Cooleconomics.com
Macroeconomics

Answers to Supplemental Study Questions: Long Run Models

1. A closed economy is characterized as follows:

$C = 100 + .9(Y-T) - 5r$
$I = 1000 - 10r$
$G = 300$
$T = .2Y$
$Y_{FE} = 2000$

a) Derive the equations for national savings and investment. Graph them.
b) Calculate equilibrium values for:
- consumption
- national income
- private savings
- government savings
- gross domestic product
- private disposable income
- budget deficit or surplus
- investment
- interest rate

Now government increases G to 390

c) Derive the equations for national savings and investment. Graph them on the same graph that you drew in (a) above. Do not draw another graph.

d) Calculate equilibrium values for:
- consumption
- national income
- private savings
- government savings
- gross domestic product
- private disposable income
- budget deficit or surplus
- investment
- interest rate

e) How have long term prospects for economic growth been affected by the change in G?

2. A small open economy is characterized as follows:

$C = 100 + .9(Y-T) - 5r$
$I = 1000 - 10r$
$G = 300$
$T = .2Y$
$Y_{FE} = 2000$
$r_W = 50$

a) Derive the equations for national savings and investment. Graph them.
b) Calculate equilibrium values for:
- consumption
- national income
- private savings
- government savings
- gross domestic product
- private disposable income
- budget deficit or surplus
- investment
- net exports
- capital account surplus or deficit
- current account surplus or deficit
- world interest rate

Now government increases G to 390

c) Derive the equations for national savings and investment. Graph them on the same graph that you drew in (a) above. Do not draw another graph.

d) Calculate equilibrium values for:
- consumption
- national income
- private savings
- government savings
- gross domestic product
- private disposable income
- budget deficit or surplus
- investment
- capital account surplus or deficit
- current account surplus or deficit
- world interest rate

e) How have long term prospects for economic growth been affected by the change in G?

3. A world economy in which only two countries exist and trade freely is characterized as follows:

Country 1
C = 100 + .9(Y-T) –5r
I = 1000 – 10r
G = 300
T = .2Y
Y_{FE} = 2000

Country 2
C = 100 + .9(Y-T) –5r
I = 1000 – 10r
G = 120
T = .2Y
Y_{FE} = 2000

a) Derive the equations for national savings and investment in both countries. Graph them.
b) Calculate equilibrium values (for each country):
- consumption
- national income
- private savings
- government savings
- gross domestic product
- private disposable income
- budget deficit or surplus
- investment
- net exports
- capital account surplus or deficit
- current account surplus or deficit
- world interest rate

Now government in country 1 increases G to 390

c) Derive the equations for national savings and investment. Graph them on the same graphs that you drew in (a) above. Do not draw other graphs.

d) Calculate equilibrium values (for each country):
- consumption
- national income
- private savings
- government savings
- gross domestic product
- private disposable income
- budget deficit or surplus
- investment
- capital account surplus or deficit
- current account surplus or deficit
- world interest rate

e) How have long term prospects for economic growth in each country been affected by the change in G?

1. A closed economy is characterized as follows:
C = 100 + .9(Y-T) –5r
I = 1000 – 10r
G = 300
T = .2Y
Y_{FE} = 2000
a) Derive the equations for national savings and investment. Graph them.
b) Calculate equilibrium values for:

consumption	national income
private savings	government savings
gross domestic product	private disposable income
budget deficit or surplus	investment
interest rate	

Now government increases G to 390
c) Derive the equations for national savings and investment. Graph them on the same graph that you drew in (a) above. Do not draw another graph.
d) Calculate equilibrium values for:

consumption	national income
private savings	government savings
gross domestic product	private disposable income
budget deficit or surplus	investment
interest rate	

e) How have long term prospects for economic growth been affected by the change in G?

a) S = Y – C – G = 2000 – [100+.9(2000-400)-5r] – 300 = 160 + 5r
I = 1000 – 10r

b) S=I → 160 + 5r = 1000 – 10r → 15r = 840 → r = 56
Consumption = 100 + .9(2000-400) – 5(56) = 1260
National income = 2000
Private savings = Y – T – C = 2000 – 400 – 1260 = 340
Government savings = T – G = .2(2000) – 300 = 100
Gross domestic product = 2000
Private disposable income = Y – T = 2000 - .2(2000) = 1600
T exceeds G by 100 → budget surplus of 100
Investment = 1000 – 10(56) = 440 (note: S=I!)
Interest rate = 56

c) S = Y – C – G = 2000 – [100+.9(2000-400)-5r] – 390 = 70 + 5r
I = 1000 – 10r

d) S=I → 70 + 5r = 1000 – 10r → 15r = 930 → r = 62
Consumption = 100 + .9(2000-400) – 5(62) = 1230
National income = 2000
Private savings = Y – T – C = 2000 – 400 – 1230 = 370
Government savings = T – G = .2(2000) – 390 = 10
Gross domestic product = 2000
Private disposable income = Y – T = 2000 - .2(2000) = 1600
T exceeds G by 10 → budget surplus of 100
Investment = 1000 – 10(62) = 380 (note: S=I!)
Interest rate = 62

e) Prospects are diminished because investment is reduced, meaning that the long term capital stock cannot be sustained at as high of a level. This will reduce the long term level of consumption per household that can be achieved.

2. A small open economy is characterized as follows:
C = 100 + .9(Y-T) –5r I = 1000 – 10r
G = 300 T = .2Y
Y_{FE} = 2000 r_W = 50
a) Derive the equations for national savings and investment. Graph them.
b) Calculate equilibrium values for:

consumption	national income
private savings	government savings
gross domestic product	private disposable income
budget deficit or surplus	investment
net exports	capital account surplus or deficit
current account surplus or deficit	world interest rate

Now government increases G to 390

c) Derive the equations for national savings and investment. Graph them on the same graph that you drew in (a) above. Do not draw another graph.
d) Calculate equilibrium values for:

consumption	national income
private savings	government savings
gross domestic product	private disposable income
budget deficit or surplus	investment
capital account surplus or deficit	current account surplus or deficit
world interest rate	net exports

e) How have long term prospects for economic growth been affected by the change in G?

a) S = Y – C – G = 2000 – [100+.9(2000-400)-5r] – 300 = 160 + 5r I = 1000 – 10r

b) Consumption = 100 + .9(2000-400) – 5(50) = 1290
National income = 2000
Private savings = Y – T – C = 2000 – 400 – 1290 = 310
Government savings = T – G = .2(2000) – 300 = 100
Gross domestic product = 2000
Private disposable income = Y – T = 2000 - .2(2000) = 1600
T exceeds G by 100 → budget surplus of 100
Investment = 1000 – 10(50) = 500
Net exports = Y – C – I – G = 2000-1290-500-300 = -90 → trade deficit of 90
Capital account balance = I – S = 500- (310+100) = 90 → capital account surplus of 90
Current account balance = -1 x capital account balance = -90 → current account deficit
World interest rate = 50

c) S = Y – C – G = 2000 – [100+.9(2000-400)-5r] – 390 = 70 + 5r I = 1000 – 10r

d) Consumption = 100 + .9(2000-400) – 5(50) = 1290
National income = 2000
Private savings = Y – T – C = 2000 – 400 – 1290 = 310
Government savings = T – G = .2(2000) – 390 = 10
Gross domestic product = 2000
Private disposable income = Y – T = 2000 - .2(2000) = 1600
T exceeds G by 10 → budget surplus of 10
Investment = 1000 – 10(50) = 500
Net exports = Y – C – I – G = 2000-1290-500-390 = -180 → trade deficit of 180
Capital account balance = I – S = 500- (310+10) = 180 → capital account surplus of 180
Current account balance = -1 x capital account balance = -180 → current account deficit
World interest rate = 50

e) Prospects are not diminished because investment is not changed, meaning that the long term capital stock can be sustained at its prior level. (However, the country's external debt has increased, making it more difficult to afford the interest payments on that debt. This is a drain on the country's citizens.)

3. A world economy in which only two countries exist and trade freely is characterized as follows:

Country 1

$C = 100 + .9(Y-T) - 5rI = 1000 - 10r$ $G = 300$ $T = .2Y$ $Y_{FE} = 2000$

Country 2

$C = 100 + .9(Y-T) - 5rI = 1000 - 10r$ $G = 120$ $T = .2Y$ $Y_{FE} = 2000$

a) Derive the equations for national savings and investment in both countries. Graph them.

b) Calculate equilibrium values (for each country):

consumption	national income	private savings
government savings	gross domestic product	private disposable income
budget deficit or surplus	investment	net exports
capital account surplus or deficit	current account surplus or deficit	world interest rate

Now government in country 1 increases G to 390

c) Derive the equations for national savings and investment. Graph them on the same graphs that you drew in (a) above. Do not draw other graphs.

d) Calculate equilibrium values (for each country):

consumption	national income	private savings
government savings	gross domestic product	private disposable income
budget deficit or surplus	investment	capital account surplus or deficit
current account surplus or deficit	net exports	world interest rate

e) How have long term prospects for economic growth in each country been affected by the change in G?

a) country 1: $S = Y - C - G = 2000 - [100+.9(2000-400)-5r] - 300 = 160 + 5r$ $I = 1000 - 10r$
country 2: $S = Y - C - G = 2000 - [100+.9(2000-400)-5r] - 120 = 340 + 5r$ $I = 1000 - 10r$

b) world savings = world investment → $500 + 10r = 2000 - 20r$ → $r = 50$

country 1:

Consumption = $100 + .9(2000-400) - 5(50) = 1290$
National income = 2000
Private savings = $Y - T - C = 2000 - 400 - 1290 = 310$
Government savings = $T - G = .2(2000) - 300 = 100$
Gross domestic product = 2000
Private disposable income = $Y - T = 2000 - .2(2000) = 1600$
T exceeds G by 100 → budget surplus of 100
Investment = $1000 - 10(50) = 500$
Net exports = $Y - C - I - G = 2000-1290-500-300 = -90$ → trade deficit of 90
Capital account balance = $I - S = 500- (310+100) = 90$ → capital account surplus of 90
Current account balance = -1 x capital account balance = -90 → current account deficit
World interest rate = 50

Country 2:

Consumption = $100 + .9(2000-400) - 5(50) = 1290$
National income = 2000
Private savings = $Y - T - C = 2000 - 400 - 1290 = 310$
Government savings = $T - G = .2(2000) - 120 = 280$
Gross domestic product = 2000
Private disposable income = $Y - T = 2000 - .2(2000) = 1600$
T exceeds G by 280 → budget surplus of 280
Investment = $1000 - 10(50) = 500$
Net exports = $Y - C - I - G = 2000-1290-500-120 = 90$ → trade surplus of 90
Capital account balance = $I - S = 500- (310+280) = -90$ → capital account deficit of 90
Current account balance = -1 x capital account balance = 90 → current account surplus
World interest rate = 50

c) country 1: $S = Y - C - G = 2000 - [100+.9(2000-400)-5r] - 390 = 70 + 5r$ $I = 1000 - 10r$
country 2: $S = Y - C - G = 2000 - [100+.9(2000-400)-5r] - 120 = 340 + 5r$ $I = 1000 - 10r$

d) world savings = world investment → $410 + 10r = 2000 - 20r$ → $r = 53$

country 1:
Consumption = 100 + .9(2000-400) – 5(53) = 1275
National income = 2000
Private savings = Y – T – C = 2000 – 400 – 1275 = 325
Government savings = T – G = .2(2000) – 390 = 10
Gross domestic product = 2000
Private disposable income = Y – T = 2000 - .2(2000) = 1600
T exceeds G by 10 → budget surplus of 10
Investment = 1000 – 10(53) = 470
Net exports = Y – C – I – G = 2000-1275-470-390 = -135 → trade deficit of 135
Capital account balance = I – S = 470- (325+10) = 135 → capital account surplus of 135
Current account balance = -1 x capital account balance = -135 → current account deficit
World interest rate = 53

Country 2:
Consumption = 100 + .9(2000-400) – 5(53) = 1275
National income = 2000
Private savings = Y – T – C = 2000 – 400 – 1275 = 325
Government savings = T – G = .2(2000) – 120 = 280
Gross domestic product = 2000
Private disposable income = Y – T = 2000 - .2(2000) = 1600
T exceeds G by 280 → budget surplus of 280
Investment = 1000 – 10(53) = 470
Net exports = Y – C – I – G = 2000-1275-470-120 = 135 → trade surplus of 135
Capital account balance = I – S = 470- (325+280) = -135 → capital account deficit of 135
Current account balance = -1 x capital account balance = 135 → current account surplus
World interest rate = 53

e) Investment falls in both countries, reducing long term prospects in both countries, since neither can sustain as high of a capital stock, resulting in lower consumption per person in the long term.