Economics 385 Project 2:  
The distribution of income in a classical macroeconomic model

The classical economists believed that the level of employment was determined in the labor market. The level of employment then determined the level of output and this, in turn, determined national income. The government cannot affect the level of employment unless it can change supply or demand in the labor market.

Suppose that the government increased government spending and bought more output. Would this increase the demand for labor to produce this increased demand for output?

Consider another question: how would the government fund its increased spending? There are two sources of income for government: taxes and loans.

Suppose the government raises taxes to pay for its spending increase. In the Classical view, taxed households will buy less goods by an amount that will offset the increase in government spending exactly. So aggregate output will remain at the same level.

The other source of funds for the government is borrowing from household savings. Realistically, government has a number of means by which it may borrow. But for the Classical model as well as future models, the details of this process are simplified by the assumption that the bond market is the only method through which industry and government borrow. A single variable \( r \) represents the interest rate of the bond market and is the cost of borrowing money. If the government borrowed money from the bond market to finance an increase in spending, interest rates would rise.

What effects would a higher interest rate have on households and businesses? Households would have a greater incentive to save since they would earn a greater profit on the interest. An assumption we make in this class is that businesses do not have any retained earnings. So if businesses want to purchase new plants and equipment they must borrow the funds from the household sector. If interest rates increase, firms will find borrowing less attractive and they will be less likely to do so. So a higher interest rate would cause households to save more (spend less) and businesses to purchase less output (invest less). These decreases in demand for output from two sectors of the economy again offsets the government spending increase exactly.

A simple Classical economic model:

The classical household savings function is given by equation 1:

\[
S(r) = S_0 + S_r * r,
\]

where \( S_r > 0 \) and \( S_0 \) is autonomous savings.
The classical investment (business spending) function is given by equation 2:

\[ I(r) = I_r \times r, \]

where \( I_r < 0 \) and \( I_o \) is autonomous investment spending.

As we mentioned above, both business (equation 2) and government borrow from the household sector, (equation 1).

The amount the government borrows is determined by how much it spends, \( G \), and how much it taxes, \( T \). If \( G > T \), the government has a deficit \( (G - T) \) for which it must borrow.

So total borrowing is given by:

\[ I(r) + (G - T). \]

Interest rates will be determined by an equilibrium in the bond market where

\[ \text{savings (bonds bought) = borrowing (bonds sold)} \]

or

\[ S(r) = I(r) + (G - T) \]

or

\[ S_r \times r + S_0 = I_r \times r + I_o + (G - T). \]

**Assignment:**

Use a Computer algebra system to explore the two scenarios of government funding -- increasing taxes and borrowing – within the classical model.

Initial parameter values:

\{ \( S_0 = 0, \ S_r = 5, \ I_o = 100, \ I_r = -5, \ G = 100, \ T = 100 \} .

Raise taxes:

\{ \( G = 100, \ T = 110 \} .

Increase government spending through borrowing:

\{ \( G = 110, \ T = 100 \} .

Present a paper with a graph of the model for each scenario -- the initial situation, raised taxes, and government borrowing.

After each graph, offer a short description and comment on what has happened.

Use the solve command to find out where output is in each case and what effect these two scenarios have on the interest rate, \( r \). And what effect the change in \( r \) has on savings, \( S(r) \), and business investment, \( I(r) \).

Write a concise conclusion discussing the general implications of the model.

Questions to consider: What effect does an increase in government spending
have on our model? What effect would a decrease in government spending have on our model? Are either effective in accomplishing anything? What would the Classical economist recommend to a government leader given an economic recession?