Macroeconomics, Module 13: Price Levels and Seasonal Variations

Homework Assignment: Seasonal Variation in Money

(The attached PDF file has better formatting.)

Suppose the real quantity of money demanded is cyclical.

- It is constant from January 1 through September 30.
- It rises at 2% per annum from Oct 1 through Dec 31.
- On January 1, it drops back to its level of a year earlier.

Assume that real interest rates are not seasonal.

The 2% figure is illustrative. You may use continuously compounded rates, annual effective rates, or quarterly compounded rates, whichever is easiest for you. The actual seasonal pattern is more complex, but the concepts are the same.

A. Before the Federal Reserve Board was created, the nominal quantity of money, M, was not seasonal. What was the seasonal pattern for the price level, P, the inflation rate, π, and the nominal interest rate, r?
B. One of the objectives of the FED is to eliminate these seasonal patterns. What seasonal behavior for the nominal quantity of money, M, would eliminate the seasonal variations in P, π, and r?
C. Explain whether people would want to hold cash or owe cash on December 31. Suppose David owes Jonathan $10,000 on December 31. Who gains and who loses from the price level change on January 1?

Use the following reasoning to answer this homework assignment. Assume

- The year to year inflation rate is zero. We compute the inflation rate in the fourth quarter.
- The nominal quantity of money does not change during the year for Part A.
- The real interest rate is 3% *per annum*, with the same compounding frequency.
- The price level on January 2 is 100.
- The real demand for money on January 2 is $100 million.

The money demanded equals the money supplied, so the real money supplied is $100 million on January 2. The price level is 100, so the nominal money supplied is $100 million.

The real demand for money is constant from January through September. The nominal money supply is constant, so the price level is 100 from January 2 through September 30.

From October 1 through December 31, the real demand for money increases 2% per annum. The real quantity of money supplied must also increase 2% per annum. The real quantity of money supplied = the nominal quantity of money supplied divided by the price level. What must be the change in the price level in the fourth quarter of the year? This is the first half of

the cyclical pattern of *P*.

The inflation rate is the annual percentage change in the price level. Given the change in the price level during the fourth quarter, what is the inflation rate in the fourth quarter?

The nominal interest rate is the real interest rate plus the expected inflation rate (if we use continuously compounded rates). For annual effective yields, the relation is multiplicative. Show the nominal interest rate during the fourth quarter.

For Part B, explain whether the FED must raise or lower the money supply in the fourth quarter. To offset the seasonality in the price level, the money supply must have the same cyclical pattern as the real demand for money.

This pattern is intuitive. If people want Z% more cash for holiday shopping, the FED creates Z% more money. The change in the money supply offsets the change in the demand for money, and the price level does not change. People don't realize that the money supply changes.

For Part C: The scenario in this homework assignment shows the problems from the growing demand for money in the fourth quarter. In this example, the demand for money drops on January 1. This causes a sudden change in the price level (if the FED does not offset the drop by changing the money supply). This distorts economic relations between creditors and borrowers.