

Introduction

January 11, 2021 8:49 AM

Economic Theories:

- Variables:
 - Endogenous: determined within the theory (model)
 - Exogenous: affect the endogenous variables but determined outside the theory (usually shift the entire graph)
- Assumptions:
 - Motives, direction of causation and conditions under which the theory is meant to apply
- Predictions(hypotheses)

Testing theory

- Testing theory:
 - Theory is tested by confronting predictions with evidence
 - If a theory conflicts with facts, it will be amended to make it consistent with the facts or be discarded
 - Theory that ignores important factors will have less predicting power
- Rejection vs. confirmation
- Statistical analysis (used to test hypothesis)
- **Correlation:**
 - Positive correlation means that X and Y move together
 - Negative relation means they move in opposite directions
- **Causation:**
 - X causes Y or Y causes X(reverse causality)
 - If X and Y are correlated, they may not be causally related

Economic data

- Index number (normalization)
 - Used to compare changes in some variable relative to some base period
 - E.g. consumer price index (CPI) (the relative price in one period to a base, normalized to 100)
 - $Value\ of\ index\ in\ given\ period = \frac{absolute\ value\ in\ given\ period}{absolute\ value\ in\ base\ period} \times 100$
 - Usually same quantity but different prices and $value = \Sigma price \times quantity$

Graphing Economic Data

- Cross-sectional data: a set of observations made at the same time across several units
 - E.g. unemployment rates in 2020 across countries
- Time-series data: a set of observations made for a variable at successive periods of time
 - E.g. Canadian unemployment rate from 2000 to 2020
- Scatter diagram: can be either between two variables

Graphing Economic Theories

- Functional relation can be expressed
 - In a verbal statement
 - In a table (numerical schedule)
 - In a mathematical equation
 - In a graph
 - E.g. $C = 800 + 0.8Y$ (Y is income, C is consumption)
 - 800 means that you still spend 800 even if you don't make any income
- Variables can be linearly or non-linearly related to each other, and the relationship can be positive or negative
- Linear relation

- Slope: $\frac{\Delta y}{\Delta x}$
- Non-linear
- No relations (x constant or y constant)

What is Macroeconomics

January 15, 2021 9:31 AM

Output and income

- The production of output(goods and services) generates income
- Nominal and real because of inflation
- If we add up the value of different goods produces, it gives **nominal** national income (GDP)
 - It may be misleading
- To get real national income (**real GDP**), we need to measure the value with respect to some reference year
 - Use reference year price for calculation (prices are held constant to see changes in quantities)
 - E.g. in 2019: price: 100, number: 2; in 2020: price 125, number:3.
Then nominal GDP: 2019-200, 2020-375, real GDP: 2019-200, 2020:30

Growth and fluctuation

- Real GDP- real gross domestic product
 - Value of total production of a nation from all sources in the given time period, measured in the **prices of a single year (base year)**
- Economic growth is the expansion of the economy's production possibilities - an outward shift of **Production Possibility Boundary**(PPB)
 - Use real GDP to calculate economic growth
- Real GDP fluctuates around a rising trend
 - Trend shows **long-run** economic growth
 - Short-run fluctuations show the **business cycle** (the fluctuations of **real GDP** around **potential GDP**)
 - Potential GDP (Y^*): what the economy could produce if all resources (labor, capital, land, entrepreneurial ability) were employed at their normal levels of utilization (**full-employment** output)
 - Real GDP (Y)
 - **Output gap ($Y - Y^*$)**: measures the difference between potential output and actual output
 - ◻ When $Y < Y^*$, there is a **recessionary gap** (produce less than expected)
 - ◻ When $Y > Y^*$, there is an **inflationary gap** (produce more than expected)
- **Recession**: period during which real GDP decreases for at least two successive quarters.
 - Actual real GDP is below potential GDP, resources are not being fully employed
- **Expansion**: period during which real GDP increases.
 - Can ensue higher inflation
- **Growth recession**: real GDP growth rate is positive, but slow, real GDP is below potential GDP

Employment

- **Employment**: number of workers (age 15+) who hold jobs
- **Unemployment**: the number who are not employed but are actively looking for one (within the previous 4 weeks)
- **Labour force**: the total number of employed and unemployed people
- **Unemployment rate** = $\frac{\text{number of people unemployed}}{\text{number of people in the labor force}} \times 100$
- When economy is at potential GDP ($Y = Y^*$), there is full employment, but natural unemployment exists
 - **Frictional unemployment**: caused by normal turnover of labor (job change, being fired)
 - **Structural unemployment**: caused by mismatch between skills and jobs available

- The employment under this condition is called the **natural rate of unemployment** or **NAIRU**, estimated to be below 7%
- When $Y \neq Y^*$, such unemployment is called **cyclical unemployment**
 - When $Y < Y^*$, unemployment is higher than natural rate
 - When $Y > Y^*$, unemployment is lower than natural rate

Productivity: a measure of output per unit of input

- Often measured as GDP per worker or GDP per hour of work
- Real GDP is a better measure

Inflation and price level

- **Price level**: the average level of all prices in the economy
 - Measured by a price index (CPI)
- **Inflation**: the rate at which the price level increases
 - The purchasing power of money is **negatively related to the price level/inflation**
 - Inflation adds to the uncertainties of economic life/decisions
- Consumer price index(CPI)
 - $$CPI_t = \frac{\sum P_t Q_0}{\sum P_0 Q_0} \times 100$$
 - Measures the price of a basket at current time relative to the price of the same basket in base year
 - Measures average level of the prices of goods and services consumed by urban family

Interest rates:

- Price you pay for borrowing money for an specific period of time
- **Prime rate**: the rate commercial banks charge to their best customers, used as a reference
- **Overnight rate**:
 - borrow money from other commercial bank to start business on the second day money
 - When pay back, there is an overnight rate, fixed by bank of Canada
 - If the overnight rate decreases, the prime rate decreases
- **Nominal interest rate**
- **Real interest rate**
 - Relative to had the price level remained the same
 - Real interest rate = nominal rate - inflation rate
- **Credit flows**
 - **Loan** represents a flow of credit with interest rate representing the price of this credit
 - Banks play a crucial role as an intermediary between those who have savings and those who need funds
 - Bank loans our deposits to others who need funds
- Those who **rely on interest incomes** (savings, stocks) benefit from higher real interest rate
- **Borrowers** benefit from low interest rate (high inflation rate)
- With lower interest rate, **firms** invest more

Exchange rate:

- The number of Canadian dollars required to purchase one unit of foreign currency (or the reverse way)
 - **Appreciation**: when CAD gains in value,
 - Buying goods from abroad is cheaper
 - **Imports** increases
 - **Depreciation**: when CAD loses value
 - Selling is cheaper
 - **Export** increases
- Investing in Canada increases, then CAD gains in value
- Currency trading: people across the world buy more CAD, CAD appreciates

- If interest rate in Canada is higher, borrowing from Canada is more expensive, investing in Canada is more attractive

Exports and imports

- Notations: X=export, IM=import
- Difference between X and IM is called Trade balance
 - When $X > IM$, trade surplus
 - When $X < IM$, trade deficits
- Volume of trade between US, Canada and Mexico grew quickly in 1990s, particularly after the signing of NAFTA (North American Free Trade Agreement) in 1994

Long-term economic growth

- Minimize fluctuation, maintaining long term economic growth
- Central bank: monetary policy
 - Money supply (interest rate change)
 - Exchange rate policy
- Government: fiscal policy
 - Taxes and government expenditure
- Disposable income = gross income - income tax
 - When income tax decreases, economic grows

Short-term economic growth

- Often called business cycles

GDP

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National output and value added

- We may double count the values when adding the total value of the economy's output, so we need to distinguish **final output** and **intermediate output**
- **Value added = revenues-cost of intermediate goods**
 - Note: **wages** paid to workers or **profits** paid to owners **are not subtracted**
- Total value added = Gross Domestic Product (GDP)

National income accounting

- GDP is the market value of all final goods and services produced in a country in a given time period, four parts:
 - Market value
 - Both **quantity** and **price** together determine the total value of production
 - Only items that are traded in markets are included
 - Final goods and services
 - A good or service that is produced for its final user and not as a component of another good or service (intermediate good or service)
 - Produced within a country
 - In a given time period
- Measuring national income
 - Total **value added** from domestic production
 - Total **expenditures** on domestic output
 - Consumption
 - ◻ Actual **consumption expenditure (C_a)** includes expenditure on all final goods and services
 - Investment
 - ◻ Actual **gross investment expenditure (I_a)** is expenditure on the production of goods
 - ◆ Inventories
 - ◆ New plant and equipment
 - ◆ New residential housing
 - ◆ Gross investment = net investment + depreciation
 - Government purchases
 - ◻ Actual **government purchases/expenditure (G_a)** is the purchase of currently produced goods and services by government, **excluding transfer** payments
 - ◆ Transfer payments: payments to retirees, employment insurance benefits, welfare payments, payments made to the provinces out of revenue raised.
 - The **payment does not add to national output or direct purchase of goods and services**
 - They do not generate additional income in the economy (thus excluded from GDP)**
 - Net exports
 - ◻ Actual **net exports (NX_a)** is the difference between exports and imports:
$$NX_a = X_a - IM_a$$
 - **$GDP = C_a + I_a + G_a + NX_a$**
 - ◻ Or GDP= investment expenditure + consumption expenditure + government purchases + net exports
 - Total **income** generated by domestic production
 - Sum of factor incomes and other claims on the value of output
 - ◻ Factor incomes (net domestic income):
 - ◆ Wages

- ◆ Rent, interest, profits
- Non-factor payments
 - ◆ Indirect/sales taxes (net of subsidies)
 - ◆ Depreciation of existing physical capital
- GDP=Net domestic income + indirect taxes - subsidies + depreciation
- Aggregate income is measured in factor prices and excludes depreciation, need to make adjustments
 - Indirect taxes - subsidies are added to get from factor cost to market prices
 - Depreciation is added to get from net domestic product to gross domestic product

GNP

- GDP=market value of all final products within a country
 - Domestic economic activity measurement
- GNP(Gross National Product)=market value of final products produced by Canadian
 - Measure of living standards of residents or Canadians
 - Disposable personal income = GNP - any part not actually paid to household - personal income taxes + transfer payments received by households
 - Measures actual purchasing power

Real and nominal GDP

- Nominal GDP: value of the final goods and services produced in a given year valued at the prices that prevailed in that same year
- Real GDP: GDP that is valued at constant base-period prices
 - Fix price, compare quantities
- GDP Deflator: measures the changes in prices
 - $GDP\ Deflator = \frac{Nominal\ GDP}{Real\ GDP} \times 100$
 - It is a comprehensive index of prices because it includes the prices of all goods and services produced in the country
 - CPI includes the prices of only those consumed by a typical household
 - Usually CPI and GDP Deflator move together, but will have some differences
 - The inflations are likely different

Real GDP Calculation: chain-weighted output index

- Uses the prices of two adjacent years to calculate the real GDP growth rate
 - $Growth\ rate = \frac{GDP_{07} - GDP_{06}}{GDP_{06}}$
- Step 1: value last year's production and this year's production at last year's prices, calculate the growth rate
- Step 2: value last year's production and this year's production at this year's prices, calculate the growth rate
- Step 3: calculate the average of the growth rates
- Step 4: repeat for each pair of adjacent year to link back to the base year

Omissions from GDP calculation

- Illegal activities
- Underground economy (evade tax, work done for cash)
- Home production (leisure adds to happiness but not GDP)
- Economic bad (environmental damage not deducted)

GDP and living standards

- Unless unmeasured economic activity changes rapidly, changes in GDP will reasonably measure changes in material living standards
- GDP is not a complete measure of economic well being
- GDP is a good measure of income
- Well being also depends on freedom, income inequality and other social and political factors

International comparisons

- Real GDP is used to compare economic welfare in one country with another
- Two problems
 - Must converted into the same currency units, **exchange rate** must be used
 - **Same prices** should be used to value the goods and services in the countries
 - The GDP calculated in this way gives better reflection of purchasing power
 - This is called the **purchasing power parity (PPP)**

Living standards depend on per-capita GDP

National savings = $S+T-G=I+X-IM$

Short-run macro model

January 29, 2021 9:20 AM

Price constant

Desired aggregate expenditure

- If desired expenditure = actual expenditure ($C_a + I_a + G_a + NX_a$), it is equilibrium
- Total desired expenditure $AE = C + I + G + NX$ (where these values are all desired value)
 - Shows the relationship between **desired aggregate expenditure** and **actual national income**
- Two types
 - **Autonomous expenditure**: components of aggregate expenditure that do not depend on the level of national income (**expenditure when income is zero**)
 - **Induced expenditure**: component that depends on (**increase with**) the level of national income
- **Desired** expenditure is what consumers and firms would like to purchase, **given the constraints** of income and market prices

Simplest short-run macro model

- Assumptions:
 - No trade with other countries
 - No government (taxes, government expenditure)
 - **Price level is constant**
- $AE = C + I$
 - Slope of the AE function is the **marginal propensity to spend** ($= MPC = b$ in this model)

Desired consumption expenditure

- Two uses of disposable income: **consumption C or saving S**
 - Consumption determined by current disposable income (Y_D)
- Simple consumption function: $C = a + bY_D$
 - a = autonomous Consumption
 - bY_D = induced C (depends on Y_D)
 - If $b < 1$, after tax
 - If $b = 1$, no savings, consumption and income are equal
 - The point when it intersects with $C = Y_D$ means **saving is zero** at the point
 - If **consumption > disposable income**, saving decreases
 - If **consumption < disposable income**, saving increases
- **Marginal propensity to consume (MPC)** is the slope of the function b ($MPC = \frac{\Delta C}{\Delta Y_D}$)
- **Average propensity to consume (APC)**: $APC = \frac{C}{Y_D}$
 - APC may fall as the level of income rises
- Since all of disposable income is either consumed or saved, let MPS = Marginal propensity to save, APS = average propensity to save
 - $APC + APS = 1$
 - $MPC + MPS = 1$
 - E.g. given $C = 30 + 0.8Y_D$, $S = -30 + 0.2Y_D$
 - If consumption function shifts upward, the saving function must shift downward
 - Change in wealth, interest rate, expectations about future causes a shift
 - **Economic growth** creates greater household wealth, consumption increase
 - **Higher expected future income** increase consumption
 - **Fall in interest rates** makes borrowing cheaper and increases consumption

Desired investment expenditure

- Investment expenditure includes:

- Inventory accumulation
- Residential construction
- New plant and equipment
- Three determinants of aggregate investment expenditure
 - Real interest rate
 - Opportunity cost of investment
 - Investment expenditure components are negatively related to the real interest rate
 - Changes in the level of sales
 - Firms hold inventories to meet unexpected changes in sales and production
 - Changes in rate of sales cause disinvestment
 - Business confidence
 - When business confidence improves, firms want to invest now and increase its capacity to produce to meet the future (increased) demand
 - It is independent of Y_D (autonomous)

Equilibrium national income

- If desired aggregate expenditure exceeds actual output, inventories will be depleted, firms will increase the level of output
- If desired aggregate expenditure is less than the actual output, inventories will accumulate, firms will decrease the level of output
- In the simple model, output is said to be demand determined (output is spurred by demand for consumption and/investments)
- Equilibrium condition: $AE(Y) = Y$
 - Where desired aggregate expenditure equals actual national income
 - It occurs when there are no unplanned changes in business inventories
- Convergence to equilibrium
 - If desired AE > real GDP (AE curve above 45° line), decrease in inventories, increase in production and real GDP
 - If desired AE < real GDP (AE curve below 45° line), increase in inventories, decrease in production and real GDP

Changes in equilibrium national income

- Shifts in AE function is caused by the changes in autonomous AE that does not depend on Y (when A changes)
- Slope of AE function changes when z (marginal propensity to spend with respect to Y) changes
- Multiplier
 - Measure of the size of the change in equilibrium Y that results from a \$1 change in autonomous expenditure A
 - Simple multiplier: $\frac{\Delta Y}{\Delta A} = \frac{1}{1-z}$
 - The larger the z, the larger the simple multiplier
 - When z = 0, multiplier=1

Economic Fluctuations as Self-Fulfilling Prophecies

- Households and firms base their desired consumption and investment partly on their expectations of the future.
- Thus the changes in expectations can lead to real changes in the current state of the economy.
- If firms expect better future prospect, that will lead to higher desired investment and hence higher national income through multiplying effect.
- Firms may take pride in their predictive power; but the truth is their actions created the economic situation they predicted

Simple model with government and trade

February 5, 2021 9:19 AM

Government purchases (G)

- Government purchases of goods and all services including payments to public servants, construction of highways and expenditure on military
- Does not include **transfer payments** (welfare or employment insurance payments)
 - It affects AE indirectly through households spending
- G is **autonomous** with respect to Y
- **All levels of government** must be included

Net tax revenues (T)

- Total tax revenues net of transfer payments
- $T = tY$ (t is the net tax rate, independent of Y)
- Budget balance:
 - If $G < T$, a **budget surplus**
 - Called **public saving** ($= T - G = tY - G$)
 - If $G > T$, a **budget deficit**

Foreign Trade

- Exports (X) are autonomous with respect to GDP
- Imports (IM) rises as GDP rises
 - $IM = mY$, where m is the **marginal propensity to import**
- **Net export function: $NX = X - mY$**
 - As Y rises, NX falls
 - As Y falls, NX rises
- **Increase in foreign income increases X** and shifts NX function upward
- **Rise in Canadian prices**
 - **Decreases X** , shifts NX function down
 - **m increase**, IM function rotates up
 - Function shifts down and gets steeper
- **Exchange rate** and **price change** are **exogenous** in this model

Equilibrium national income

- With taxation disposable income Y_D is less than Y , if $T = tY$, $Y_D = Y - T = (1 - t)Y$
- The AE function: $AE = a + I + G + X + [b(1 - t) - m]Y$
 - Autonomous $AE = a + I + G + X$
 - Induced $AE = [b(1 - t) - m]Y$
 - Marginal propensity to spend $z = b(1 - t) - m$
- At equilibrium $Y = AE(Y)$
 - When $Y >$ desired AE, inventories pile up, firms decreases actual production
 - When $Y <$ desired AE, inventories depletes, firms increases actual production

Changes in equilibrium national income

- Simple multiplier: $\frac{\Delta \text{income}}{\Delta a + I + G + X} = \frac{1}{1 - z}$, $z = MPC(1 - t) - m = b(1 - t) - m$
 - Only when $t = 0$ and $m = 0$, $z = MPC$
- Net exports
 - If NX shifts up, equilibrium Y rises
 - If NX shifts down, equilibrium Y falls
 - Exports are autonomous to GDP, but depend on

- Foreign income
- Domestic and foreign prices
- Exchange rate
- Consumer preference
- Fiscal policy
 - The use of the government's spending and tax policies (change in G and t) to change equilibrium Y
 - Any policy that attempts to stabilize Y at or near potential GDP Y^* is called stabilization policy
 - In recession, decrease in t and increase in G shifts the AE curve upwards

Demand determined output

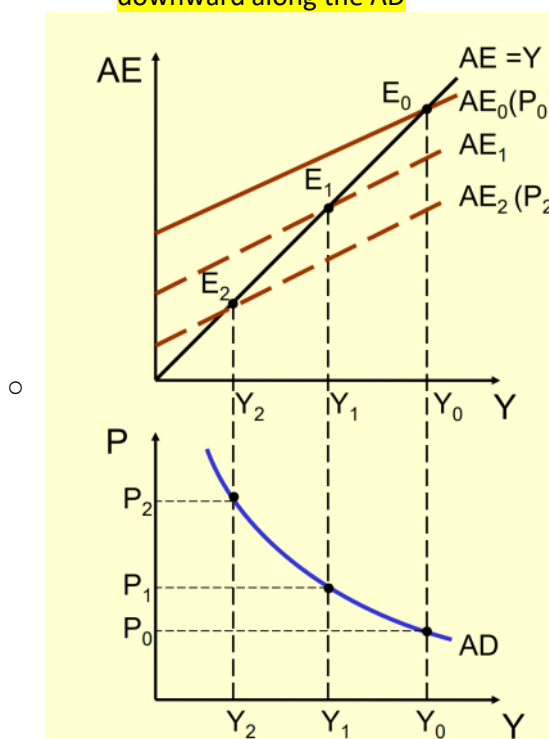
- Related to constant price level
- Firms are able to produce any levels of output that is demanded without requiring to change prices
- When output is below potential, firms can increase output without the need for increasing their prices
- When firms are price setters, they often respond to shocks by changing output.

Output and prices in short run

February 10, 2021 9:20 AM

The demand side of economy

- Exogenous changes in the price level
 - Increase in price P reduces the real value of money
 - Changes in P also affect the wealth of bondholders and bond issuers.
 - If P increases, bond issuers gain and lenders lose
 - Increase in P reduces private-sector wealth and reduces desired consumption and shifts AE curve downwards
 - Increase in P will shift the NX function downward and AE curve downwards
- Aggregate demand (AD) curve
 - Relates equilibrium real GDP to the price level
 - For any P , AD curve shows the level of real GDP for which desired AE equals actual GDP
 - When P increases, AE shifts down and have lower equilibrium level of real GDP.
 - Changes in price level cause movements along the AD curve
 - Increase in domestic price level leads to a fall in real private-sector wealth, which results in a downward shift of the AE curve
 - Changes in autonomous expenditure with P remaining the same shifts the AD curve
 - Autonomous consumption, firms' investments, foreign demand for exports
 - Increase in autonomous expenditure, with no change in price level, causes AE to shift upward and causes the AD curve to shift to the right
 - Fall in the price level causes an upward shift of the AE, and a movement downward along the AD



- Simple multiplier measures the horizontal shifts in AD
 - If z is higher, AD is flatter
 - If z is lower, AD is steeper

The supply side of the economy

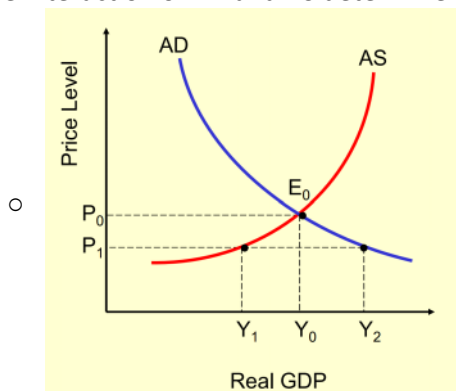
- Aggregate supply (AS) curve
 - Relates price level to the quantity of output that firms would like to produce and sell
 - Drawn for a given level of technology, set of factor (labor, capital, raw materials) prices
 - As unit costs rise with output, firms will produce more output only if prices increase, AS

curve is upward sloping

- AS curve is flatter at low level of outputs (below potential GDP)
- When output is nearer potential GDP Y^* or higher, firms need higher prices to produce more
- Increase in factor prices, technological glitches causes the AS curve to shift up
- Decreasing wage would shift the AS curve down and right
 - when wage rises faster than labor productivity, unit labor cost will rise and AS curve will shift left
- Increase in labor productivity, without changes in wages shift the AS curve down and to the right
- Decrease in export cause movement down and left along AS curve
- Reduces in costs in all services shift the AS curve down and right
- Increase in investment causes movement upward and to the right
- AS curve is flat when GDP is low, firms have excess capacity, expand with little increase in unit costs
- AS curve is steep when GDP is high, firms are over capacity, unit costs are rising rapidly
- AS curve shifts in response to changes in prices of inputs and productivity
- The positive slope is because of
 - The law of diminishing returns
 - Rising unit costs associated with rising output levels
 - Presence of firms that are price-setters/takers
 - Multiplier is smaller than simple multiplier (very small)
- Flat AS curves: price-setters, excess capacity
 - The multiplier equals the simple multiplier
 - Firms are producing well below their capacity, willing to produce more without increase in price
 - Usually, with upward AS, firms will produce more only if prices increase

Macroeconomic equilibrium

- The interaction of AD and AS determine the real GDP and price level simultaneously



- E_0 is the macroeconomic equilibrium
- At this price level P_0 , demand behavior is consistent with supply behavior
- Changes in macroeconomic equilibrium
 - Demand shocks can be positive (expansive) or negative (contractionary)
 - Shift of AD to right is positive, caused by increase in autonomous expenditures
 - Decrease in import, increase in G,I,X,C will cause shift to right/up
 - Increase in tax will cause shift to left/down
 - Reduce in tax will increase C and I and shift the AD to the right
 - Positive shock causes AE curve to shift upward, but rise in the price level causes it to shift down
 - Positive AD shock causes price level to increase and real GDP to increase
 - With an upward sloping AS, multiplier is smaller than the simple multiplier
 - Effect of AD curve shift will depend on the slope of the AS curve
 - The steeper the AS curve, the greater the price effect and the smaller the multiplying and hence output effect
 - Supply shocks can be positive or negative, caused by changes in the prices of factors of

production

- i.e. changes in price of inputs, wages, technology
- **Stagflation**: negative supply shock causes a fall in real GDP but increase in price levels
 - Caused by external forces (e.g. increase in oil price)
- Fall of prices of raw materials may cause a positive supply shock
- **Negative shocks cause AS curve to shift up and left (higher cost in production)**
 - Large increase in wages
 - diseases
- **Positive shocks cause AS curve to shift right and down, price level and GDP decreases**
 - Good weather

Many economic events cause both aggregate demand and aggregate supply shocks
Overall effect depends on the relative importance of the two separate effects

Adjustment of factor prices

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In the short run

- Factor prices are assumed to be exogenous and constant
- Technology and factor supplies (potential GDP) are assumed to be constant
- Equilibrium is when AD and AS curves intersect
- As AD or AS shifts, real GDP fluctuates (business cycle)

Adjustment of factor prices

- Factor prices are flexible and respond to output gap
- Technology and factor supplies (potential GDP) are constant
 - Potential GDP acts as an anchor
- AD or AS shifts has no long run effects on real GDP

Long run

- Real GDP $Y=Y^*$
- Technology and factor supplies are changing. This leads to changes in Y^* (usually increase, leading to economic growth)

Adjustment process

- Factor prices and the output gap ($Y-Y^*$)
 - When $Y>Y^*$, the demand for labor is relatively high and firms bid for labor. Factor prices (wages) rise - **inflationary output gap**
 - An increase in cost of production shifts AS curve to left or up until equilibrium $Y=Y^*$ and the output gap disappears
 - When $Y<Y^*$, the demand for labor is low - recessionary output gap
 - Wages and unit cost of production fall
 - AS curve shifts down or right until $Y=Y^*$
- Adjustment asymmetry
 - **Inflationary output gaps typically raise wages rapidly**
 - Recessionary output gaps reduce wages slowly (**sticky wages**), the AS shift down is slow
 - **Phillips Curve** (from output gaps to factor prices): **negative relationship** between the unemployment rate and the rate of change in nominal wages
 - Wages tend to fall during unemployment, rise during growth
 - When $Y=Y^*$, wage is constant

Potential output acts as an anchor

- When AD or AS shock pushes Y away from Y^* in short run, wages and other factor prices will adjust until Y returns to Y^*
- When $Y=Y^*$, the economy is fully employed

Automatic stabilizers are elements of the tax-and-transfer system that reduce the responsiveness of real GDP to changes in autonomous expenditure.

Aggregate demand shocks

- **Expansionary AD shocks**
 - Caused by **fiscal or monetary policy**
 - causes inflationary gap
 - AD curve shifts right
 - Wages increases, AS shifts to the left until $Y=Y^*$
 - Price level increases

- **Contractionary AD shocks**
 - AD curve shifts left and down (negative demand shocks)
 - Wages fall (sticky wages)
 - AS shift right and down until $Y=Y^*$
 - Price level decreases
 - Real wages along the potential GDP line are the same
 - Lower real GDP means lower real wage
- The speed that Y returns to Y^* depends on **wage flexibility**
 - Flexible wages provides faster adjustment
 - If wages are slow to adjust, the output gaps tend to persist

Aggregate supply shocks

- **Stagflation** (higher price but lower real GDP)
 - Increase in the world price of raw materials (unit cost of production)
 - AS curve shifts to the left (negative supply shock)

Additional pressures for adjustment

- During economic expansion, expectation of rising sales and profits lead to gains in stock market prices. Firms also invest more
- As real GDP rises further above Y^* , bottlenecks and shortages arise, restricting the further expansion
- Firms expectation reverses leading to sell off of stocks, firm confidence decreases and real GDP tends to move back to Y^* (without changes in factor prices)

Long run equilibrium

- Economy is in a stat of **long-run equilibrium** when factor prices are no longer adjusting to output gaps
- The vertical line at Y^* is called
 - Long-run aggregate supply curve
 - Classical aggregate supply curve
- There is **no relationship** in the long run between the **nominal variables (price level)** and the **potential output**
 - Y is determined only by potential output Y^*
 - AD is only to determine P
 - For a given AD curve, long-run **growth in Y^* results in a lower price level**
 - Change in Y^* comes from new technology and capital (human/physical) accumulation

Fiscal Stabilization policy

- Motivation: reduce the volatility (fluctuations) of aggregate outcomes
- Government can change **G or taxes** to stabilize the economy
 - Increase in G or reduction in taxes shift the AD curve to the right
- Basic theory
 - **Recessionary gap** ($Y < Y^*$) can be closed by
 - Policy induced rightward shift in AD (decrease in tax or increase in G)
 - Natural (slow) rightward shift in AS curve (**wage rigidity**)
 - **Inflationary gap** ($Y > Y^*$) can be removed by
 - Policy induced leftward shift in AD (increase in tax or decrease in G)
 - Natural leftward shift in AS (increase in factor prices)
- Paradox of thrift
 - Increase saving if the economic situation changes for the worse
 - If all population increased savings, **GDP reduces in the short run**
 - Persistent recession can be battled by encouraging governments, firms and households to increase spending and reduce savings
 - In the **long run**, the paradox does not apply,
 - The price level falls
 - Investment rises and aggregate output returns to Y^*

- Automatic and discretionary fiscal policy
 - Automatic: the design of the tax and transfer system in place (without change of tax rate or G)
 - **Y increase**, tax revenue increases and unemployment drops. **Dampens** the economic growth
 - Makes the **multiplier smaller**, changes in Y due to automatic expenditure will be more stable
 - Desirable and generally work well
 - Discretionary: when the government actively changes G, T to steer real GDP
 - Long and uncertain lags
 - Temporary versus permanent changes in policy
 - Impossibility of fine tuning
- Fiscal policy and growth
 - **Increase in G** temporarily increases real GDP by shifting AD to the right, adjustment brings the economy back to Y^*
 - **Decline in I, C, NX** slows long run economic growth
 - If G is in R&D, infrastructure and other productive activities, it can shift the Y^* and bring a long term economic growth
 - Increasing G increases Y
 - **Reducing tax increases C and I** and shifts the AD to the right
 - Reduction in corporate taxes increase I and Y^*
 - Increase in wage then brings the economy back to Y^*
 - Reduce tax in R&D and technology, shift both Y^* and AS to the right
 - Trade-off between government and the private sector

Long run economic growth

March 5, 2021 8:56 AM

Nature of economic growth

- Sustained increases in Y^* are more powerful in raising material living standards than the removal of recessionary gaps
- Small differences in annual growth rates can result in large changes in living standards
- Real GDP, real per capital GDP and real GDP per employed worker show different aspects of economic growth

Benefits of economic growth

- Rising average living standards
- Alleviation of poverty and income inequality
 - Tax cut to middle and low income families
 - Redistribution is hard to achieve politically

Costs of economic growth

- Forgone current consumption
- Social costs of growth
 - Displacement of firms and workers
 - Requires a rapid transition in labor force
 - Personal costs are borne very unevenly

A case against economic growth

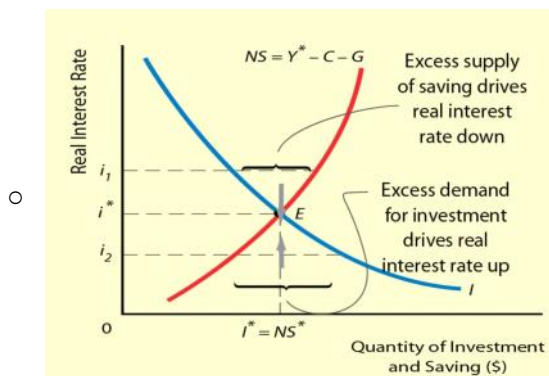
- Growth is not sustainable
- Growth may not increase overall wellbeing
- The weakness of technological defense

Sources of economic growth

- Labor force
- Human capital (skills, knowledge)
- Physical capital (machines, tools, communication equipment, factories)
- Technological improvement
- Different theories emphasize different sources of growth.

Established theories

- Focus on the long run (real GDP is equal to potential output Y^*)
- Hold Y^* constant, and let **interest rate be determined endogenously**
 - In equilibrium desired saving = desired investment
- Investment and savings
 - **Investment**: increases in the stock of capital
 - Lead to increases in the future level of Y^*
 - **Saving**: used to finance investment
 - Firms' **investment demand** is **negatively** related to the **real interest rate**
 - National saving = private saving + public saving
 - **$NS = (Y^* - T - C) + (T - G) = Y^* - C - G$**



- E is the equilibrium point, I^* is the equilibrium real interest rate
- **Increased national saving (NS shift to the right)** reduces the real interest rate and encourages investment
 - **Greater flow of investment** leads to higher future growth rate of potential output
- **Increased investment demand** (I curve shift to the right) increases real interest rate and encourages saving
 - Caused by better **technology, government tax incentives**
 - **Greater flow of saving** leads to a higher growth rate of Y^*
- Countries with **high investment rates also have high growth rate**

Neoclassical growth theory

- **Aggregate production function** $GDP = F_T(L, K, H)$
 - L is the total amount of labor
 - Grow by population, increase in labor force participation rate
 - K is the stock of physical capital
 - H is the quality of human capital
 - T is the state of technology, exogenous
 - F_T reflects how given L, K, and H are related to GDP depending on the changes in the state of technology (how changes in L, K, H affect GDP for a given technology)
- Key assumptions:
 - **Diminishing marginal product** of K (human capital H and physical capital K) and L, when either factor is changed in isolation
 - Holding K constant, increases in L generate positive but smaller and smaller (diminishing) increments to output
 - **Constant returns to scale**
 - When K and L change in equal proportions, GDP also changes by the same percent
- When Marginal product (MP) < average product (AP), average product decreases
- Central predictions
 - **Diminishing Marginal product of L**
 - Increases in population lead to increases in GDP but eventually to reductions in per capita GDP (living standards)
 - Once both marginal product and average product of labor fall, real GDP per capita falls leading to falling average living standards
 - **Diminishing marginal product of K**
 - Capital accumulation leads to improvements in living standards, but such improvement becomes smaller and smaller with each unit addition of capital
 - **GDP will grow but per capita GDP will be constant**
- **Technology change is necessary for sustained growth** in living standards. However, it is assumed to be **exogenous**
 - New knowledge and inventions can significantly contribute to economic growth even without capital accumulation and labor force
 - Much technological change is embodied in the quality of new capital equipment
 - Measuring the extent of technological change is difficult (not directly observable)

New growth theories

- **New growth theories** emphasizes the process of innovation and the incorporation of new technology (as an **endogenous variable**)
 - Learning by doing
 - Knowledge transfer
 - Market structure and innovation
 - Shocks and innovation
- Also emphasize the possibility that each new investment is more productive than the last (**increasing marginal returns**)
 - Market development costs
 - Increasing returns to knowledge
- **Increasing return to scale**: $y = KL$ (when K and L doubles, y is 4 times the original value)
- **Constant return to scale**: $y = K^{0.5}L^{0.5}$, when K and L doubles, y is doubled
- Generally, $y = K^aL^b$,
 - if $a + b = 1$, constant return to scale (Neoclassical growth theory)
 - if $a + b > 1$, increasing return to scale
 - If $a + b < 1$, decreasing return to scale
- However, if $y = K^a + L^b$
 - If $a > b$, power is a .
 - If $a = b$, power is a or b .
 - If $a < b$, power is b .

Limits to growth

- **Resource exhaustion**
 - Current technology and resources could not support the entire world's population at the current standard of living
 - Absolute limits to growth based on constant technology and fixed resources may not be relevant
 - Technology improves constantly as do the stock of resources
 - New resources, efficiency
- **Environmental degradation**

Money and banking

March 10, 2021 9:16 AM

Money

- Medium of exchange
 - If there is no money, goods would have to be exchanged in a system of **barter**
- Store of value
- Unit of account

Money origins

- Metallic money
 - Debasing (melting coins and producing more coins by mixing other less valuable metals)
 - Gresham's Law: minting new coins will be disappeared as soon as they are circulated
- Paper money
 - Backed by gold
- Fractionally backed paper money
- Fiat money - legal tender

Modern money

- **Deposit money**: money held as deposits with commercial banks and other financial institutions
- **Cryptocurrency**: digital currency that uses a block-chain encryption techniques to regulate the generation of units of currency and verify the transfer of funds
 - Independent of any central bank, **not a fiat money**

Canadian banking system

- **Central bank**: bank of Canada
 - Bank to the banking system
 - Government-owned institution
 - Sole money-issuing authority
 - System of **joint responsibility** maintains day-to-day independence
 - Basic functions
 - Banker to the commercial banks
 - Fiscal agent of the federal government
 - Regulate the money supply
 - Regulate, support and monitor financial markets
- Commercial banks: TD, RBC...
 - Provision of credits: accepts deposits and makes loans
 - Interbank activities: provides credit-card, cheque clearing and electronic transfer services
 - Offers wealth-management services
 - **Reserves**:
 - Keep sufficient cash as reserve to be able to meet the day-to-day need of customers to withdraw money from their deposits
 - Either vault cash or deposits with the central bank
 - Usually small
 - **Reserve ratio**: fraction of its deposit liabilities that it actually holds as reserves
 - Reserve ratio = reserve/deposit
 - **Target reserve ratio**: fraction of its deposits it wishes to hold as reserves
 - **Excess reserves**: any reserves in excess of target reserves, can be loaned out
 - Canadian banking system is a **fractional-reserve system**
 - Central to the process of money creation

Money creation

- Assumptions
 - Banks invest only in loans

- There are only demand (checkable) deposits
- Fixed target reserve ratio: all banks have the same target reserve ratio
- No cash drain from the banking system
- A new deposit adds to both cash in assets and deposits in liabilities
- With no cash drain, a banking system with target reserve ratio of v will have $\Delta Deposits = \frac{1}{v} \Delta Reserves$
- Excess reserves and cash drain
 - Cash drain: households hold a fraction of their deposits in cash, the deposit-creation process is dampened
 - If c is the currency-deposit ratio, the final change will be $\Delta Deposits = \frac{1}{c+v} \Delta Reserves$
- Difference between one bank and the whole banking system
 - Total deposit in all banks is $\Delta Deposits = \frac{1}{c+v} \Delta Reserves$
 - Deposit in the second bank is $\Delta Deposits = (c + v) \Delta Deposits$
 - Maximum amount of loans that the whole banking system can make $\frac{D}{c+v} (1 - v)$
 - Total change in $D = \frac{D}{c+v}$
 - Total change in $R = vD$
 - Total change in $L = D - R$

Money, Interest rates and economic activity

March 10, 2021 9:50 AM

Two types of financial assets

- **Money** (earns no interest): coins, paper money, and deposits on which checks can be drawn
- **Bonds** (earn interest): including interest-earning financial assets.
 - It is a financial asset that promises to make one or more specified payments at specified dates in the future

Present value

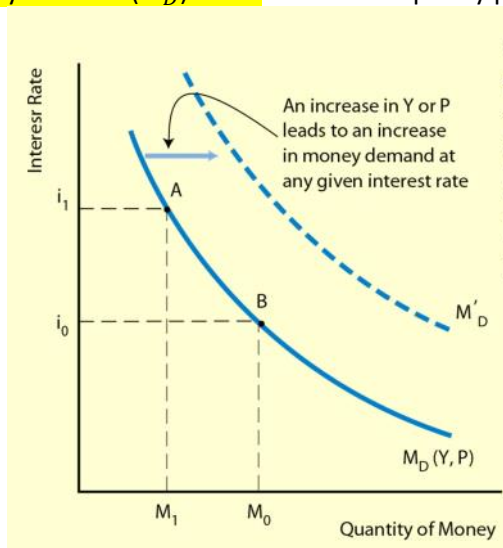
- Present value is **negatively related to the interest rate**
 - $PV = \frac{R_1}{1+i} + \frac{R_2}{(1+i)^2} + \dots + \frac{R_T}{(1+i)^T}$
- Some bonds make only a single payment at some point in the future - zero coupon bonds
 - Treasury bills, short-term government bonds
- Equilibrium market price of a bond should be the PV of the stream of income generated by the bond
- Market interest rates and bond yields tend to move together
- Bond riskiness
 - High risk leads to high yield
 - High yields reflect higher risks
 - Usually government bonds are perceived not risky

Three reasons for holding money

- **Transaction motive**: hold cash to have it readily available for upcoming purchases
- **Precautionary motive**: hold money because you may need it some time
- **Speculative motive**: interest rate may rise and bond price fall

Determinants of money demand

- Three variables
 - Real GDP (Y): higher Y leads to more money demand
 - Price level (P): higher price leads to higher money demand
 - Interest rate (i): opportunity cost of holding money is the interest that could be earned by holding bonds
- **Money demand (M_D) curve** called the liquidity preference

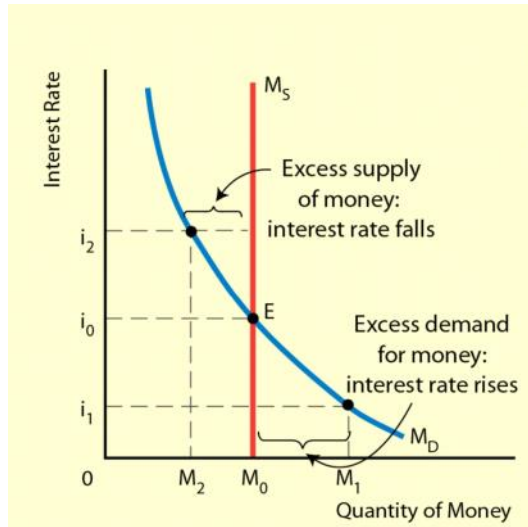


- Changes in Y or P cause the M_D curve to shift
 - **Decrease in P** causes the M_D curve to shift left
- Changes in i cause movements along the curve

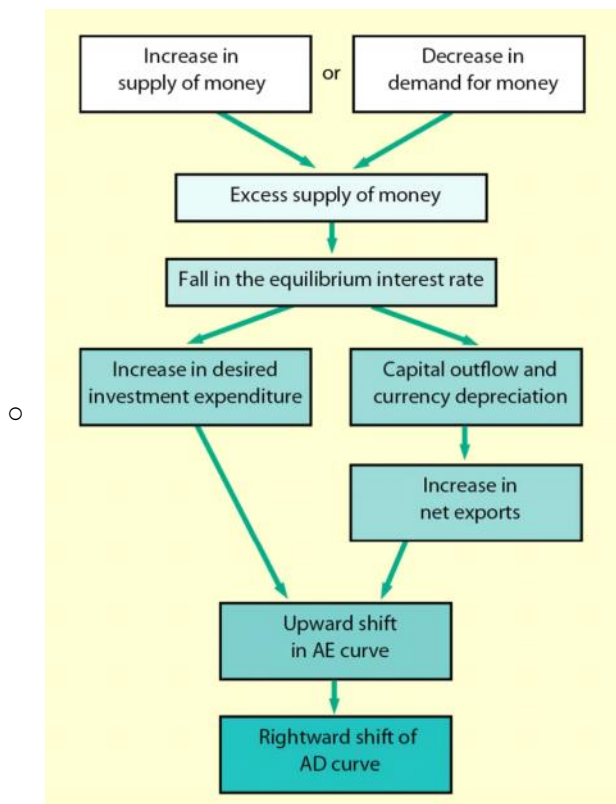
- Lower i leads to lower opportunity cost of holding money and bonds are less attractive, fewer bonds
- **Increase in i** reduce bond prices and increase bond yields
- $M_D = M_D(i, Y, P)$.

Monetary equilibrium and national income

- Equilibrium occurs when the quantity of money demanded equals the quantity of money supplied



- i_0 is the equilibrium interest rate
- Money supply increases when BOC increases reserve or the commercial banks lend larger fraction of the reserve
- Monetary transmission mechanism
 - Monetary equilibrium and interest rate
 - **Decrease money supply**, excess demand for money, increase interest rate, decrease in desired investment and then decrease in AE
 - **Increase money supply**, excess supply for money, decrease interest rate, increase in desired investment and increase in AE
 - Interest rate and desired expenditure
 - Desired expenditure and real GDP
 - **Decrease money supply** causes leftward shift of the AD curve
 - In **open economy** with mobile financial capital, there is an **extra channel** to the transmission mechanism
 - **Decrease money supply** causes interest rate to increase, an appreciation of the Canadian dollar and decrease in net exports and desired investment, leftward shift of the AD curve (**inflow**)
 - **Increase money supply**, decrease interest rate, depreciation of the Canadian dollar, increase in net export and desired investment, rightward shift of the AD curve. (**outflow**)



Negative slope of AD curve:

- Change in P leads to change in wealth (increase in P decreases the level real wealth and hence consumption)
- Change in P leads to change in net exports (higher P reduces net exports)
- A rise in P leads to
 - An increase in money demand
 - Higher interest rate, lower desired investment

Long-run neutrality of money

- In the long run, output eventually returns to Y^*
- Money neutrality (classical view):
 - changes in the money supply do not affect the real GDP in the long run
 - Only effect is on the price level
 - Process
 - As MS increases, interest rate declines, increased investment and net export shifts the AD curve to the right
 - P and Y increase, M_D shifts up, factor prices adjust shifts AS to (the left) new long-run equilibrium
 - Increase P , shifts MD and interest rate returns to the initial value
- Hysteresis: growth rate of Y^* may be affected by the short run path of real GDP
 - Change in the money supply can affect investment in R&D and technological changes
 - Prolonged unemployment leads to loss of human capital

Short-run non-neutrality of money

- Short run effect depends on the extent of the shift of the AD curve
- The steeper the MD curve, a small change in MS will bring a large change in interest rate
- Flatter I curve, small change in interest rate brings large change in I and large shift in AD
- Monetary policy is more effective when MD is steeper and I is flatter

Keynesians and monetarists

- Keynesians:
 - Monetary policy is not very effective in stimulating AD
 - M_D curve is relatively flat

- I_D curve is relatively steep
- Need fiscal policy for stimulating economy
- **Monetarists:**
 - Monetary policy is effective
 - M_D curve is relatively steep
 - I_D curve is relatively flat

Empirical evidence

- Money demand is insensitive to changes in interest rate
 - **Money demand curve is relatively steeper**
- Changes in money supply leads to significant changes in the equilibrium interest rate
- Monetary policy is effective

Monetary policy

March 10, 2021 5:02 PM

For any given money demand curve, a central bank has two alternatives

- Targeting the **money supply**
 - Monetary equilibrium determines interest rate
- Targeting the **interest rate**
 - Money supply must adjust to have the target rate as the equilibrium rate
- Both cannot be targeted independently
- **Open market operation**: the attempt to shift MS by buying or selling government securities

Bank of Canada chooses to implement its monetary policy by targeting interest rate

- Bank can influence the interest rate more easily
 - It can control the amount of **cash reserve** in the banking system, but not the process of **deposit expansion**
- Instability of money demand
- Easier to communicate its policy through changes in interest rate
 - Easier for the public to see what it means when interest rate changes

Overnight interest rate

- **Bank rate**: 0.25% above the overnight interest rate
 - Loan to commercial banks
- **Borrowing rate**: 0.25% below the overnight interest rate
 - Pays for commercial banks reserves
- Keep actual overnight rate within 0.5%
- Lowering target for the overnight interest rate (in recession):
 - Commercial bank increase in the demand for loans by selling government securities in exchange for cash
- Increasing target for the overnight interest rate (inflationary):
 - Amount of money in the economy decreases
 - Decrease in the demand for loans by buying government securities from BOC
 - Helpful for reacting to a large positive AD shock

Money supply is endogenous

- Prime rate (mortgage rate) can change quickly
- Households response to such changes can take longer
- BOC does open market operation **passively**

Monetary policy

- Expansionary: reduce target for the overnight rate
 - Increased investment demand
 - Shift the AD curve to the right
- Contractionary: increase target for the overnight rate
 - Decrease money supply (or growth rate)
 - Reduced investment demand
 - Shift the AD curve to the left
- Changes in interest rate leads to changes in C and I, international capital flows and exchange rate

Inflation targeting

- High inflation is damaging for economy
- Inflation targeting tends to stabilize output (keeping Y close to Y^*)
 - Monetary policy can be used to control inflation. If $Y > Y^*$, bank of Canada can use **contractionary** policy (**increase in r**) to control inflation (that might happen due to shift

- of AS to the left)
 - Reduce investment demand, shift AD curve to the left
- If $Y < Y^*$, use expansionary policy
 - Increase investment demand, shift AD curve to the right
- Complications
 - Volatile food and energy prices
 - Prices of many goods included in CPI are determined in world markets and may change suddenly for reasons unrelated to Canadian output gaps
 - Have little implication for Canadian monetary policy
 - Exchange rate
 - Canadian dollar appreciates due to exports, Bank of Canada can increase r
 - Canadian dollar depreciates due to higher demand for Canadian bonds and assets, lower exports, Bank of Canada can use expansionary policy

Two views on great depression

- Monetarists: fall in money supply caused recession in the US
- Keynesians: fall in autonomous expenditure (pessimism) caused the depression

Liquidity trap: If money demand curve is completely horizontal, then monetary policy would be completely ineffective.

Long and variable lags

- Monetary policy operates with a time lag
 - Changes in expenditure take time. Low interest does not mean households start buying and business start investing right away
 - Multiplier process takes time
- Destabilizing
 - Monetary policy must be forward-looking or consider what might happen after one year

BOC react to a large positive AD shock by increasing its target for the overnight rate (cause recession)

- Negative by decreasing its target for the overnight rate (cause inflation)

Inflation

March 10, 2021 5:02 PM

Effects of inflation

- Failure to anticipate inflation correctly results in unintended consequences that impose costs to both the **labor market** and the **capital market**
- Labor market
 - **Redistribution of income**: higher than anticipated inflation lowers the real wage rate
 - **Departure from full employment**: higher than anticipated inflation increases the quantity of labor demanded, lowers the unemployment rate
- Capital market
 - **Redistribution of income**: when inflation rate is high, borrowers gain
 - **Too much or too little lending and borrowing**: when inflation rate is high, real interest rate is lower

Inflation hurts **who hold money and lenders**

Wage changes

- Change in wages = output-gap effect + expectation effect
 - Change in money wages = excess demand effect + expectation effect
- Forward-looking: based on expected economic conditions and government policies
- Backward-looking: based on past experience about the inflation rate changes
- Combination of both

Price changes

- Actual inflation = output-gap inflation + expected inflation + supply shock inflation
- Causes shifts in AS by changes in prices of raw materials

Constant inflation(with $Y=Y^*$)

- Both AD and AS curve shifts upward at the same rate
- If inflation has been constant for several years, then expected inflation will equal actual inflation
- There is no output gap
- **validation**
 - Expectation of inflation and continued money supply
- Happens when the rate of monetary growth, the rate of nominal wage increase and expected inflation are all consistent with the actual inflation rate
- To stop this, central bank tries to stop the rightward shift of the AD curve

Deflation

- When price levels are falling, firms and households defer spending
- Shift AD to the left and causes recession

Demand shocks

- **Demand inflation** results from a rightward shift in the **AD** curve
 - Caused by fiscal or monetary policy
 - Not validated demand shock produces only temporary inflation, price level increases

Supply shock

- **Supply inflation**: inflation caused by leftward AS shifts unrelated to excess demand
- If wages fall slowly ($Y < Y^*$), the return to Y^* after a **non-validated** negative AS shock will be slow
- If there is **monetary validation**, rightward shift in the AD, return to Y^* faster
 - Initial rise in P will be followed by a further rise

- If the validation leads firms and workers to expect further inflation, AS will continue to shift left, causes **wage-price spiral**

Accelerating inflation

- **Acceleration hypothesis**: as long as an inflationary gap persists, inflation rate cannot remain constant because expectations will always be revised upwards
- **NAIRU** (non-accelerating rate of inflation): lowest level of sustained unemployment
- When AS curve shifts leftward, AD curve shifts further to the right, keeping open the inflationary gap
- Continued validation turns a transitory inflation into **sustained accelerating inflation**

Causes of inflation

- Anything that increases AD
- Anything that increases factor prices will shift AS to the left
- Unless continual monetary expansion occurs, such increases in P must eventually come to a halt

Consequences of inflation in the short run

- **Demand inflation** increases Y above Y^*
- **Supply inflation** decreases Y below Y^*
- When costs and prices have fully adjusted, shifts in either AD or AS affect P but leave output unchanged

Conclusion

- Without monetary validation
 - Positive (right, up) AD shocks cause temporary inflation, output returns to Y^*
 - Negative (left, up) AS shocks cause temporary inflation, output returns to Y^*
- Inflation initiated by either AD or AS shocks can only be sustained with continuing monetary validation
- **Sustained inflation is always a monetary phenomenon**

Unemployment

March 10, 2021 5:03 PM

In the **long run**: changes in employment roughly match changes in the labor force. Unemployment changes more due to structural changes in the labor force

In the **short run**: employment and unemployment fluctuate considerably because changes in labor force are not matched by changes in employment.

- Unemployment usually **falls during booms** and rises during slowdowns

Flows in the labor market

- Level of activity in the labor market may be better shown by the **flows** into and out of unemployment

Unemployed: those who don't have a job but are actively looking for one

Consequences of unemployment

- Lost output:
 - Unemployed people are valuable resource who are not producing anything currently
 - forgone opportunities
- Personal costs:
 - Lost wages
 - Psychological distress

Cyclical unemployment

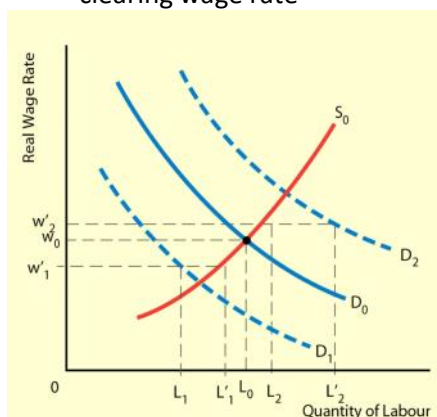
- Difference between actual unemployment and the unemployment at $Y=Y^*$
- Frictional
- Structural

Market clearing theories

- Major characteristics
 - Both workers and employers continuously optimize
 - Markets continuously clear; real wage and price flexibility plays a leading role in clearing market
- Any **unemployment** that may exist is due to **voluntary** decisions of the workers

Non-market clearing theory

- Wages are sticky
 - When demand for labor falls, wage rate may not clear, causing **involuntary unemployment** $= L'_1 - L_1$
 - **Involuntary unemployment** happens when the wage is **greater than** the market-clearing wage rate



- Explanations

- Long term relationships
- Menu costs and wage contracts (involuntary unemployment)
- Efficiency wages
 - Provide an incentive for employees to work hard so they are not laid off and why wages do not readily fall in response to excess supply in labor markets
 - Cause involuntary unemployment
- Union bargaining

Convergence of theories

- Both theories predict that in the long run, the unemployment rate comes back to NAIRU
- In short run
 - Market clearing theory predicts unemployment as NAIRU
 - Non market clearing theory predicts that U is always different from U^* until long run equilibrium in the labor market

Frictional unemployment:

- Caused due to the time required for labor to move from one job to another
- Source
 - Young people who enter the labor and look for jobs
 - Dissatisfied workers leaving their jobs
- May be voluntary or involuntary

Structural unemployment:

- Caused by mismatch between what employers want and what workers have
 - Locations, occupation, industries, skills
- Natural causes
 - Oil price
- Policy causes

Frictional-structural distinction

- Common characteristics
 - Both suggest that there are as many unfilled vacancies as there are unemployed persons
 - Hard to distinguish between the two
 - Differ from cyclical unemployment

NAIRU changes

- Demographic shifts
- Hysteresis
 - NAIRU can be influenced by the level of the actual rate of unemployment
- Globalization and structural change
- Government policies

Reducing unemployment

- Cyclical unemployment
 - Fiscal and monetary policies
- Frictional unemployment
 - Increase firms and workers knowledge about market opportunities may reduce frictional unemployment
 - Employment insurance
- Structural unemployment
 - Increase retaining
 - Improve the flow of labor-market information

Exchange rates

March 22, 2021 1:30 PM

Current account (CA)

- Records payments and receipts arising from international trade in goods and services
- **Trade account: $X - IM$**
 - If $X > IM$, trade surplus
 - Export: income that earned by selling goods and services to the world
 - Import: expenditures that made on goods and services
- Capital-service account:
 - Income from foreign investments minus payment to foreign investors
 - Net interest earnings/payments on assets/debts + unilateral transfers (gifts)
- **Current account: $CA = \text{Trade Account} + \text{Capital Service Account}$**
 - Records payments/receipts arising from trade in long term and short-term assets
 - **Current account = exports - imports + net investment income + unilateral transfers = private saving + tax revenues - investment - government purchases**
- **Current account surplus:**
 - **Net lender**

Budget deficits give **deficit in the current account, fall in national savings**

Budget surplus give **surplus** in the current account, rising the national savings

Capital account (KA)

- **Foreign direct investment (FDI):** purchase or sales of assets that changes the legal control of those assets
- **Portfolio investment (PI):** transaction in assets that does not change legal title
- **Official financing account (OFA):** includes purchases of foreign currencies by the government or central bank
 - If there is no transactions here, the exchange rate is being determined freely in the foreign-exchange market
- **$KA = FDI + PI (+/-) OFA$**
- **Capital account = capital inflows - capital outflows + official financing account**
 - Capital outflow: purchase of foreign assets (debit on capital account)

Balance of payments (BOP) deficit

- **Balance of payments = $CA + KA = 0$**
- **$CA + KA < 0$**
- It is financed by selling foreign-exchange reserves by the central bank, leading to more supply of foreign currencies
 - Canadian dollar appreciates and the BOP is balanced
- Selling and buying of foreign exchange is a tool for balancing BOP
- Deficit means the Bank of Canada decreased its reserves of foreign exchange

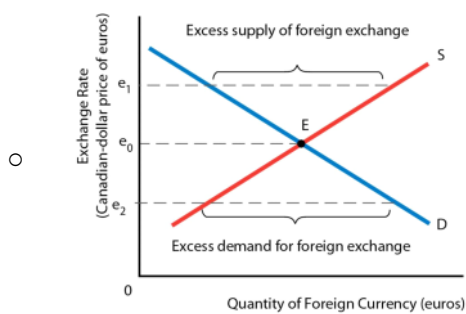
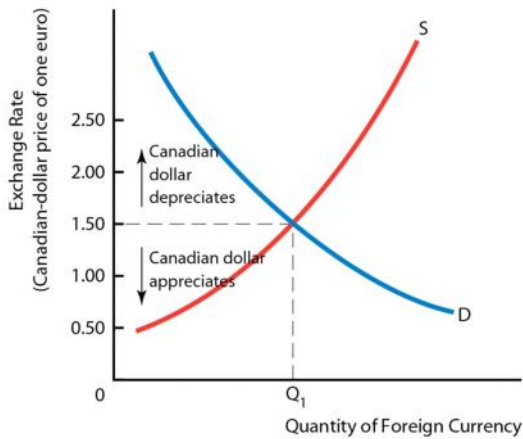
A **positive value** for the "**Changes in official international reserves**" in the BOP indicates that the **Bank of Canada issued foreign exchange**.

- Negative value implies increasing the reserves for foreign exchanges. (BOP surplus)

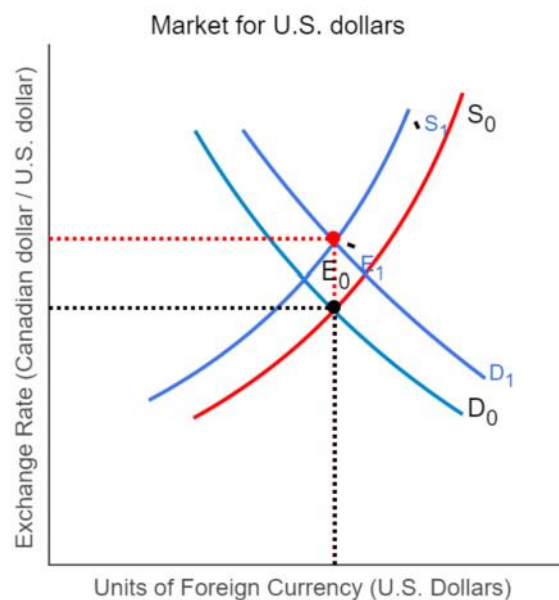
Exchange rate: the number of units of domestic currency required to purchase one unit of foreign currency

- **Appreciation** of domestic currency is a **fall** in exchange rate
- **Depreciation** is a rise in exchange rate
- **Demand** for foreign currency implies a **supply of Canadian dollars** in the foreign exchange market
- **Supply** of foreign currency implies a demand for Canadian dollars

Supply of foreign exchange

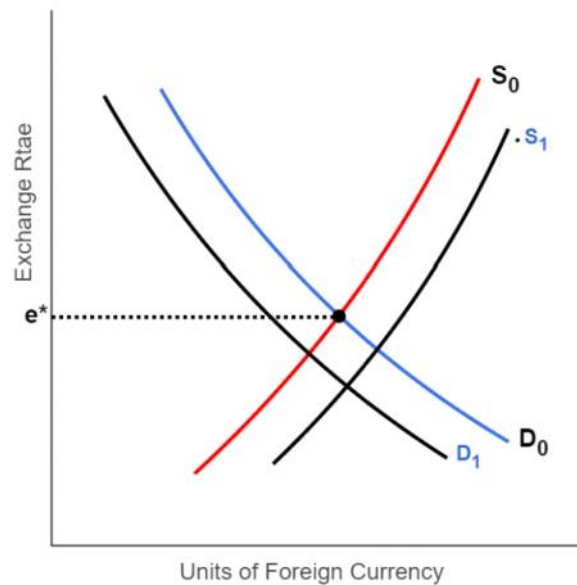


- When **foreign demand increases**:
 - **Supply curve** shifts to the right
 - **Appreciation** of the Canadian dollar
- When **Canadian demand for foreign goods increases**:
 - **Demand curve** shifts to the right
 - **Depreciation** of the Canadian dollar
- When Canada has a persistent inflation, with prices stable in other countries
 - Supply curve shifts left (increase supply of the currency in the foreign exchange market)
 - Demand curve shifts right
 - Exchange rate goes up
 - Depreciation of the Canadian dollar



- During deflation in Canada

- Demand curve shifts to the left
- Supply curve shifts to the right
- Exchange rate decreases
- Canadian dollar appreciates



- When **CAD depreciates**, Canadian goods become cheaper in other currencies
 - Demand for Canadian products and dollars increases
 - Supply of foreign currency increases
- Source of supply of foreign currencies
 - Canadian exports
 - Asset sales (capital inflows)
 - Reserve currency
- When **Canadian demand for foreign goods decreases**, supply of Canadian dollars to foreign-exchange market will **decrease**, and demand for foreign currencies will **decrease**. **Canadian dollar appreciates**.
- When **foreign demand for Canadian goods changes**, supply of Canadian dollars to the foreign-exchange market and the demand for foreign currencies **remain the same**.
 - **Fall in foreign GDP**, there will be decrease in supply of foreign currency. **Canadian dollar depreciates**.

Demand for foreign exchange

- When CAD **depreciates**, the quantity of foreign currency demanded reduces
 - Foreign goods become expensive to Canadians, reduce foreign purchases
- A negative slope: when price of foreign currency (in CAD) is higher, the demand for that currency will be lower

Determination of exchange rates

- **Perfectly flexible** exchange rates are determined solely by market forces
- Central bank attempt to **fix or peg** the exchange rate
- **Managed floats and adjustable pegs** are intermediate cases
 - Managed float: influence exchange rate but does not peg it
 - Adjustable peg: pegs the exchange rate at one level but changes the level as situation demands
- **Flexible exchange rate**:
 - In the absence of central bank
 - Exchange rate determined solely by the demand and supply of currencies in the market
 - exchange rate is determined by the equality of supply and demand for foreign exchange and the central bank makes **no foreign-exchange transactions**
- **Fixed exchange rates**
 - Central banks must intervene in foreign exchange market if they wish to fix the

- exchange rate
- central bank buys and sells foreign exchange to maintain the exchange rate at a specific value
 - To fix the exchange rate **above free-market equilibrium value**, excess **supply** of foreign exchange and central bank will **buy foreign currencies**
 - **debits in the capital account**
 - To fix the exchange rate **below** free-market equilibrium value, excess **demand** of foreign exchange and central bank will **sell foreign currencies**

Increase in the demand for foreign exchange causes CAD to depreciate

- Lower foreign prices
- Increase in domestic income
- Greater preference for foreign products

Decrease in the supply of foreign exchange causes CAD to depreciate

Increase in Canadian prices relative to foreign prices will cause **an increase** in the demand for foreign exchange and a **decrease** in the supply of foreign exchange.

- Exchange rate will rise, Canadian dollar depreciates

Determinants of exchange rates

- Rise in the world price of exports
 - Appreciate CAD
- Rise in foreign price of imports
- Changes in overall prices
 - If general inflation is the same, the exchange rate remains unchanged
- Capital movements
 - Higher interest rate attracts financial capital inflow
 - Expectation about future exchange rate
 - Long term profit opportunities in a foreign country relative to the domestic country
- Structural changes

Volatility of exchange rates

- Exchange rates are one of the **most volatile** of all macroeconomic variables, mostly because of heavy speculation and reaction to news

Correct value of CAD

- With flexible exchange rate, market forces determine the value of the exchange rate
- The **free-market equilibrium exchange rate** is the correct exchange rate
 - It accurately represents the market value of the dollar

Purchasing power parity (PPP)

- Exchange rate is equal to relative price levels
- If P_C and P_E are price levels of Canada and Europe and e is the CAD price of Euros, then **$P_C = eP_E$** .
- **PPP exchange rate** is the value of e that makes the previous equation hold.
 - But data show that they are not equal or move together all the times
 - **Non-traded goods**: presence of transportation costs prevents PPP from holding
 - **Different baskets and relative price changes**: composition of consumption basket and hence the price of the basket can be different

Benefits of fixed exchange rates

- Exchange-rate risk is eliminated
 - Promotes more international trade
 - Can buy in forward market (buy and sell foreign exchange in the future at the price specified today) and avoid such risks

Benefits of flexible exchange rate

- Exchange rate can act as a shock absorber:
 - Dampen the effects on output and employment

Flexible Exchange Rates as a Shock Absorber

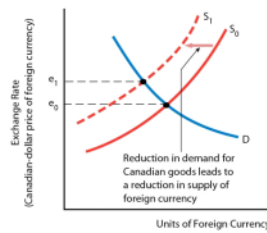
With a fixed exchange rate:

- the exchange rate is maintained at e_0

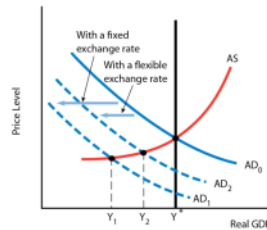
- – AD_0 shifts to the left to AD_1

With a flexible exchange rate:

- the exchange rate rises to e_1
- AD_0 shifts to the left to AD_2



(i) Foreign-exchange market



(ii) AD and AS

- **Reduction in demand for Canadian exports**
 - AD curve shifts to the left
 - The shift is dampened by the depreciation of dollar
- **Increase in demand for Canadian exports**
 - AD curve shifts to the right
 - This shift is dampened by the appreciation of dollar
- Depreciation of the CAD will dampen the effect of the shock, reducing the shift of the AD curve.
- Monetary policy
 - Easier for the BOC to focus on its target inflation rate
 - Fluctuation in P would be lower with flexible exchange rate

With flexible exchange rates, net capital inflows tend to appreciate the currency of the capital-importing nation

- Increases the demand for domestic currency

When **overnight rate increases**, Canadian dollar appreciates, encourages import

- When decreases, depreciates, encourages export