Inventory-Based Pricing

Introduction

The Inventory-Based Pricing Model shows that a simple modification to the Cobweb Model can eliminate the instability and cycles that can appear for the latter model. The specific mechanism that dampens down these oscillations is an inventory held by the producers. Given that supply in a given period reacts with a one period lag to market prices because it takes one period to complete the production process, it is natural for the producers to hold an inventory to meet unexpected demand.

The Model

To emphasize the differences between the models, the Inventory-Based Pricing Model adopts the supply and demand equations from the Cobweb Model. The latter's demand equation

$$P = 2 + (20 + QS - 3 Y) / alpha$$

is rearranged to put quantity demanded QD on the left:

$$QD = -20 + alpha (P - 2) + 3 Y$$

For comparison to the results for the Cobweb Model, the demand slope alpha is taken to range from -6.0 to -3.5.

The Supply Curve is given by

$$QS = -10 + beta (P[t-1] - 2) + 2 WX$$

The supply curve slope beta is always set to 5.

The Inventory-Based Pricing Model does not attempt to achieve QD = QS immediately. Rather, the inventory absorbs the difference:

$$Inv[t] = Inv[t-1] + QS - QD.$$

The price then adjusts to eventually restore the inventory to 10 units:

$$P = 2 - 0.1 (Inv - 10).$$

If the inventory is below 10, the price is increased to encourage supply and discourage

demand, leading to an excess supply and an increase in the inventory.

Exercises

1. Run the favorable weather simulations for various values of the demand curve slope alpha.

2. Is the process unstable for alpha equal to -3.5, as it is for the Cobweb Model?

3. Does the market price have cycles?

4. Run the increased income simulations.

5. Does the increase in income cause an immediate increase in demand? How about supply? How is the immediate increase in demand accommodated?

6. Do inventories eventually return to 10?