EC 140 Test 2 Cheat Sheet
finished version v2.0

GDP=Y (national income) *Variables ACTUAL*

Firms contribute to GDP by **value added**. Does not account for illegal/black markets, leisure, "bads". Adjusting for **real GDP** is better, to account for inflation. Stuff with no clear market value is counted at cost.

Income Side: Y = Net domestic income (**NDI**) + Depreciation + Indirect Taxes − Subsidies with NDI = Wages + Interest + Business profits

Expenditure Side: Y = $C_a$onsume + $I_a$nvestment + $G_a$vmt + E$X_a$ports − IM_aports.

Investment = Net Invesment + Depreciation: not "investing" but inventory, plants, and equipment. Count only gvmt spend on firms, not all spend.

Business Cycle

Regular short-run GDP fluctuations. Measure actual vs **potential GDP (Y*)** with full employment. **Output gap** = %diff = $\frac{Y - Y^*}{Y^*} \times 100\%$

Recession is decreasing output gap, **recovery** when increasing. **Depressions** are long recessions. **Peak/trough** when GDP hits local min/max.

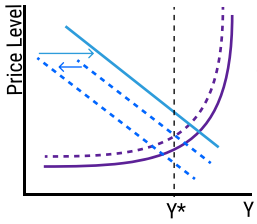
Output gaps put pressure on wages and working hours. For example, COVID screwed GDP. Biggest recession ever with fastest recovery

Trends

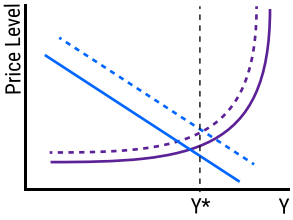
Actual GDP stays around potential
Labor force growing, so (un)employment rises
Unemployment rate has no long term trend

Examples

COVID MPSave up (b down)
AE < Y but production did not go up, so GDP fell
No change in NX or G



Oil price drop (see below) so AD down
To fix, gov did **CERB** (transfer/negative tax) so T_0 fell and AD up



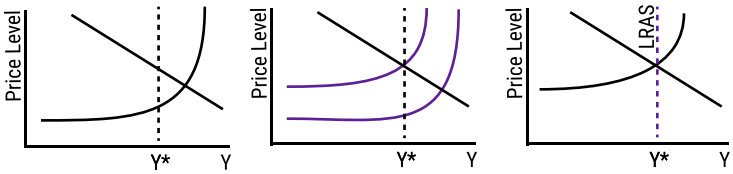
Wage subsidy (CEWS) lowers factor price, shifts AS right

Canadian oil prices fall: Fall in I_0 so AD down (because oil industry worth less)
AS curve shifts right (lower factor price)

The **neoclassical AS growth model** has **diminishing marginal returns** to either **K**apital, **H**uman capital, or **L**abour, and **constant returns to scale** if both go up proportionally. In the long run, the only change is **tech** which means LRAS is a constant vertical line.

Modern models say tech is **endogenous** like, **learning by doing** or **innovation/competition**, which lead to **increasing marginal returns**. This is the only way we can get **sustained growth**, like the industrial revolution (see graph →)

Neoclassical model short to long run adjustment process ↓



Short run assumes constant factor prices and tech

Factor prices shift AS to close output gaps, technology still const

Long run has factor prices fully adjusted, **tech (Y*) is changing**

Factors GDP = f_t(K,L,H)

$\frac{\text{current}}{\text{base}} \times 100$ Index $\quad \frac{\text{new} - \text{old}}{\text{old}} \times 100\%$ %change

Kapital **Price level** is the average price of **everything**. Power of money goes down as price level goes up.

Today dollars are **nominal.** Indexed against a particular base year is **real.**

Real national income is quantity now @ base year prices. Measure price of the **same** stuff relative to some year as the **CPI**, which is **calculated as an index**.

For any index, **deflator = nominal/real**. Deflator is also a (price) index. **Inflation** is **% change in deflator index**. Or, deflator = last year deflator × inflation

Negative inflation is **deflation**. Decreasing inflation is **disinflation**. **Real interest = nominal − inflation.**

People plan for normal, **anticipated** inflation. If price level goes up before people plan, inflation is **unanticipated**, like being paid back in weaker dollars.

Exchange rate is the price in Canadian dollars to buy one of another currency. More valuable currency is **appreciating**, less valuable **depreciating**.

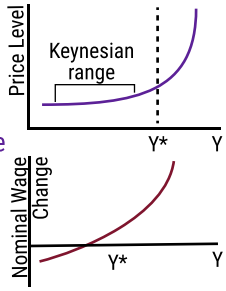
Labour

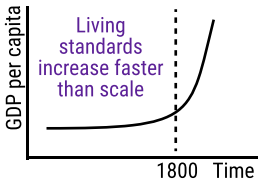
Labour force is people who are 15+ and **employed** or **unemployed** (job searching). **Unemployment rate** is unemployed ÷ labour force. **Potential** or **full employment** still has some unemployed: **frictional** from turnover and **structural** from skill mismatch. **Seasonal** from yearly patterns. **Cyclical** from the business cycle. **Productivity** is **GDP per unit labour**, with people (worse) or hours worked (better).

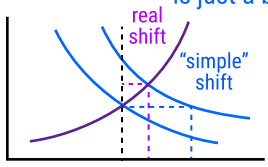
Aggregate Supply

shows the **quantity of aggregate output Y** created if it's sold at **price level P**.

AS **slopes up** from **increasing unit (marginal) costs**. There's a **flat "Keynesian" range** somewhere left of Y* and steep right of Y*. The **Philips curve** shows **sticky wages**: wages rise quickly in inflationary gaps and fall slowly in recessions, since AS can't shift as fast to fix them.







Supply/Demand

D+→P+Y+ read as AD up causes price up and GDP up

S+ → P− Y+ S− → P+ Y−
D+ → P+ Y+ D− → P− Y−
S+ D+ → P? Y+ S− D− → P? Y−
S > D → P+ Y? D > S → P− Y?

Use to table to lookup cause from result or vice versa

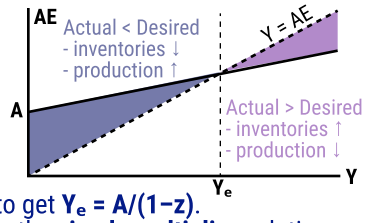
Variables *DESIRED* The Macro Model

AE = C + I + G + X − IM (same as GDP expenditure side)

Model **desired aggregate expenditure AE** with an **autonomous part A** and **induced part zY** (**z** is the **marginal propensity to spend**). Expand **AE = A + zY** with variables on back side to get:

$$AE = \underbrace{(a + I_0 - bT_0 + G_0 + X_0)}_{A\ \text{(autonomous)}} + \underbrace{(b(1-t) - m)}_{z\ \text{(induced)}} Y$$

AE tends to equilibrium when desired = actual, that is, **AE = Y**. Otherwise, inflationary or deflationary gaps push actual production and inventory towards desired amounts.



Solve AE = Y for Y to get **Y_e = A/(1−z)**.
$\Delta Y_e / \Delta A$ = **1/(1−z)** is the **simple multiplier**, relating autonomous spending (vertical shift) to equilibium.

Shifts *See variables + graphs on back page*

Basic Wealth rises→consume more (a)→shift up
Interest rates up→less inventory (I_0)→shift down
Expectations up→consume more (a)→shift up
Higher sales→higher desired stock (I_0)→shift up

Government Spending up (G)→shift up
T_0 up→shift down, t up→flatter

Trade Foreign GDP up→X up→shift up
Domestic price up→X down/m up→down and flatter
CAD weaker→X up/m down→shift up and steeper

Fiscal Policy

Government can **take** your money, **spend** your money, or give **bonus** money. Affects disposable income **YD=Y−T**. The **budget balance** is **T−G**, positive→surplus and pay debt, negative→deficit and go into debt. When zero, budget is "balanced".

Unlike monetary policy, fiscal policy **lags**. It takes time to get **information** and **decide**, but also to **implement** or **execute** the plans. This makes **timing** really hard.

Savings

The sum private + public where private is S = Y−C (= I_0 in Baby) and public is budget balance T−G. 1−b is **marginal propensity to save**, opposite of MPC

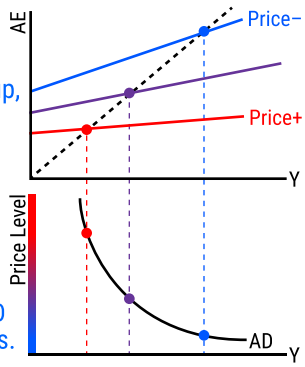
Aggregate Demand

is **all equilibria points** for **different price levels**.

As the domestic **price level** goes up, **exports** go down and **imports** go up, making the AE curve **shift down and be flatter**.

The AD curve is all the equilibrium points for all price levels.

The curve's **sensitivity** to shocks depends on the **simple multiplier** since AD is just a bunch of Y_e points.



The true **multiplier** (change in Y_e given ΔA) is **smaller** than simple (horizontal shift) **whenever AS slopes up.** The **paradox of thirft** is that if **everyone saves**, b goes down and **everyone gets poorer** (Y_e down)

Automatic Stabilizers

are parts of **tax-and-transfer systems** that **reduces the multiplier** making AD more stable (smaller changes in real GDP due to shock).

Unlike **discretionary** (purposeful) fiscal policy adjusting G_0 or T_0, automatic stabilizers are **induced** (automatically shift). Examples include employment insurance, progressive taxes, and the welfare system.

Support us and see list of previous versions' errors at ko-fi.com/jahyong

Money is a medium of exchange in place of bartering stuff (which needs a coincidence of wants). This makes it a useful store of value to keep the power to buy stuff unless there's **hyperinflation** (inflation over 50% per month). Value measurement allows for it to be a **unit of account** to balance.

Coinage suffers from **debasing** (making lower quality coins) causing people to hoard the better ones (**Gresham's law**).

Paper money are promises to pay holder of paper the money. Can lead to **runs on the bank** when everyone asks for money at once and there isn't enough money.

Fiat money is not convertable into gold or anything at all. Instead "pay to bearer on demand", fiat bills say "this is legal tender". Almost all money now is fiat.

Deposit money is made-up money in banks that the public "has". Banks promise to pay more money than they have (**fractional reserves**). Deposits are either **demand** (withdraw whenever) or **notice** (take time to withdraw). **Term** deposits collect interest and you can't withdrawa until the term is finished.

Near money is stuff with value easily converted (liquidated) into money, like term deposits. **Money substitutes** are used in exchange but are *not* stores of value, like credit card debt.

Money Supply is sum of actual currency + bank deposits (fake money). **M1** includes demand deposits at chartered banks. **M2** includes demand *and notice* deposits. **M1+/M2+** include the same types of deposits at all bank and non-bank institutions.

Money Creation in banking happens from: (1) **immigrants** bringing cash to Canada (2) **finding money** under beds and (3) when the **BoC** increases money supply. When money is "created" (i.e. deposited in a commercial bank), it moves through the balance sheets →

The total **deposit money** created is (deposit)÷(target reserve ratio)

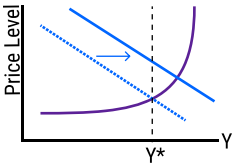
Fiat money is created by the central bank (the BoC) through purchase of securities

Money is "destroyed" in the opposite process to creation.

Commercial Bank Balance Sheet

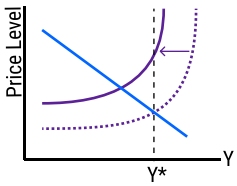
Assets	Liabilities
• Reserves (including deposits at the BoC) • Gov securities • Loans (incl. mortgages) • Canadian securities • Foreign currency	• Demand/Notice deposits • Term deposits • Gov deposits • Foreign liabilities • Shareholder equity

AD/AS Curves



Positive AD shock (from Y*)
→inflationary gap
→supply increases
→new Y_e with price level up

Causes similar to EC120 demand
• anything that shifts AE up
• population up



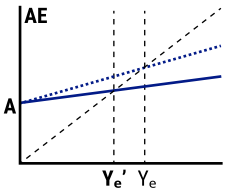
Negative AS shock (from Y*)
→recessionary gap
→gov spending can close gap
→new Y_e with price level up

Causes similar to EC120 supply
• technology level down
• people/capital down
• factor prices up
(e.g. oil, wages, commodities)

Both can cause **stagflation** (price level and unemployment up)

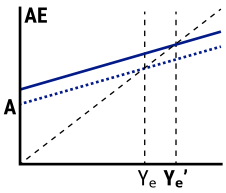
Invert causes/effects to get the other directions

Graph Shifts AE Curve



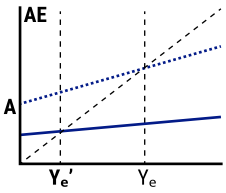
Net tax rate goes up
→ t up → z down
→ graph flatter
→ Y_e down

Other causes
• MPC goes down
• Imports up

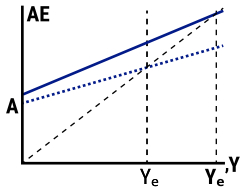


Foreign income up
→X_0 up→NX up
→A up→shift up
→Y_e up by $X_0 \times 1/(1-z)$

Other causes
• Wealth goes up
• Future expectations up
• Interest rate down



Relative foreign prices down
→X_0 down→shift down
→**also** IM up
→graph flatter
→Y_e goes down



Relative domestic prices down
→X_0 up→shift up
→**also** IM down
→graph steeper
→Y_e goes up

Bank of Canada is Canada's central bank and has 4 main functions: (1) Banker to the **chartered** (commercial) **banks**. They keep deposits with the BoC, called **reserves**. (2) Banker to the **federal gov**, who keeps some deposits. (3) Regulator of the **money supply** by **buying and selling gvmt bonds**. (4) **Regulator** of financial institutions alongside OSFI (Office of the Superintendent of Financial Institutions). **Bank of Canada Balance Sheet**

Assets	Liabilities
• Federal bonds • Provincial bonds	• Currency • Gov Deposits • Commercial Bank Deposits

Reserves are a commercial bank's **cash and deposits at BoC**.

Commercial banks in Canada have a **fractional banking system**, so they reserve only some deposits. Reserves÷deposits is the **reserve ratio**, and banks have a **target reserve ratio** (v). When above, **lend excess reserves** to collect interest.

Example If a commercial bank with **target ratio 10%** gets a new **deposit of $250**. Target reserves are 10%×**$1250** = $125, so excess reserves are **$300** + $50 − $125 = **$225** (BoC deposits are part of reserves)

Assets		Liabilities	
Cash^{+250}	50	Deposits^{+250}	1000
BoC Deposits	50	Kapital	100
Loans	900		

Assets		Liabilities	
Cash^{-225}	300	Deposits	1250
BoC Deposits	50	Kapital	100
Loans^{+225}	900		

Assets		Liabilities	
Cash	75	Deposits	1250
BoC Deposits	50	Kapital	100
Loans	1125		

So the bank loans out **$225** so **cash decreases** and **loans increase**

Lending to a second-hand bank increases *their* cash, so they lend, repeating the cycle to make **$250**/10% = $2500 of new deposit money in the banking system.

Modelling Change Express as **growth rates**, normally **percentages per year**, e.g. $2 after 50 yrs @ 5% is $2\times(1.05)^{50}$. The **rule of 72** says it takes 72/x years for x% growth to cause a **double**.

Growth is limited by resources: **exhaustion** of supply or **degragation** of the environment can halt growth. Sustained economic growth must be **tech change** (by definition, this is janky).

In models, change is either **endogenous** (explained by the model) or **exogenous** (not explained). E.g., in the neoclassical model tech is exogenous but **endogenous technology models** argue tech is affected by the macro model (so it's explained).

Growth outside of the *neoclassical* model (i.e. exogenous tech) is also called the **Solow residual** (or **total factor productivity**).

Calculations+Examples

CPI and Inflation

Given base year is 2018 (CPI = 100), find inflation between 2018 and 2019.

2018	Price	Quant
Good A	$1.10	90
Good B	$1.90	215
Good C	$4.80	90
2019		
Good A	$2.00	130
Good B	$2.20	210
Good C	$9.50	88

Total Expenditure (2018):

$$TE = 1.10(90) + 1.90(215) + 4.80(90) = 939.5$$

Total Expenditure (2019, with 2018 quant):

$$TE = 2.00(90) + 2.20(215) + 9.50(90) = 1508$$

Calculate CPI for 2019:

$$CPI = \frac{TE_{2019}}{TE_{2018}} \times 100\% = 160.5$$

$$\text{Inflation} = \frac{160.5 - 100}{100} \times 100\% = 60.5\%$$

GDP Deflator Calculate the GDP deflator of this economy in 2019 if the base year is 2018

GDP 2018:

$$GDP = 1.10(90) + 1.90(215) + 4.80(90) = 939.5$$

Real GDP 2019 (using 2018 prices):

$$GDP = 1.10(130) + 1.90(210) + 4.80(88) = 964.4$$

Nominal GDP 2019:

$$GDP = 2.00(130) + 2.20(210) + 9.50(88) = 1558$$

$$\text{Deflator} = \frac{2019_{\text{Nominal}}}{2019_{\text{Real}}} \times 100 = 161.6$$

Exchange Rate

CAD to USD rate went from 1.13 to 1.21.
CAD **depreciated** as more CAD to buy 1 USD

CAD to USD rate went from 1.27 to 1.13.
CAD **appreciated** as less CAD to buy 1 USD

Variable Reference Table

AE = A + zY	**A** | all autonomous expenditures **z** | marginal propensity to spend
z = b(1 − t) − m	**b** | marginal propensity to consume **m** | marginal propensity to import
C = a + b(YD)	**C** | desired consumption **a** | autonomous consumption **YD** | disposable income
YD = Y − T	**Y** | national income **T** | net tax revenues
T = T_0 + tY	**T_0** | autonomous tax revenues net of transfers **t** | net tax rate of all taxes net of subsidies
NX = X − IM	**NX** | desired net exports **X** | desired exports **IM** | desired imports
IM = mY	**m** | marginal propensity to import
G = G_0 **X = X_0** **I = I_0**	For simplicity, all autonomous with no induced **G/G_0** | desired government expenditure **X/X_0** | desired exports **I/I_0** | desired investment