

1. Consumption Functions

We are given the following equations from the Keynesian Model, find the autonomous consumption level, marginal propensity to consume (MPC) and marginal propensity to save (MPS). Find the savings function with respect to disposable income, and then use the given information about net taxes to find the consumption and savings function with respect to real output. If the consumption function with respect to disposable income is not given, find that first!

Note: Remember when we have the consumption function in the form $C = a + b(Y - T)$ that autonomous consumption is a and the marginal propensity to consume is b .

To solve for the consumption and savings functions with respect to real output rather than disposable income we need to enter the value of net taxes.

The savings function with respect to disposable income is $S = -a + (1 - b)(Y - T)$

(a) $C = 125 + 0.75(Y - T)$

Net Taxes = 100

Autonomous Consumption Level	:	$a = 125$
MPC	:	$b = 0.75$
MPS	:	$MPS = 1 - MPC = 0.25$
Savings Function w/ respect to DI	:	$S = -a + MPS(Y - T) = -125 + 0.25(Y - T)$
Consumption Function w/ respect to Y	:	$C = 125 + 0.75(Y - 100) = 50 + 0.75Y$
Savings Function w/ respect to Y	:	$S = -125 + 0.25(Y - 100) = -150 + 0.25Y$

(b) $C = 0.80(300 - T + Y)$

Net Taxes = 50

$= 240 - 0.8(T - Y) = 240 + 0.8(Y - T)$

Autonomous Consumption Level	:	$a = 240$
MPC	:	$b = 0.8$
MPS	:	$MPS = 1 - MPC = 0.2$
Savings Function w/ respect to DI	:	$S = -a + MPS(Y - T) = -240 + 0.2(Y - T)$
Consumption Function w/ respect to Y	:	$C = 240 + 0.8(Y - 50) = 200 + 0.8Y$
Savings Function w/ respect to Y	:	$S = -240 + 0.2(Y - 50) = -250 + 0.2Y$

(c) $2T = 2Y - 3C + 300$

Net Taxes = 90

$\Rightarrow 3C = 300 + 2(Y - T) \Rightarrow C = 100 + 2/3(Y - T)$

Autonomous Consumption Level	:	$a = 100$
MPC	:	$b = 2/3$
MPS	:	$MPS = 1 - MPC = 1/3$
Savings Function w/ respect to DI	:	$S = -a + MPS(Y - T) = -100 + 1/3(Y - T)$
Consumption Function w/ respect to Y	:	$C = 100 + 2/3(Y - 90) = 40 + 2/3 Y$
Savings Function w/ respect to Y	:	$S = -100 + 1/3(Y - 90) = -130 + 1/3 Y$

(d) $600 = 35(T - Y) + 50C$

Net Taxes = 0.2Y

$\Rightarrow 50C = 600 + 35(Y - T) \Rightarrow C = 12 + 0.7(Y - T)$

Autonomous Consumption Level	:	$a = 12$
MPC	:	$b = 0.7$
MPS	:	$MPS = 1 - MPC = 0.3$
Savings Function w/ respect to DI	:	$S = -a + MPS(Y - T) = -12 + 0.3(Y - T)$
Consumption Function w/ respect to Y	:	$C = 12 + 0.7(Y - 0.2Y) = 12 + 0.56 Y$
Savings Function w/ respect to Y	:	$S = -12 + 0.3(Y - 0.2Y) = -12 + 0.24 Y$

2. Equilibrium

Solve for the short run equilibrium output using the Keynesian Model. Use the fact that Output = $Y = C + I + G + X - M$ in equilibrium.

(a) $C = \text{Consumption function} = 125 + 0.75(Y - T)$

$T = \text{Net Taxes} = 100$

$G = \text{Government Spending} = 100$

$I = \text{Investment Spending} = 120$

Closed economy

$Y = C + I + G + X - M$ in equilibrium

$Y = 125 + 0.75(Y - 100) + 120 + 100 = 345 + 0.75Y - 75$

$Y = 270 + 0.75Y$

$0.25Y = 270$

$Y = 1080$

(b) $C = \text{Consumption function} = 20 + 0.75(Y - T)$

$T = 0.2Y$

$G = \text{Government Spending} = 50$

$I = \text{Investment Spending} = 20$

$X = M + 10$

$Y = C + I + G + X - M$ in equilibrium

$Y = 20 + 0.75(Y - 0.2Y) + 20 + 50 + 10 = 100 + 0.75(0.8Y)$

$Y = 100 + 0.6Y$

$0.4Y = 100$

$Y = 250$

(c) $S = \text{Savings function w/ respect to output} = -100 + 0.2Y$

$T = \text{Net Taxes} = 50$

$G = \text{Government Spending} = 100$

$I = \text{Investment Spending} = 175$

$M - X = 125$

Solve for Y first, we know $S = -100 + 0.2Y = -90 + 0.2(Y - 50) = -90 + 0.2(Y - T)$

Using the relationship that $MPS = 1 - MPC$, we know $MPC = 0.8$ and autonomous consumption is 90.

$C = 90 + 0.8(Y - T)$

$Y = C + I + G + X - M$ in equilibrium

$Y = 90 + 0.8(Y - 50) + 175 + 100 - 125 = 240 + 0.8Y - 40$

$Y = 200 + 0.8Y$

$0.2Y = 200$

$Y = 1000$

3. Tables, Functions, & Equilibrium (Challenging Problems)

Given the information in the following tables, fill the blanks (assuming that the consumption function is linear with respect to disposable income). Find the consumption function with respect to disposable income, the consumption function with respect to output, the savings function with respect to disposable income, and the savings function with respect to output. Then find the equilibrium output level in the closed economy if $G + I = 100$.

a) Flat Taxes: Taxes are a constant number

Y	T	Y-T	C	S
0	40	-40	20	-60
100	40	60	95	-35
400	40	360	320	40
800	40	760	620	140
1000	40	960	770	190

To solve the table:

- ① From the first line we know $T = 40$ for all levels of Y
- ② From the first and second line, we know $MPC = \Delta C / \Delta(Y-T) = (95 - 20) / (60 - (-40)) = 75/100 = 0.75$
- ③ From the second line, knowing MPC, we have that $95 = a + 0.75(60) = a + 45$ which implies that $a = 50$.
- ④ We have the consumption function now, so use MPC and autonomous consumption to find the savings function with respect to disposable income.
- ⑤ Use this function to find the income level in the third line.
- ⑥ Use the consumption and savings functions to find the level of consumption and savings in the fourth and fifth lines.

$$\begin{aligned}
 \text{Consumption Function w/ respect to DI} & : C = 50 + 0.75(Y - T) \\
 \text{Consumption Function w/ respect to Y} & : C = 20 + 0.75Y \\
 \text{Savings Function w/ respect to DI} & : S = -50 + 0.25(Y - T) \\
 \text{Savings Function w/ respect to Y} & : S = -60 + 0.25Y \\
 \text{Output} & : Y = C + I + G = 20 + 0.75Y + 100 = 120 + 0.75Y \\
 & \Rightarrow 0.25Y = 120 \Rightarrow Y = 480
 \end{aligned}$$

b) Progressive Taxes: Taxes are a function of income (i.e. $T = c + dY$)

Y	T	Y-T	C	S
0	-20	20	110	-90
100	0	100	150	-50
200	20	180	190	-10
500	80	420	310	110
700	120	580	390	190

$$\begin{aligned}
 \text{Tax Function} & : T = -20 + 0.2Y \\
 \text{Consumption Function w/ respect to DI} & : C = 100 + 0.5(Y - T) \\
 \text{Consumption Function w/ respect to Y} & : C = 110 + 0.4Y \\
 \text{Savings Function w/ respect to DI} & : S = -100 + 0.5(Y - T) \\
 \text{Savings Function w/ respect to Y} & : S = -90 + 0.4Y \\
 \text{Output} & : Y = C + I + G = 110 + 0.4Y + 100 = 210 + 0.4Y \\
 & \Rightarrow 0.6Y = 210 \Rightarrow Y = 350
 \end{aligned}$$