

Simulating Hypothetica:

1) Calculate:

a) The equilibrium level of income

Step 1: Find APE

$$C = 100 + .75*(Y - \$0.25*Y)$$

$$I = 125$$

$$G = 175$$

$$EX = 95$$

$$IM = -65 - .10*Y$$

$$APE = 430 + .4625*Y$$

Step 2: Current Production = Y

Step 3: At $Y_e \Rightarrow$ APE = Production

$$430 + .4625*Y_e = Y_e$$

$$\text{so } Y_e = 430 / (1 - .4625) = 800$$

b) The multiplier = $1 / (1 - g) = 1 / (1 - .4625) = 1.860$.

c) $G = 175$ $T = \$0 + .25*(800) = 200$ Surplus of 25

d) $EX = 95$ $IM = 65 + .1*(800) = 145$ Deficit of 50

2) Current $Y_e = 800$ Goal $Y_e = 900$ $\Delta Y_e = +100$ Multiplier = 1.860

$$1.860 * \Delta G = 100 \quad \Delta G = +53.75$$

At $Y_e = 900$ $G = (175 + 53.75)$ $T = 0 + .25*(900) = 225$ Deficit of 3.75

Simulation #1: Comparing Tax and Transfer Solutions to using G.

If the Minister of Finance uses G to drive the economy a deliberate budget deficit is created as illustrated in Sim 1.1. The increase in G outweighs the tax collections induced by higher levels of income. Sim 1.2 indicates, not surprisingly, that consumption and savings rise as well. (What will have happened to net exports?)

<u>Sim 1.1</u>			<u>Sim 1.2</u>		
Equilibrium Values			Equilibrium Values		
	Current	Base		Current	Base
Purchases	228.75	175.00	Y_Disposable	675.00	600.00
Net Taxes	225.00	200.00	Consumption	606.25	550.00
Budget	Deficit of -3.75	Surplus of 25	Savings	68.75	50.00

Suppose that the Government wants to drive the economy to the target of \$900 by giving the public a transfer payment (Ta). How does this solution differ from the use of G?

The required transfer increase is 71.67 which is greater than the required G increase of 53.75. So use of transfers results in a bigger deficit Compare Sim 1.3 to Sim 1.1. Can you explain why?

Sim 1.3

Sim 1.4

Equilibrium Values		
	Current	Base
Purchases	175.00	175.00
Net Taxes	153.33	200.00
Budget	Deficit of -21.6666	Surplus of 25

	Cons.	Savings
Intercept	\$ 153.75	\$ (82.08)
Slope	0.5625	0.1875

On the other hand the transfers act through the households which shifts up the consumption and savings lines through the initial boost in disposable as illustrated in Sim 1.4. This means that the driving engine of spending is consumption so Transfers lead to higher levels of consumption spending than the G solution (compare Sim 1.2 to Sim 1.5).

Sim 1.5

Equilibrium Values		
	Current	Base
Y_Disposable	746.67	600.00
Consumption	660.00	550.00
Savings	86.67	50.00

Suppose that the Government wants to drive the economy to the target of \$900 by giving the tax rate adjustments (t)?

The required tax rate cut has impacts similar to the transfer payment results as shown in Sim 1.7 and Sim 1.8.

Sim 1.7

Equilibrium Values		
	Current	Base
Purchases	175.00	175.00
Net Taxes	153.33	200.00
Budget	Deficit of -21.6666	Surplus of 25

Sim 1.8

Equilibrium Values		
	Current	Base
Y_Disposable	746.67	600.00
Consumption	660.00	550.00
Savings	86.67	50.00

Comparing Sim 1.4 and Sim 1.9 models shows us that the major distinction of the tax rate solution is that a decrease in rates increase the fraction of income represent on Hypothetica’s goods and therefore increases Hypothetica’s multipliers because it increases the rate at which consumers spend:

Sim 1.9

	Cons.	Savings
Intercept	\$ 100.00	\$ (100.00)
Slope	0.6222218	0.2074073

Simulation #2: Using Monetary Policy.

What interest rate is necessary to drive the economy to \$900?

Goal Seek projects an interest rate cut from 6% to 2.4%. Notice that this shifts up the planned spending line because it operates through (autonomous) investment.

What type of open market operation is necessary to move the interest rate in the desired direction?

The Bank of Hypothetica, the central bank, will begin to buy government securities on the open market running what’s called “easy money”. This puts more reserves in the banking system and touches off a deposit multiplier as the private banks begin to expand their loans. To make the loans attractive they will put downward pressure on rates.

How does the monetary policy solution impact on the government budgetary position?

Sim 2.1 shows that the government's surplus increases. This occurs because of the increased tax collections. In a more complex model, to be discussed, there are other reasons for the surplus to increase because the government will find that its cost of servicing the debt falls when the debt rolls over at lower interest rates. Thus stimulating the economy by lower interest rates appears to be very useful to the government's budget position. This is all true but we need to look into the possibility that the stimulus will generate inflation (see the next couple of chapters).

Sim 2.1

Equilibrium Values		
	Current	Base
Purchases	175.00	175.00
Net Taxes	225.00	200.00
Budget	Surplus of 50	Surplus of 25

Simulation #3: A decline in private sector spending

What does this do to the level of income and the multiplier in the economy?

Exports fall by 20 and the pessimism reduces investment by 25 so autonomous spending falls by 45.. Nothing has happened to the multiplier because neither change impacts on n the fraction of income respent in Hypothetica. This shows up as a parallel shift down in the spending line. As a result income falls by $1.86 * (-45) = (-83.72)$ meaning the new $Y_e = 716.72$

What does this do to the level of net exports in the economy?

Sim 3.1 shows that the reduction in exports outweighs any reduction in imports (remember that Hypothetica's imports are going to fall as its GDP falls).

Sim 3.1			Sim 3.2		
Equilibrium Values			Equilibrium Values		
	Current	Base		Current	Base
Exports	75.00	95.00	Purchases	175.00	175.00
Imports	136.63	145.00	Net Taxes	179.07	200.00
Net Exports	Deficit of 61.627	Deficit of 50	Budget	Surplus of 4.0697	Surplus of 25

What does this do to the government's budgetary position?

Sim 3.2 shows that the government's budget moves towards a deficit (the surplus is reduced) as net tax collections fall when income falls. This reaction of the budget to changes in private sector behaviour is called automatic (or built-in) stability. The fact that the government's budget slides towards deficit by collecting less taxes (and shipping out more transfers) as the level of GDP falls cushions the economy (reduces the multiplier) by leaving more purchasing power with the households.

Suppose the government tries to drive the GDP back to its original level of 800 using a tax rate change. What does this do to the multiplier in the economy?

The tax rate will fall to .175 meaning that the fraction of increased income available to be spent on goods and services increases thus the slope "g" has increased meaning the multipliers increase. If you look at the spending line Chart you will see a steeper APE.

What does this do to the level of net exports in the economy?

Interestingly this also increases the trade deficit as illustrated by comparing Sim 3.1 and Sim 3.3. Do you see why?

Sim 3.3			Sim 3.4		
Equilibrium Values			Equilibrium Values		
	Current	Base		Current	Base
Exports	75.00	95.00	Purchases	175.00	175.00
Imports	145.00	145.00	Net Taxes	140.00	200.00
Net Exports	Deficit of 69.999	Deficit of 50	Budget	Deficit of -34.999	Surplus of 25

What does this do to the government's budgetary position?

Sim 3.4 shows that the reduction in tax rates to stimulate the economy results in a budget deficit as tax collections from the rising GDP are not enough to compensate for the lower rates of taxation.

What interest rate is necessary to drive the economy to \$800?

Goal seek returns a rate of about 2%

What type of open market operation is necessary to move the interest rate in the desired direction?

The Bank of Hypothetica, the central bank, will begin to buy government securities on the open market running what's called "easy money". This puts more reserves in the banking system and touches off a deposit multiplier as the private banks begin to expand their loans. To make the loans attractive they will put downward pressure on rates.

How does the monetary policy solution impact on the government budgetary position?

Since the Minister of Finance has not altered the spending or taxing plans the budget position will return to a surplus of 25 when Hypothetica returns to an income level of 800. Sim 3.5 demonstrates the result.

Sim 3.5

Equilibrium Values		
	Current	Base
Purchases	175.00	175.00
Net Taxes	200.00	200.00
Budget	Surplus of 25	Surplus of 25

What does this do to the multiplier in the economy?

Since the interest rate reduction stimulates autonomous investment it has no impact on the value of the multiplier.

Simulation #4: An increase in private sector spending

Suppose that consumers get excited to spend more so that autonomous consumption rises to 150. What does this do to the level of income and the multiplier in the economy? This increase in autonomous spending raises Y_e to 893 but does not impact on the multiplier value since there is no change in the fraction of additional income respent in Hypothetica. Again the Chart shows a parallel shift in the APE. What would the Charts for Consumption and Investment look like?

What does this do to the level of net exports in the economy?

Sim 4.1 shows Net exports decrease, a larger deficit, since the rise in Hypothetican incomes leads to more imports. How would this show up on the Net Export Chart?

Sim 4.1			Sim 4.2		
Equilibrium Values			Equilibrium Values		
	Current	Base		Current	Base
Exports	95.00	95.00	Purchases	175.00	175.00
Imports	154.30	145.00	Net Taxes	223.26	200.00
Net Exports	Deficit of 59.30	Deficit of 50	Budget	Surplus of 48.255	Surplus of 25

What does this do to the government's budgetary position?

Suppose the government tries to drive the GDP back to its original level of 800 using a autonomous transfer payments:

A bit tricky since we started from zero Goal Seek says we need to decrease autonomous taxes by 66.67 or increase autonomous taxes. Since we had $T_a = 0$ we need to increase autonomous taxes (ie/ take a total of 66.67 from the public regardless of current Y):

Sim 4.3

Government Sector		Current	Base	
Purchases	Ga	175	175.00	
Taxes	Ta	-60	0.00	Means increased transfers
	t	0.25	0.25	of Y or reduced auto. taxes

What does this do to the multiplier in the economy?

Nothing since the tax increase is autonomous the spending line shifts parallel

What does this do to the level of net exports in the economy?

Since taxes are increased to reduce income and spending by consumers the Net Exports increase back to their original (deficit) level as illustrated in Sim 4.4.

Sim 4.4

Equilibrium Values		
	Current	Base
Exports	95.00	95.00
Imports	145.00	145.00
Net Exports	Deficit of 50	Deficit of 50

Sim 4.5

Equilibrium Values		
	Current	Base
Purchases	175.00	175.00
Net Taxes	266.67	200.00
Budget	Surplus of 91.666	Surplus of 25

What does this do to the government's budgetary position?

The increased tax collections result in an increased government surplus, Sim 4.5, even though there is a reduced level of GDP.

What interest rate is necessary to drive the economy to \$800?

Goal seek estimates .093 (an increase from .06)

What type of open market operation is necessary to move the interest rate in the desired direction?

The Bank of Hypothetica, the central bank, will begin to sell government securities on the open market running what's called "tight money". When the central bank cashes the cheques it receives for the bonds it removes reserves from the private banks and touches off a deposit multiplier as the private banks begin to restrict their loans. The restriction of supply puts upward pressure on rates.

How does the monetary policy solution impact on the government budgetary position?

Since the rising interest rates drag down the level of GDP but the Minister of Finance has done nothing the government surplus in Sim 4.2 is brought back down to its original level as illustrated in Sim 4.6.

Sim 4.6

Equilibrium Values		
	Current	Base
Purchases	175.00	175.00
Net Taxes	200.00	200.00
Budget	Surplus of 25	Surplus of 25

What does this do to the multiplier in the economy?

Nothing because interest rates operate on the autonomous components of APE in this model.