Week 5-6: The Government Sector

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Economics 203: Introduction to Macroeconomics

This chapter explains:

1. Government in Canada

2. Government expenditure, taxes and equilibrium real GDP

3. The government's budget & budget balance

4. Fiscal policy and government budgets

5. Automatic and discretionary fiscal policy

6. The public debt and the budget balance

7. Aggregate demand, and equilibrium real GDP

Government in Canada

Table 7.1 Total government expense in Canada, 2015

Total Expense (billions $)	Compensation of employees %	Use of goods & services %	Consumption of fixed capital %	Subsidies & grants %	Social Benefits %	Other expense %	Interest %
790.9	30.5	21.6	8.5	2.2	0.6	24.3	4.3

Source: Department of Finance, *Fiscal Reference Tables, 2016*, Table 34.

Government in Canada

Table 7.2 The general government sector in Canada vs. the G7 countries								
	Total Revenues % GDP		Total Outlays %GDP		Budget Balance %GDP		Net Public Debt %GDP	
	2007	2015	2007	2015	2007	2015	2007	2015
Canada	40.1	38.6	38.6	40.3	1.5	-1.7	27	26.7
G7 Average	37.3	36.4	39.9	39.8	-2.6	-3.4	49.7	83

Source: Canada: Department of Finance, *Fiscal Reference Tables, 2016*, Tables 51-54.

Government Expenditure, Taxes and Equilibrium GDP

Basic government budget has two components:

1. A plan for *government expenditures,* **G**,

2. A *net tax rate* on income, **t,** to raise revenue.

Government expenditure (G) ≡ government spending on currently produced goods and services
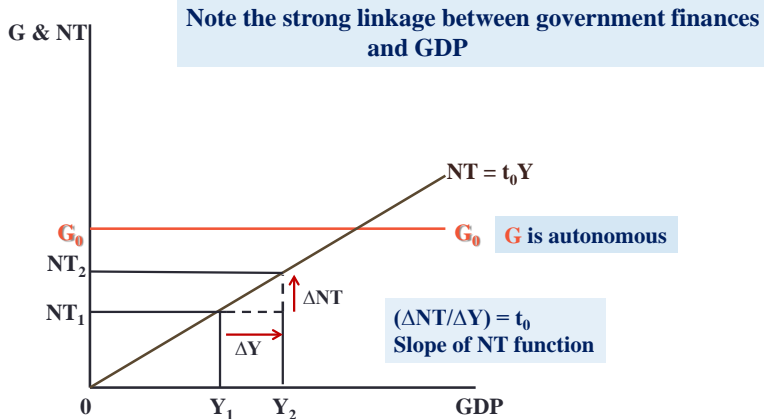
G is *autonomous*, ie $G = G_0$

Net taxes ≡ taxes on incomes minus transfer payments.

NT = tY [is the **induced]:** $0 < t < 1$, $\quad t = (\Delta NT/\Delta Y) > 0$

Government Expenditure, Taxes and Equilibrium GDP

Government Expenditure and Net Tax Revenue Function

Note the strong linkage between government finances and GDP

G & NT

$NT = t_0 Y$

G_0 G_0 **G is autonomous**

NT_2

NT_1

ΔNT

$(\Delta NT / \Delta Y) = t_0$
Slope of NT function

ΔY

0   Y_1 Y_2 GDP

Government Expenditure, Taxes and Equilibrium GDP

Effect of taxes on consumption expenditures C

- Net tax rate on income reduces *induced* consumption

- Disposable income is *after tax income*

- **Disposable income** YD = Y − NT

- **Consumption = autonomous consumption plus induced consumption based on disposable income**
  - $C = C_0 + c(Y - NT)$
  - $C = C_0 + c(Y - tY)$
  - **$C = C_0 + c(1 - t)Y$**

Government Expenditure, Taxes and Equilibrium GDP

Effect of taxes on consumption expenditures C

A Numerical Example:

a) No taxes:

$C = 20 + 0.8YD$

$NT = 0$

$YD = Y$

$C_1 = 20 + 0.8Y$

b) Net tax rate t = 0.15

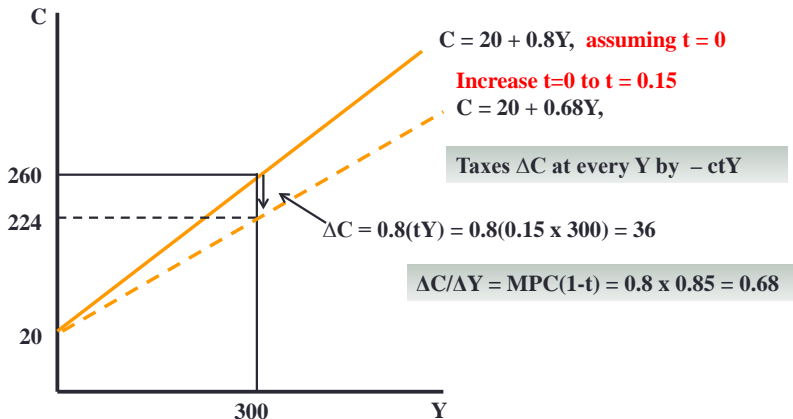$C = 20 + 0.8YD$

$NT = 0.15Y$

$YD = (Y - 0.15Y) = (1-0.15)Y$

$C_2 = 20 + 0.8(1 - 0.15)Y = 20+0.68Y$

a) Y	NT	YD	C_1	$\Delta C/\Delta Y$	b) Y	NT	YD	C_2	$\Delta C/\Delta Y$
100	0	100	100	--	100	15	85	88	--
300	0	300	260	(160/200) = 0.8	300	45	255	224	(136/200) = 0.68
500	0	500	420	(160/200) = 0.8	500	75	425	360	(136/200) = 0.68

- **Net tax rate changes induced consumption from**
  $(\Delta C/\Delta Y) = cY$ to $(\Delta C/\Delta Y) = c(1 - t)Y$

Government Expenditure, Taxes and Equilibrium GDP

Effect of taxes on consumption expenditures C

$C = 20 + 0.8Y$, **assuming t = 0**

Increase t=0 to t = 0.15
$C = 20 + 0.68Y$,

Taxes ΔC at every Y by $-ctY$

$\Delta C = 0.8(tY) = 0.8(0.15 \times 300) = 36$

$\Delta C/\Delta Y = MPC(1-t) = 0.8 \times 0.85 = 0.68$

Government Expenditure, Taxes and Equilibrium GDP

The effect of G and NT on AE

$$AE_0 = A_0 + (c - m)Y$$

$$AE_1 = (A_0 + G_0) + [c(1 - t) - m]Y$$

A change in G shifts AE vertically

A change in t changes the slope of AE
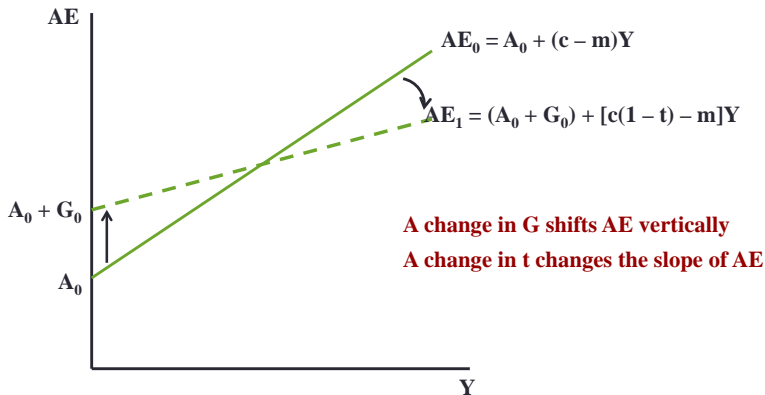
Figure 7.3 Government expenditure, taxes and equilibrium real GDP

a) Increase in government expenditure
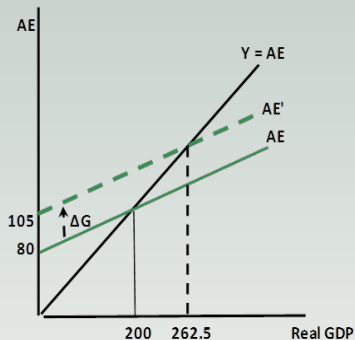
An increase in G = 25 with a multiplier of 2.5
increases equilibrium GDP by 62.5

b) Increase in government expenditure and taxes
funded in part by a tax rate t = .10

t = 0.10 lowers
slope of AE
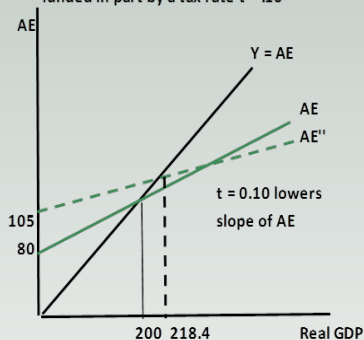
With G = 25 fund by a tax rate t = 0.10
the multiplier is reduced from 2.5 to 2.08
and equilbrium GDP is 218.4

Government Expenditure, Taxes and Equilibrium GDP

The Multiplier revisited:

$$\text{The multiplier } = \frac{1}{1\text{-slope of AE}}$$

$$\frac{\Delta Y}{\Delta A} = \frac{1}{1 - c(1 - t) + m}$$

- **Slope of AE = c(1-t)-m = c-ct-m**

- **Increase in m or t → reduces the slope of AE**

- **Lower AE slopes → smaller Multiplier**

The Government's Budget Function

Basic Concepts:

Government budget: planned government spending and revenue

Balanced budget: revenues are equal to expenditures

Budget surplus: revenues are greater than expenditures

Budget deficit: revenues are less than expenditures

The Government's Budget Function

Government revenue & spending:

- Net tax revenue: **NT = tY**

- Expenditure on goods & services: **G**

- **Govt budget balance: BB** = revenue - expenditure

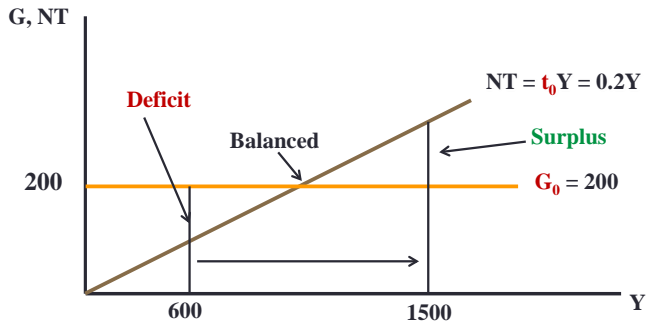$$BB = tY - G$$

The Govt Budget and Budget Balance (BB)

The BB depends on three things:

1. Net tax *rate* (**t**) set by the govt

2. Govt expenditure (**G**) set by the govt

3. GDP (**Y**) determined by AE and AD

The Govt Budget and Budget Balance (BB)

Assume:

- G_0 & t_0 set by govt's **Budget Plan**

- Then **BB** is determined by Y and ΔY → ΔBB

The Govt Budget and Budget Balance

A numerical example:

The Govt's **Fiscal Plan** sets t_0 & G_0:

$$NT = t_0 Y, \qquad G = G_0$$

Budget Function: $BB_0 = t_0 Y - G_0$

E.g. if $BB_0 = 0.2Y - 200$

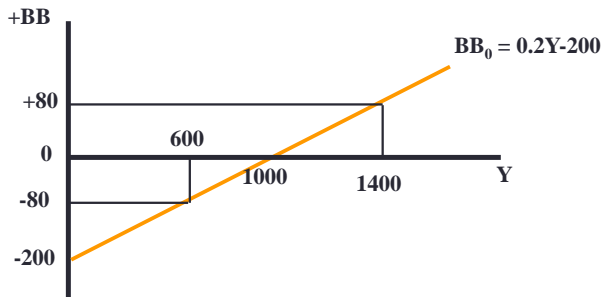| Y	NT	G	BB
200	40	200	-160
600	120	200	- 80
1000	200	200	0
1600	320	200	120

For this fiscal plan the budget balance depends on Y.

If Y rises from 200 to 1600 the budget balance increases from a deficit of 160 to a surplus of 120

A fall in Y would reduce The budget balance

The Govt Budget and Budget Balance

A Govt Budget Function: $BB_0 = 0.2Y - 200$

- This fiscal program with t = 0.2 & G = 200
- The BB depends on Y
- $\Delta BB/\Delta Y > 0$

Fiscal Policy & Govt Budget Balances

Fiscal policy objectives:
- Stabilize equilibrium $Y = Y_P$ &/or,
- Manage budget deficits & public debt

Fiscal policy instruments:
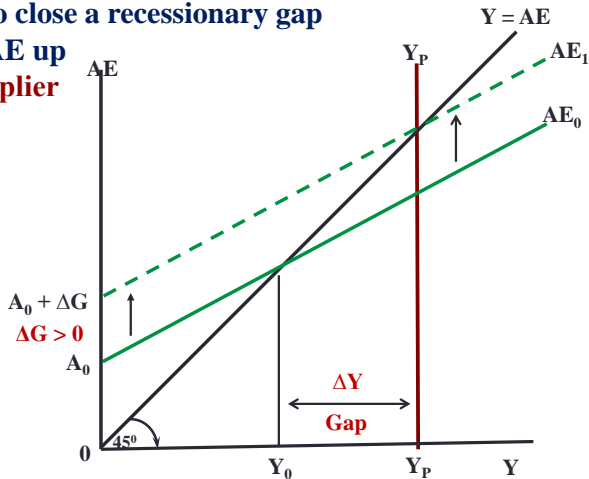- Set net tax rate (t), both taxes & transfers
- Set government expenditure (G)

Δ **Fiscal Policy** $\equiv \Delta$**Fiscal Plan** $\rightarrow \Delta$**BB** *function*

Fiscal Policy & Govt Budget Balance

Fiscal *stimulus* to close a recessionary gap
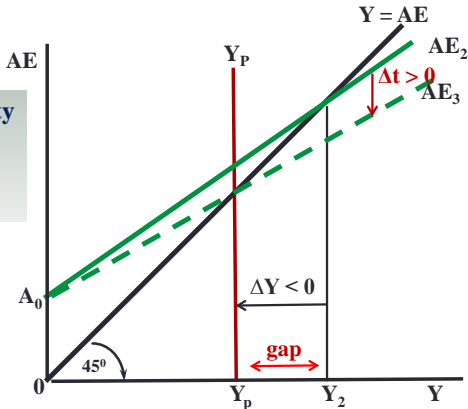$\Delta G > 0$ → shift AE up
$\Delta Y = \Delta G \times$ multiplier

Fiscal Policy & Govt Budget Balance

Fiscal austerity to close an inflationary gap

$\Delta t > 0$ → *reduces slope of AE and the multiplier*

Δt → **lowers Y_e**

Alternatively, **fiscal austerity** could also mean cuts to G that would shift AE down and reduce Y_e

Fiscal Policy & Govt Budget Balances

Fiscal policy and the budget function

- ΔFiscal policy $\equiv$ ΔFiscal plan $\equiv$ ΔBudget function

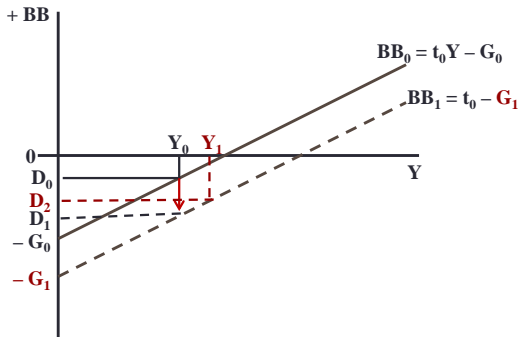Initial equil @ BB_0, Y_0, D_0

Fiscal stimulus by $\uparrow G$:

New spending on infrastructure = ΔG

BB function shifts down BB_0 to BB_1

Deficit $\uparrow D_1$

$\uparrow G \rightarrow \uparrow Y \rightarrow \downarrow D$ to D_2

$$BB_0 = t_0 Y - G_0$$
$$BB_1 = t_0 - G_1$$

Fiscal Policy & Govt Budget Balances

Fiscal austerity to reduce a budget deficit
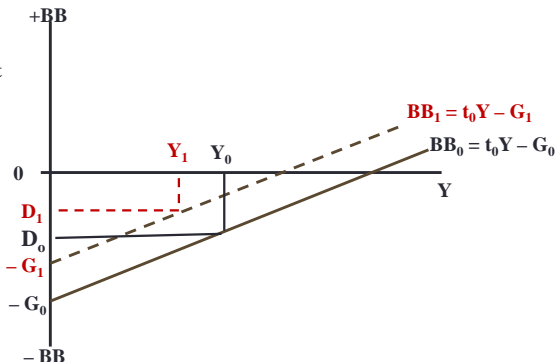
Initial budget $BB_0 = t_0Y - G_0$

Initial budget deficit = D_0 @ Y_0

Fiscal austerity to reduce deficit cuts G to $G_1 < G_0$

→ $BB_1 = t_0Y - G_1$

→ G_1 reduces AE and Y to Y_1

Reduction in Y reduces deficit cut but by less than the cut in G.

+BB

$BB_1 = t_0Y - G_1$

$BB_0 = t_0Y - G_0$

Y_1 Y_0

0

Y

D_1

D_0

$-G_1$

$-G_0$

$-BB$

Fiscal Policy & Govt Budget Balance

- The ***actual budget balance, BB*** is determined by the ***budget plan*** and the level of ***national income:*** $(BB = t_0 Y - G_0)$
    - ΔY &/or ΔFiscal program $\rightarrow \Delta BB$

- Does the budget balance show whether fiscal policy is expansionary, aiming to raise national income,
    - or contractionary, aimed at deficit control and reduction?
- The budget balance may be a poor measure of the government's fiscal stance, because the budget balance can change for reasons unconnected to fiscal policy.
    - Even if G and t are unaltered, a fall in investment or exports will reduce national income and output.

Fiscal Policy & Govt Budget Balance

The Structural Budget Balance

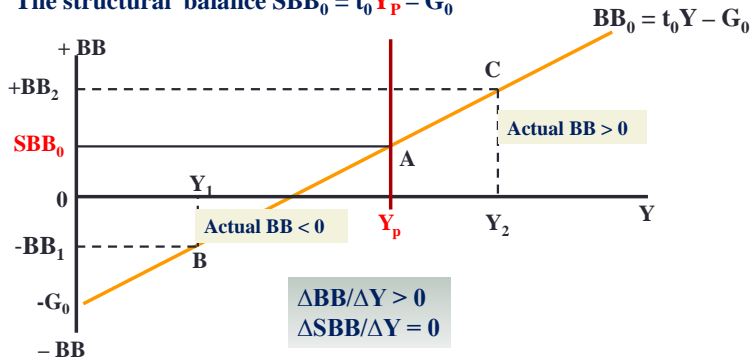### --- An indicator of Fiscal Policy Stance

- The **structural budget balance (SBB)** is an estimate of what the budget balance would be if the economy were operating at potential output:

- *($SBB = tY_P - G$)*

- **BB estimated @ Y_P**

- Δ*Fiscal program* (Δt_0 &/or ΔG_0) $\rightarrow$ Δ**SBB**

- Δ**SBB** $\rightarrow$ *shift BB function* $\equiv$ Δ**Fiscal Policy Stance**

Fiscal Policy & Govt Budget Balance

Actual & Structural Budget Balances

The budget plan: $BB_0 = t_0 Y - G_0$

The structural balance $SBB_0 = t_0 Y_P - G_0$

$BB_0 = t_0 Y - G_0$

$+BB$

C

$+BB_2$

Actual BB > 0

SBB_0

A

0

Y_1

Actual BB < 0

Y_p Y_2 Y

$-BB_1$

B

$-G_0$

$\Delta BB/\Delta Y > 0$
$\Delta SBB/\Delta Y = 0$

$- BB$

Fiscal Policy & Govt Budget Balance

Automatic & Discretionary Fiscal Policy

Automatic fiscal stabilizers

- *Reduce slope of AE* → reduce ΔY/ΔA (the multiplier)

- NT = tY → (ΔAE/ΔY) = [c(**1 – t**) – m)]

- **Built into budget program** by setting **t** in NT = **t**Y

- → ΔBB changes *with ΔY moving along BB function*

Discretionary fiscal policies

- Δt &/or ΔG → *shift BB function* → ΔSBB

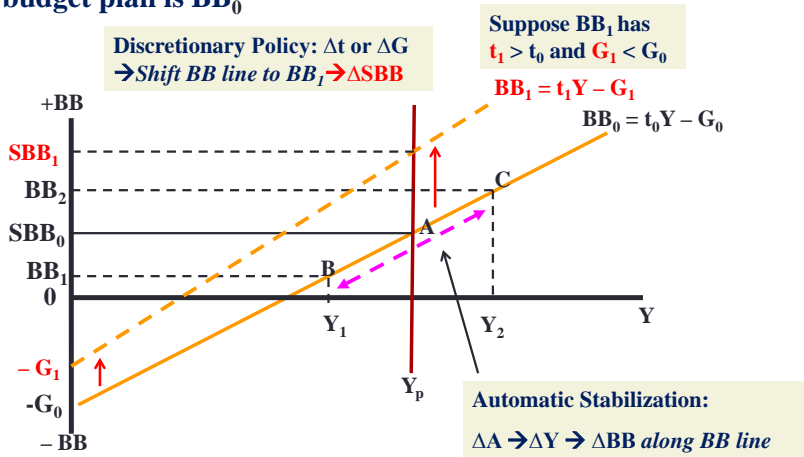- *Shift* AE & AD functions & Δslopes → AE →ΔY

Fiscal Policy & Govt Budget Balance

Automatic and Discretionary Fiscal Policy

- The budget plan sets t_0 and G_0 to give $BB = t_0Y - G_0$

- **Automatic fiscal stabilization:** the *net tax rate t* reduces *the size of the multiplier* and the *effects of transitory fluctuations* in autonomous expenditures on equilibrium GDP

- **Discretionary fiscal policy:** *changes in net tax rates Δt & government expenditure ΔG* introduced in a *new budget plan* to offset *persistent* autonomous expenditure shifts and stabilize equilibrium GDP at Y_P

Automatic and Discretionary Fiscal Policy

Initial budget plan is BB_0

Discretionary Policy: Δt or ΔG
→*Shift BB line to BB_1* →ΔSBB

Suppose BB_1 has $t_1 > t_0$ and $G_1 < G_0$

$BB_1 = t_1 Y - G_1$

$BB_0 = t_0 Y - G_0$

+BB

SBB_1

BB_2 C

SBB_0 .... A

BB_1 .... B

0

Y_1 Y_2 Y

$-G_1$

$-G_0$

Y_p

$-BB$

Automatic Stabilization:

ΔA →ΔY → ΔBB *along BB line*

The Public Debt and the Budget Balance

Public Debt (PD) ≡ govt bonds issued to finance BB < 0

- The outstanding PD = ∑ *(*past BB, + & -)

- Annual ΔPD = - BB

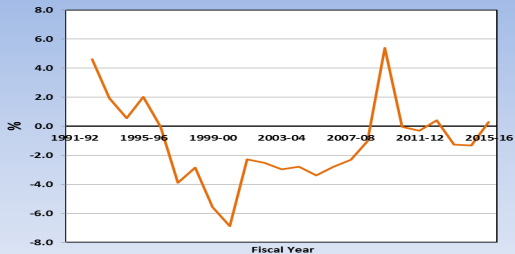- Public Debt Ratio ≡ PD/Y
    - Debt to GDP Ratio

Federal Govt Budget Balances & Changes in Public Debt Ratios Canada 1991-92 to 2015-16

Figure 7.9 Government of Canada Budget Balances 1991-92 to 2015-16
% GDP
Source: Department of Finance, Fiscal Reference Tables 2016

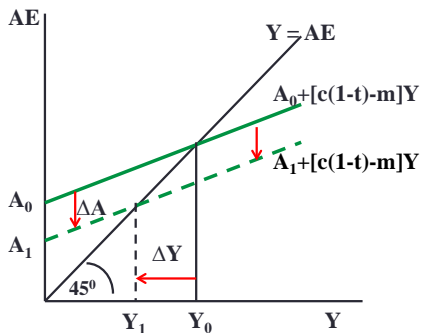Figure 7.10 Change in the Government public debt ratio 1991-92 to 2015-16
Source: Department of Finance, Fiscal Reference Tables 2016, Table 15, Statistics Canada CANSIM series 3800063 and author's calculations
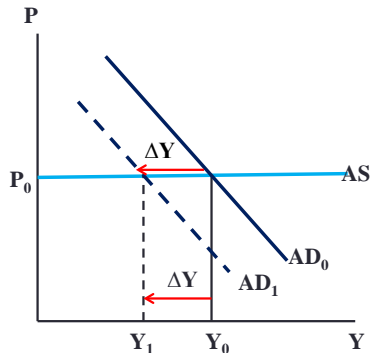
Aggregate Demand & Equilibrium Output

Equil $Y = AE$
$AE = A_0 + [c(1-t) - m]Y$
$Y = A_0 / (1 - c(1-t) + m)$

Equil Y & P: AD = AS

$\Delta A \rightarrow$ Shift AE $\rightarrow \Delta Y \rightarrow$ Shift AD = $\Delta Y \rightarrow \Delta Y_e$ @ P_0

The Multiplier in Canada

$$\text{Multiplier} = \frac{\Delta Y}{\Delta A} = \frac{1}{1 - \big[c(1-t) - m\big]}$$

Estimates for Canada:

$$c(1-t) = 0.54$$

$$m = 0.34$$

The Multiplier for Canada

$$\frac{\Delta Y}{\Delta A} = \frac{1}{1 - 0.54 + 0.34} = \frac{1}{1 - 0.2} = 1.25$$

Key Concepts

- **Government expenditure G** is a *policy variable* and part of **autonomous expenditure (A)** in AE & AD.

- **Net tax revenue, NT = tY,** is tax revenue net of transfer payments. The *net tax rate (t) is a policy variable*

- **Disposable income (YD)** is national income minus net taxes:
  $$YD = (Y - NT) \text{ and } \Delta YD \rightarrow \Delta C$$

- **Government expenditure** & **net taxes** affect equilibrium Y through both **A** and *the multiplier*

- The **Government Budget** sets out government expenditure plans and sources of funds to pay for expenditures

Key Concepts

- The **government budget balance BB** is the *difference between net revenues and government expenditures*.
- The *actual budget balance, BB* is determined by the *budget plan* and the level of *national income:* $(BB = t_0 Y - G_0)$
- The **structural budget balance (SBB)** is an estimate of the budget balance at *potential output*: $(SBB = tY_P - G)$
- **Automatic (fiscal) stabilizers** reduce the effects of *transitory fluctuations* in A on Y_e
- **Discretionary fiscal policy** changes the *net tax rate t and G* to offset *persistent shifts* in A that cause output gaps
- **Public debt (PD)** is the outstanding stock of government bonds issued to finance past deficits minus the net retirement of bonds in times of budget surpluses

Key Concepts

- The **public debt ratio** (**PD/Y**) is the *ratio of outstanding government debt to GDP*
- The **sovereign debt crisis** in several European countries provide examples of the importance of *controlling* public debt ratios
- The **government sector and fiscal policies** are important determinants of aggregate expenditure **(AE)** and aggregate demand **(AD)**

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