Assignment 7

# An ISMP Model

Consider the following economy

$$C=220+0.4Y\_{D}$$

$$I=160+.1Y-1800\left(i-π\_{e}+x\right)$$

$$T=80$$

$$G=50$$

$$i=0.08$$

$$π\_{e}=0.03$$

$$x=0.02$$

## Basic Equilibrium

1. Identify the meaning of each variable.

*C is consumption, and is composed of autonomous consumption (220), and the marginal propensity to consume (0.4) and YD is disposable income (Y – T). T is taxes (80). I is investment, and is composed of autonomous investment 160, the marginal propensity to invest (0.1) and the interest sensitive portion of investment (*$1800\left(i-π\_{e}+x\right)$*). G is government spending. i is the risk free interest rate set by the Federal Reserve,* $π\_{e}$ *is the expected inflation rate, and* $x$ *is the risk premium.*

1. Derive the IS curve.

*Deriving the IS curve involves deriving the conditions for equilibrium output while leaving the market rate of interest unspecified.*

*Lets define:*

$$r=i-π\_{e}+x$$

*Where r is the real interest rate facing borrowers (the market rate of interest).*

*We begin as usual with the core condition for equilibrium:*

$Y=Z$

 *Then we plug in the behavioral equations:*

$$Y=220+0.4\left(Y-80\right)+160+0.1Y-1800r+50$$

$$Y= \frac{1}{1-0.4-0.1}\left[398-1800r\right]$$

 *This is what we will call the IS curve. It shows us how equilibrium Y changes with r.*

1. Derive the MP curve

*The MP curve is simply the equation for the market rate of interest:*

$$r=i-π\_{e}+x$$

1. Solve for equilibrium

$$Y=2\*\left[398-1800\*0.07\right]=544$$

## Comparative statics

Suppose there is a collapse in autonomous consumption, such that it falls from $220$ to $100$.

1. Sketch an IS-MP model (don’t worry about labeling intercepts or getting the slope right - just do a rough sketch) and show this change.

r

MP

7%

IS

IS’

Y2

Y1

Y

1. Calculate the new equilibrium level and the output gap, assuming that the equilibrium in 4 was potential output.

*New equilibrium:*

$$Y=2\*\left[278-1800\*0.07\right]=304$$

*Output gap:*

$$544-304=240$$

1. How should the Federal Reserve respond to close the output gap? (calculate)

*The goal here is to increase GDP (Y) by 240 using interest rate policy. Every change in interest rates translates into a change of Y of:* $2\*(-1800)$ *.*

*So:*

$$∆Y=240$$

$$240=2\*\left(-1800\right)\*∆r$$

$$∆r=-0.066$$

*So the Fed needs to lower its main policy rate by 6.66% (from 7% to 0.44%).*

1. Sketch the Federal Reserve’s response in a graph.

MP

7%

0.44%

MP’

IS

IS’

Y2

Y1

Y