal/monetary policy

A shift in AE due to a change in Y will cause the AD curve to shift the same amount.

1.5.2 Aggregate supply

There are two types of aggregate supply curves: one for short run and one for long run.

Short run aggregate supply curve (SRAS) In the SR, we assume the prices of factors of production and wages to be constant (sticky so slow to react). If the prices decrease, the only solution is to reduce labour because they have to reduce production costs.
SRAS shifters:

- Change in commodity prices
- Change in nominal wages
- Change in productivity

Long run aggregate supply (LRAS) In the long run, the LRAS is perfectly inelastic, meaning prices have no influence in the LR. The LRAS is perfectly inelastic at Y^*, which is the potential GDP $\rightarrow$ point of output at full employment (cyclical unemployment = 0). In the LR, all wages are flexible, so the SRAS has time to shift accordingly.

1.5.3 Output gaps

The point where SRAS and AD intersect is the Y^{EQ} point. This is not necessarily at Y^*, as prices are not fully flexible in the short run. If $Y^{EQ} > Y^*$, then we have an expansionary gap because we are producing past potential GDP. This gap causes a period of high inflation, excess demand for factors and an upward pressure of wages. Eventually the wages will adjust and the SRAS will shift back, bringing Y^{EQ} back to Y^*.
On the other hand, if we have $Y^{EQ} < Y^*$, then we have a recessionary gap. A recessionary gap causes a period of low inflation, below normal sales and a downward pressure on wages. Eventually, the SRAS will shift outward and bring us back to potential output.

1.6 Shocks

Why would we be producing outside of potential GDP ever? Isn't it always optimal to produce at Y^*? The answer is yes; of course it is. It's just that in the short run, we have these things called demand/supply shocks, which cause the SRAS or AD curves to shift, which causes equilibrium GDP to also shift.

2 Inflation and unemployment

2.1 Inflation indicators

2.1.1 GDP Deflator

- Measures a **changing** mix of goods **PRODUCED** domestically
- Includes **exports** (not imports)

GDP deflator is calculated by

$$\begin{aligned}\text{GDP deflator} &= \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100 \\ &= \frac{\sum \text{Current prices} \times \text{Current output}}{\sum \text{Base prices} \times \text{Current output}} \times 100\end{aligned}$$

2.1.2 CPI

- Measures a **fixed** basket of goods **CONSUMED** domestically
- Includes **imports** (not imports)

CPI is calculated by

$$\begin{aligned}\text{CPI} &= \frac{\text{Value of basket in current year}}{\text{Value of basket in base year}} \times 100 \\ &= \frac{\sum \text{Base output} \times \text{current prices}}{\sum \text{Base output} \times \text{base prices}} \times 100\end{aligned}$$

Using these indicators, we can calculate inflation rate by using this equation:

$$\text{Inflation rate} = \frac{\text{current year} - \text{base year}}{\text{base}}$$

2.1.3 Problem with inflation indices

- Substitution bias: Inflation is actually lower than the measured value since consumers can substitute goods in response to relative price changes
- Quality adjustment bias
- New goods- how do you capture the influence on baskets that new items have?
- Income disparity

2.2 Costs of inflation

2.2.1 Shoe-leather costs

- Increased transaction costs associated with high inflation
- Inflation rising discourages holding money as cash
- People put money into assets - this cost is more of an OC

2.2.2 Menu costs

- Cost of changing list prices
- Higher inflation causes prices to change more often
- Hyperinflation causes people to use foreign currencies

2.2.3 Unit of account costs

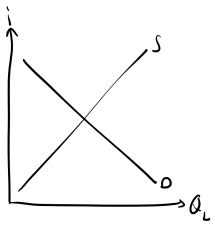
- Costs from how money becomes less reliable as a unit of measurement
- Money's role as a medium of exchange is degraded
- Income tax becomes distorted and sometimes people pay a phantom tax

2.3 Interest rates

- Real interest rate = Nominal interest rate - Inflation rate
- Loans are usually in **nominal terms**
- If actual inflation > expected → borrowers win
  - Real interest rate would be lower so borrowers pay back less money in nominal
- If actual inflation < expected → lenders win
  - Real interest rate would be higher than expected so borrowers end up paying back more money in real terms
- **Fisher effect:** The nominal interest rate rises as the inflation rate rises → produces no real effect on interest rates

2.3.1 Loanable funds market

The domestic market for loanable funds is the market for bonds, loans, stocks, etc. Similar to the standard demand-supply models, this model compares prices (interest rates) to quantity (amount of loans). Who are the demanders? Governments, individuals, firms, etc. Who



are the suppliers? Also governments, individuals, firms, etc. Remember that savings finance investments.

The reason why demand is downward sloping is because of the present value. Let's take a look at that first.

Present value Present value is the amount of money needed today to receive a certain sum of money in the future given a specific interest rate (i). As the interest rate rises, the more attractive it becomes to put money in the bank rather than investing. This is because as the interest rate rises, the future value decreases, so we get less payoff for our investments. PV is calculated using

$$PV = \sum_{i=1}^{n} \frac{R}{(1+r)^i}$$

where R is return and r is the interest rate.

When a firm is looking to invest in something, they want to look at the PV and the investment amount. If the amount they have to invest is greater than PV, that means they get less return for their money so they will choose to **not** invest. If the amount they have to invest is less than PV, then they will invest because they will have a return if they invest rather than if they put the money into the bank instead. Let's do an example.

Example 2. Firm A has some money they want to invest and are presented with an opportunity that will require an investment of 980 and will give a return of 1000 next year. If the interest rate is 4%, will firm A invest?

Solution. The present value of the investment is

$$PV = \frac{1000}{(1+0.04)}$$
$$\approx 961$$

Since the investment requires 980, which is larger than 961, firm A will not invest since they will have a greater return by putting the 980 in the bank.

$$980(1.04) = 1019.20$$

■

The general takeaway is: **As interest rises, PV decreases, causing less enticement to invest**.

Looking at the graph, the demand is downward sloping because of 2 reasons:

1. If interest is higher, PV is lower so less projects have a PV higher than investment cost (higher interest means more incentive to put money in bank)
2. The higher interest, the more loans will cost the borrower so less people want to take out loans

Conversely, since the supply is upward sloping because as the interest rate rises,

1. People are more willing to lend out money because they get a bigger pay back
2. More people will put money into banks, which finance loans

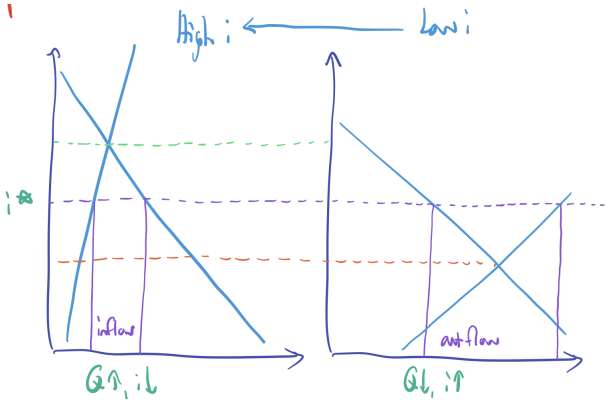
Through the intermediary process, banks use deposits to finance loans (covered in a different section).
Much like any other supply demand model, the curves can shift.

Demand shifters	**Supply shifters**
Change in perceived business opportunities	Change in private savings behaviour
Change in government policies that affect investment	Change in government budget balance (public savings)

2.3.2 Global loanable funds market

In the global scene, countries have different interest rates, as the elasticity of each of the demand curves is different. If we have two countries that are trading with each other, the country with the lower interest rate will experience an increase in quantity demanded because foreigners want to take out lower interest loans. This causes the interest rate for the lower interest rate country to increase. Conversely, the suppliers of the lower interest rate country will outsource

loans to the country with higher interest rates because they get a higher payback. This will cause the quantity supplied of loans in the higher interest rate country to increase. This cycle will cause the interest rate to increase in the lower interest rate country but increase in the higher interest rate country.



2.4 Unemployment

2.4.1 Conditions for unemployment

Be aged 15+ and

1. Not currently employed
2. Available to work
3. Have been actively looking for work for the past 4 weeks

2.4.2 Labour force and unemployment rate

The labour force is equal to number of employed and number of unemployed

$$\text{Labour force} = \text{Employed} + \text{Unemployed}$$

$$\text{Labour force participation rate} = \frac{\text{Labour force}}{\text{Population of 15+}} \times 100$$

$$\text{Unemployment rate} = \frac{\text{Number of unemployed}}{\text{Population of 15+}} \times 100$$

Unemployment is split into 2 parts:

1. Natural unemployment
2. Cyclical unemployment

Natural unemployment is what the unemployment rate would be if the economy was put at full employment, which is producing at full capacity and utilizing all resources to the fullest. There are two types of natural unemployment: frictional and natural.

Frictional unemployment

- Not working but searching
- Higher when unemployment is low
- Lower when unemployment is high
- Not necessarily a bad thing because workers are taking time to find a better job

Structural unemployment

- Happens when there are more people job-seeking than there are jobs
- When wages are consistently higher than equilibrium wage level, there will be less jobs offered → higher structural unemployment Since if it tied to wages, structural unemployment can be influenced by external factors:
    1. Unions
        - Bargaining for higher wages causes structural unemployment to increase
    2. Efficiency wages
        - Higher wages set as an incentive for hard work
        - Also cause structural unemployment to increase
    3. Government policy
        - Reduce incentive to find a new job

2.4.3 Types of workers NOT counted in employment rate

Unemployment rate can understate real unemployment rate because there are 3 types of workers counted in the unemployment rate:

1. Discouraged workers
    - Not working currently but searched for work in the past year
    - Lost hope in finding work; not seeking anymore

2. Marginally attached workers
    - Stopped looking for work for now because waiting for employment to pick up again
3. Underemployed workers
    - Workers who either work too little hours or whose skills aren't put to the fullest

2.5 Okun's Law

Tells us relationship between GDP and unemployment. In an inflationary gap, we have a positive output gap, so unemployment is less than natural. In a recessionary gap, we have a negative output gap so unemployment is higher than natural.

$$u - u^n = -\beta(Y - Y^*)$$

where β represents the sensitivity of cyclical unemployment to the output gap

2.6 Phillips curve

The SRAS is modelled by

$$Y = Y^* + a(P - P^e)$$

where P^e is expected future prices. Future expectations affect today's decisions. If P^e rises, the AD curve will shift right and up because we are expected higher prices so we buy more today. Similarly, the SRAS will shift left and up because they want to sell more at a higher price. This will cause the EQ Y will stay the same but prices will increase. This means inflation. At $P = P^e$, we have

$$Y = Y^* + a(0) = Y^*$$

so at long run output, $P = P^e$. This also means that when $P > P^e$, output is greater than potential output and at $P < P^e$, output is less than potential.
The short run phillips curve (SRPC) tells us that as inflation rises, so does unemployment.

$$\pi = \pi^e - \lambda(u - u^n) + v$$

Where π represents inflation (π^e is expected inflation), $u - u^n$ represents cyclical unemployment and v represents supply shocks.
SRPC shifters:

- Supply shocks

- Demand shocks
- Expected inflation - shifts SRPC by the amount that expectations shift

3 Long Run Growth

3.1 Rule of 70

Given a geometric sequence, the rule of 70 tells us the number of years it takes for the initial amount to double (treat this as a crude approximation).

$$\text{Rule of 70} = \frac{70}{\text{Annual growth rate}}$$

3.2 Aggregate Production function

There are 3 reasons for productivity growth:

1. Physical capital increase
    - Better equipment and facilities
    - Workers are more productive
2. Human capital increase
    - Education and knowledge improvements
    - Workers are more skilled and know how to operate equipment
3. Technology progress increase
    - Innovation advancement
    - Allows for quicker and more efficient production

In terms of LR growth, higher productivity is the **only** source.
The production function is given by

$$Y = A \cdot F(K, H, L)$$

where Y is GDP, A is the total factor productivity (AKA tech improvements), K is the physical capital, H is human capital and L is labour. No, we did not forget to include natural resources; it's just that natural resources are of less importance than human/physical resources when it

comes to productivity.

If we rewrite the above equation like

$$\frac{Y}{L} = A \cdot f(\frac{K}{L}, \frac{H}{L})$$

we can see that there exist diminishing returns to capital. This means that as we increase capital, we get less and less output for each increment of capital increase. Furthermore, increasing the total factor productivity will cause a stretch of the productivity curve, not a shift.

There are 6 ways the government can help increase productivity (growth rate):

1. Subsidies to infrastructure
    - Poor infrastructure stunts growth
2. Subsidies to education
    - Improve human capital
3. Subsidy to research and development
    - Improve tech advancements
    - Bolster innovation
4. Maintaining good financial system
    - Trust in banks means money can be used for productive investments
5. Protection of property rights
    - Provide incentive to innovate
6. Political stability and good governance
    - Maintain LR growth
    - Excess intervention will halt growth

3.3 Growth accounting

Using the production function equation we had earlier, we can obtain a new equation:

$$\%\Delta Y = \%\Delta A + \alpha_L \%\Delta L + \alpha_K \%\Delta Y + \alpha_H \%\Delta H$$

where $\%\Delta Y = \frac{Y_t - Y_{t-1}}{Y_{t-1}}$, α_i is the value of income going to factors K, L, H. α_i is also equal to the elasticity of output is equal to $\frac{\text{income to factor}}{\text{total income}}$.

Convergence hypothesis: Differences in real GDP/capita are decreasing over time because economic growth can be really quick in countries playing catchup.

4 Money and other assets

4.1 4 types of financial assets

The four types of financial assets are

1. Loans
    - High transaction costs but tailored to borrower's needs
2. Bonds → promise for future repayment
    - High risk
    - Minimize the costs of loans
    - The higher the risk, the higher the payoff
3. Loan-backed securities → pool of loans
    - Difficult to assess the true value of the loans
    - Offer more diversification and security
4. Stocks
    - Highest risk of all assets
    - While bonds at least have promise for repayment, if a stock crashes, it's gone
    - Gains value over time
    - Also used to help cover firm costs

The performances of these assets do not affect each other.

4.2 Financial systems and intermediaries

There are 3 tasks for any financial system:

1. Reduce transaction costs
    - Loans are more expensive if taken one-to-one than if taken from a bank
2. Reduce risks
    - Selling shares reduces risk
    - People are more sensitive to losses than gains
3. Provide liquidity
    - Ability to get money quickly if needed

These tasks build off of trust in the financial system and help to mitigate any concerns people have. There are 3 types of intermediaries:

1. Mutual funds $\rightarrow$ create portfolio of many stocks and sell shares of that portfolio
    - Selling shares of portfolio creates diversification, which reduces risk
    - Save the costs of research that potential buyers have to do
2. Pension funds, life insurance
    - Collect savings and invest those in assets so income upon retirement
3. Banks
    - Accept cash from depositors
    - Deposits to fund loans
    - Provide liquidity for depositors while financing illiquid needs of firms

4.3 Monetary supply

- Money is a medium of exchange
- We use fractional banking: keeping fraction of money in reserves
- Fiat money: money that isn't backed by anything with value

3 tools for bank stability (meant to prevent bank runs)

1. Deposit insurance
    - guarantee for payback if not enough funds
    - can have lower rr (more loans) and keeps interest low
2. Capital requirements
    - need more assets than deposit volume
    - prevent risky investments
3. Reserve ratio
    - always have money at hand

$$rr = \frac{reserves}{deposits}$$

$$MS = Cu + D$$

$$MB = Cu + R$$

$$\text{Money multiplier} = \frac{1+c}{c+rr}$$

where c is the cash holding ratio.

$$\Delta MS = \Delta H \cdot \frac{1+c}{c+rr}$$

4.3.1 Money creation cycle

- Deposits go into the bank
- The bank keeps some of the deposits as reserve (rr), lends out the remaining
- The loans go into another bank as deposit
- That bank keeps some, loans rest out

This cycle will create money, which can be measured using the money multiplier. At each step, however, some cash will leak out because people hold onto cash, so we introduce c, the cash holding ratio where $Cu = cD$.

4.3.2 Central bank

Central bank tasks:

- Bank for commercial banks
  - Commercial bank reserves are central bank liabilities
  - Conduct monetary policy using banks as intermediary
- Bank for government
  - Buy bonds and sometimes lend to government
- Issue currency

Central bank CONTROLS interest, not set it

Central bank tools:

- Target overnight rate
  - Rate at which banks borrow from each other over night
  - Central bank sets the bank rate by increasing/decreasing MS
- Open market operations
  - Selling/buying bonds from public will change Cu
  - Selling/buying bonds from bank will change Re
  - These operations affect MB → affect MS through money multiplier
  - Control interest rate; monetary policy
- Deposit switching
  - Put money from government accounts into commercial bank accounts → increase MB and MS

FOR TACCOUNTS, TOTAL ASSETS = TOTAL LIABILITIES

4.4 Monetary policy

4.4.1 Money demand

- People hold money or bonds
  - Value of bonds to each individual = OC of holding onto money
  - At low interest, the value of a bond is higher than is interest is higher → bonds are more popular

Bonds Bonds are a promise for repayment in the future. There are 3 parts of a bond: maturity (duration), face value (bond sticker price), coupon payment (regular interest payments until maturity)

$$\text{Bond value} = PV = \frac{coupon}{1+i} + \frac{coupon}{(1+i)^2} + \cdots + \frac{coupon}{(1+i)^n} + \frac{face\ value}{(1+i)^n}$$

The reason why the bond value is the PV is because the bond value is the OC of not getting the bond. Similar to loan market, PV is higher at low interest, so the bond is worth more to you → OC of not buying is higher

4.4.2 MS-MD model

MD is a function of prices, GDP and interest rate.
MS is perfectly inelastic at quantity of money demanded because the central bank controls MS

- Central bank does not set interest
  - Central bank sets policy rates, which influence interest rates
  - Increase MS, interest decrease
  - Control MS through the tools (selling bonds, deposit switching, etc.)

4.5 Expansionary vs Contractionary monetary policy

Expansionary policy: MS increase, interest rate decrease, investment increase, consumption increase, AD increase, since P and Y increase, MD will eventually increase so interest rises back to the original level.
Contractionary policy: MS decrease, interest rate increase, investment and consumption decrease, AD decrease, since P and Y decrease, MD will eventually decrease so interest rate decrease to original level

4.5.1 Extreme cases of money market

Keynesian case:

- Relatively elastic MD
- Investment demand is perfectly inelastic
- Small change in interest - change in MS has little effect on investment
- Pro fiscal policy

Monetarists case:

- Relatively inelastic MD
- Investment demand perfectly elastic
- Small change in interest leads to huge change in investment
- Pro monetary policy

Problems with monetary policy

- Time lags
- Precision
- Depends on MD slope and investment claims

4.5.2 Quantity equation

$$MS \times V = P \times Y$$

Where V represents velocity of money: how fast money is spent. In the long run, V and Y are constant, therefore MS = P in the long run. This leads us to conclude that money is neutral in the long run.

5 Government policy

5.1 Fiscal policy

Recall the output gaps discussed earlier. Eventually, in the long run, these gaps will be closed because of the self correcting mechanism (ie: wages will feel pressure and shift) but the problem is these mechanisms are...slow. A solution to this is to use fiscal policy.

5.1.1 Expansionary vs Contractionary policy

During a recessionary gap, the economy is underperforming, so it is best to use expansionary fiscal policy. Expansionary fiscal policy involves an increase in G, decrease in T, increase in Tr.

During inflationary gap, the economy is overperforming, so it is best to use contractionary fiscal policy. This involves decrease in G, increase in T, decrease in Tr.

5.1.2 Automatic vs Discretionary stabilizers

Automatic stabilizers automatically cause fiscal policy when the economy experiences a gap and don't require deliberate action. These stabilizers deepen government deficit and are only temporary since they are tied to the business cycle.
Discretionary stabilizers are deliberate policy changes to taxation and government spending (and transfers).

5.1.3 Fixed vs Flexible prices

If the SRAS is constant, then ΔG has the full multiplier effect on Y.
If the SRAS is upward sloping, then ΔG has to be greater than if prices were fixed because this chain reaction:

$$G \uparrow \rightarrow AE \uparrow \rightarrow AD \uparrow$$

Eventually, prices will rise, so aggregate quantity demanded decreases, closing the gap.

5.1.4 Limits of expansionary fiscal policy

- Time lags - sometimes fiscal policy is so slow even self-correcting is faster
- Government deficit increases (G increase, Tax decrease, Transfer increase)

5.1.5 Government spending and crowding out

- Government spending doesn't crowd out investment if $Y < Y^*$
  - This is because we are putting our resources to full employment which increases incentive to consume and invest
  - In recessionary gap, government spending has full multiplier effect
  - Production capacity increase so encourage investment

- Crowds out if $Y > Y^*$
  - Using expansionary policy will cause prices to go up but will not increase productive capacity very much
  - Decrease incentive to spend and invest
- Always crowd out in LR
  - For every increase in G, there must be equal decrease in all other factors of GDP because have to maintain $Y = Y^*$

5.2 Debt

- Debt is a stock - government sells bonds to pay its debt
- Debt = 0 in LR
- Contractionary policy decreases debt, expansionary policy increases debt

$$D_n = D_{n-1}(1+i) - S_{n-1}^{public}$$

$$\text{Debt-to-GDP ratio} = \frac{NetDebt}{GDP}$$

If Debt-gdp ratio is growing slower than GDP growth, then the debt can be ignored and less burden to repay.

5.2.1 Dangers of debt

1. Crowding out
   - If public savings < 0 at full employment, national savings decrease and interest increases, investment decrease
2. Financial pressure and default
   - If debt increases, then the amount to repay increases, government borrows to pay off debt, creates more debt, etc.

6 International trade

6.1 Exchange rates

- Balance of payments records a country's transactions and has two parts: Capital account and Current account

$$CA + KA = 0$$

$$S - I = NX$$

If $NX < 0$, then there is a capital inflow. If $NX > 0$, there is a capital outflow.
Value of one unit of foreign currency in terms of CAD:

$$e = \frac{CAD}{foreign}$$

- Supply of foreign currency from demand for CAD
- Demand for foreign currency from supply of CAD

For example, if demand for CAD increases, then the supply of the foreign currency will increase - they are buying more Canadian exports (importing more Canadian products)

6.1.1 Graphing the exchange market

x-axis: contains the foreign currency
y-axis: is the exchange rate If the e rises on the y-axis, domestic currency is depreciating (the x-axis currency is appreciating)
If the e lowers on the y-axis, domestic currency is appreciating (the x-axis currency is depreciating)
Demand and supply affect e: if supply of foreign currency increases, exchange rate decreases. If demand for foreign currecny increases exchange rate increases.

6.1.2 Shifters of the curves

1. Inflation
    - If domestic inflation = foreign inflation, $\Delta e = 0$
    - If domestic inflation > foreign inflation, $\Delta e > 0$ so net exports decrease $\rightarrow$ demand for foreign goods increase, domestic depreciate

- If domestic inflation < foreign inflation, $\Delta e < 0$, so net exports increase → demand for domestic goods increase, domestic appreciate

2. Net exports
    - If demand for imports rises, demand for foreign $ rises/supply of domestic $ rises
    - If demand for exports rises, demand for domestic $ rises/supply of foreign$ rises
3. Interest
    - If interest rise, demand for domestic assets rises
    - this causes capital inflow so KA increase and foreign supply of funds increase
    - Appreciate domestic dollar
    - If interest lowers, demand for foreign assets rises
    - This causes capital outflow so KA decrease and demand for foreign funds increases

Shock to price of **some** exported goods will increase the exports of other goods because exchange rate increase

Shock to the price of **some** imported goods will increase the import of other goods because exchange rate decrease

For example, take contractionary monetary policy. Interest rises, investment decrease, AD decrease, GDP decrease, prices decrease. Since interest rise, foreign supply of funds increase, CAD appreciate.

6.1.3 Real exchange rates

$$RER = e \times \frac{P_{foreign}}{P_{domestic}}$$

This is adjusted for inflation. If prices are increase, nominal e increases so no real affect on CA

This closely tied to NX, since as RER decrease, CAD appreciates - NX decreases since get more foreign/CAD

6.1.4 Purchasing power parity (PPP)

Currency has same purchasing power when spent in home country or abroad (when converted to foreign currency). This means that the same item should cost the same in two countries relative to their currency valuations.

$$e_{ppp} = \frac{P_{domestic}}{P_{foreign}}$$

If $e > e_{ppp} \Rightarrow$ CAD undervalued

If $e < e_{ppp} \Rightarrow$ CAD overvalued

6.1.5 Types of Exchange rates

6.1.6 Flexible exchange rates

ER changes as result of supply/demand shocks of foreign currency

- Value of flexible ER is determined by market forces (supply/demand)

The ER is always in EQ

Advantages:

- Shock absorber
- Monetary policy is independent

6.1.7 Fixed Exchange rates

- Value of ER is set by central bank
- May not be at EQ ER
- Only actions of CB change ER - devaluation (letting currency depreciate) and revaluation (letting currency appreciate)

If $e > e^{EQ}$, then excess supply of foreign, so buy foreign to keep e above EQ

If $e < e^{EQ}$, then excess demand of foreign, so sell foreign to keep e below EQ

Advantages:

- Stable and predictable
- Commit to low inflation