4| EQUILIBRIUM PRICES

Purpose: The purpose of this problem set is to show that markets will be in equilibrium when excess demand is zero. You will explore how variations in price can put a market in equilibrium. You will examine the effects of taxes on market equilibrium price and quantity.

Computer file: **eq98.xls**

Background information.

This problem set deals with the workings of a hypothetical market for spaghetti. It is concerned with how the market price changes when the amount consumers want to buy is different from the amount suppliers want to sell.

Excess demand for a good is quantity demanded minus quantity supplied at the current market price. If at the current market price of a good the amount demanded by consumers is greater than the amount supplied by sellers, there is *excess demand*, and market price will tend to rise.

On the other hand, if the amount demanded by consumers is less than the amount supplied by sellers, *excess demand* is negative, and market price will fall.

A market is in equilibrium if excess demand is zero, that is, if consumers want to buy exactly the amount the suppliers want to sell.

Open the Excel file **eq98.xls**. You will be asked whether you want to do practice problems or take the test for this problem set. Choose one option, and enter any requested information. A student number should have at least four digits at the end.

What you then see are supply and demand curves for a hypothetical market for spaghetti in San Francisco, as well as some data on the market, including the market price of spaghetti, average annual income of consumers, quantity supplied, quantity demanded, and excess demand at the current market price. Quantities demanded and supplied are measured in plates of spaghetti per day.

You can change the price of spaghetti by clicking on its current value, entering a new value, and hitting Enter. New values for the variables in the model are computed automatically, and the graph is updated to show the current market price.

You can also change demand factors such as income, and the prices of tacos and wine. Finally, you can change the prices of two inputs into spaghetti, and adjust the amount of a per unit tax, all determinants of supply.

Play with the worksheet by changing the price of spaghetti, and seeing what happens to excess demand. Then change some of the demand data and supply data values (incomes and prices) that underlie the demand and supply curves. Be sure you understand what happens when you change each of the "policy" variables.

Finding the equilibrium price of spaghetti using Goal Seek is easy. (It's easier than using trial and error, though that's not a bad strategy for getting a feel for how the market works.)

1) Select the cell that contains the value for excess demand by clicking on it.
2) Select Goal Seek from the Tools menu. The Set Cell box should contain the cell address of the value for excess demand. If it doesn't, click on the cell that contains the current value for excess demand.
3) Click on the To Value box. Use the keyboard to enter the number <u>zero</u> (0), but don't hit the Enter key.
4) Click on the By Changing Cell box. Because you want to change *price* to get excess demand equal to zero, click on the current value for the price.
e) Click on the OK button.
f) Excel displays another dialog box showing the status of goal seeking. To incorporate the results into the worksheet, click on OK. To return to the values you started with choose Cancel.

If you chose OK, and everything worked as planned, the equilibrium values for the market are displayed. If in entering information you get an error box or message, simply choose OK in the error box and continue entering information.

Now you're ready to tackle the questions for this problem set.
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MATH MAVEN'S CORNER: The demand function for spaghetti is given by $Q(D) = (A) p_s^a I^b p_t^c p_w^d$, where p_s is the price of spaghetti, p_t is the price of tacos, p_w is the price of wine, and I is income. The values of A, a, b, c, and d are set by the program. The supply function for spaghetti is given by $Q(S) = B(p_s - t)^f p_{sauce}^g w^h$, where p_s is the price of spaghetti, p_{sauce} is the price of sauce, w is the price of labor (the wage rate), and t is the tax per unit of spaghetti. The program sets the values of B, f, g, and h.

EQUILIBRIUM PRICES

Questions

With all variables at their baseline values:_
      1)   What's the equilibrium price of spaghetti?
      2)   What's the equilibrium quantity of spaghetti?

Change the level of income to $27,000.
      3)   What's the new equilibrium price of spaghetti?
      4)   What's the new equilibrium quantity of spaghetti?

      5)   Is spaghetti normal or inferior here?"

Set all variables to their baseline values. Set the price of spaghetti to its equilibrium level. Now the price of tacos falls to $3.
      6)   At the current price of spaghetti, supply changes by…
      7)   At the current price of spaghetti, demand changes by…

When the price of tacos falls to $3 (as in the last question),
      8)   What's the new equilibrium price of spaghetti?
      9)   What's the new equilibrium quantity of spaghetti?

Set all variables to their baseline values. Set the price of spaghetti to its equilibrium level. The wage rises to $7.50 an hour.
      10)   At the current price of spaghetti, supply changes by...
      11)   At the current price of spaghetti, demand changes by…

When the wage rises to $7.50 (as in the last question),
      12)   What's the new equilibrium price of spaghetti?
      13)   What's the new equilibrium quantity of spaghetti?

Set all variables to their baseline values. A tax of $4.00 per plate is put on all spaghetti sales.
      14)   What's the new equilibrium price of spaghetti?
      15)   What's the new equilibrium quantity of spaghetti?

For the $4.00 tax per plate in the last question:
      16)   The tax of $4.00 caused an increase in price of how much?
      17)   What is the government's total tax revenue from its spaghetti tax?

Set all variables to their baseline values. Set the price of spaghetti to its equilibrium level. Government grants a subsidy of $3 per plate.
      18)   What's the change in price due to the subsidy?
      19)   Continuing on from the last question, what's the change in quantity due to the subsidy?

20) Continuing on from the last question, what's the total cost of the subsidy to the government?