Problems for Week 10

Data for this exercise are available on the course website under the Weekly Assignments link. Data for this exercise are available on the course website under the link for Chapter 12.

Problem 12.1. The multiplier formula (12.17) was derived on the assumption that the consumption function passed through the origin – i.e., it took the form given in (12.3) with the intercept \( c_0 \) set to zero. Assume that \( c_0 \neq 0 \) and, following the same steps as the text, derive the three equations analogous to (12.15), (12.16), and (12.17). Note the similarities and differences between these equations and your derivations. What do they tell you about the relationship of the multiplier, the consumption function, and the marginal propensity to consume?

Problem 12.6. Consider an economy with no foreign trade and no transfer payments whose consumption function is given as

\[ C = 100 + 0.9(Y - T). \]

(a) Initially let \( G = 800, \ T = 800, \) and \( I = 300. \) What is the level of \( Y? \) Assuming that taxes follow the simple function, \( T = tY, \) what is \( t? \)
(b) Holding \( t \) constant, what is the effect on \( Y \) of increasing \( G \) by 100 to 900?
(c) What is the effect \( \textit{ceteris paribus} \) on \( Y \) of decreasing \( T \) by 100? At what value must the government set \( t \) to achieve this tax cut?
(d) Explain why the effects in (b) and (c) are different.
(e) Suppose that the government wanted to maintain a balanced budget and increased both \( G \) and \( T \) by 100. What would be the effect on \( Y? \) What \( t \) would it need to choose to keep the budget balanced?

Problem 12.8. Consider an economy in which aggregate demand is described by the following equations:

\[
\begin{align*}
C &= 100 + 0.9(Y + TR - T) \\
I &= 300 - 20rr \\
G &= 400 \\
TR &= 200 \\
T &= tY \\
NEX &= 100
\end{align*}
\]

(Note that the real rate of interest \( rr \) is measured in percentage points, not as a natural fraction.)

(a) Initially if \( rr = 6\% \) and \( t = 0.14285 \) (i.e., 14.285%), what is \( Y? \) If you have calculated this correctly, the budget will be balanced.
(b) Starting from the situation in (a), what would be the effect on $Y$ of an increase of 100 in transfer payments? How would the government budget deficit be affected?
(c) Starting from the situation in (a), what would be the effect on $Y$ of an decrease of 100 in $G$ while keeping the government budget balanced? What tax rate ($t$) would the government have to set to achieve this?

**Problem 12.9.** For the same economy as described in Problem 12.8:

(a) Write down the equation for the IS curve. Sketch the curve.
(b) Starting from the situation in Problem 12.8(a) show that the IS curve implies that $Y$ is what you calculated in Problem 12.8(a).
(c) What would be the effect on $Y$ and the budget deficit of an action by the monetary authorities that cut $rr$ by one percentage point?
(d) Again, starting from the situation in Problem 12.8(a), what would be the effect of a cut in the tax rate to $t = 0.12$. Calculate the value of $Y$, the budget deficit, and sketch the shift in the IS curve.

**Problem 12.10.** Any outflow from the domestic private sector that rises in the boom and falls in the slump might act as an automatic stabilizer. As well as taxes, candidates include transfer payments, imports, and inventory investment.

(a) To get an idea of which of these act as automatic stabilizers, express each as a percentage of potential GDP (i.e., form scaled variables $\tilde{T}, \tilde{TR}, \tilde{M}, \tilde{InvI}$). This removes the trends and, since potential output is acyclical, does not itself contribute to the cyclicality. Plot each series against the NBER cycle dates to determine its cyclicality. Do the series show the right cyclicality to be automatic stabilizers?
(b) Assess the effectiveness of the automatic stabilizers in light of your investigation.

**Problem 12.12.** How to the following affect the IS curve?

(a) A decrease in exports;
(b) A decrease in imports;
(c) An increase in the marginal propensity to import (i.e., the rate at which imports increase with an increase in GDP);
(d) An increase in investment risk;
(e) An increase in the savings rate;
(f) A decrease in the expected returns to investment;
(g) An increase in payments of interest on the government debt.