The Mexican Soda Tax
(Vikas Bajaj, New York Times, October 18, 2013)

The soda tax didn’t fly in Albany, but it’s found new life in Mexico City. On Thursday the lower house of Mexico’s Congress approved new taxes on sugary beverages and high-calorie foods as part of a broader reform plan proposed by President Enrique Peña Nieto. If the proposal passes the Senate, the government will levy a 1 peso (8 cent) per liter tax on sugary beverages such as soft drinks, and a 5 percent tax on packaged foods that contain 275 calories or more per 100 grams.

Mexico had an intense public debate about the soda tax, which the soft-drink industry dubbed “the Bloomberg tax” because the New York mayor spent some of his personal fortune to support it. The beverage industry took out full-page newspaper ads to fight the proposal. But Mexican lawmakers went ahead and voted for the tax because they were concerned about the country’s significant obesity problem. More than 32 percent of its population is obese and nearly 70 percent are obese or overweight, according to the World Health Organization. Diabetes and heart disease are the top two causes of deaths among adults.

Suppose that in Mexico, sugar is used either in the production of soda or "other sugary" goods. Prior to the 2013 tax, the demand functions for these goods are:

\[ P_{soda} = 100 - 0.5Q \]
\[ Q_{other} = 25 - 0.5P \]

The processing and marketing of sugar in Mexico is characterized by the transformation of sugar cane plants into sugar. The corresponding supply function is:

\[ Q_{P&M} = 58 + 0.04P \]

Lastly, the farm level supply function for sugar cane is, \( Q_F = -20 + 0.02P \)

1. Provide a graphical representation of the Mexican retail market for goods that use sugar and the farm level market for sugar cane before and after the tax on soda. Describe the changes in prices and quantities at both levels.
2. Determine the equilibrium quantity (in thousand tons) and price (cents per ton) at the farm level, and the prices at the retail level (in cents per unit), prior to the tax.
3. Assume that tax policy reduce the soda quantity consumed by 10 units, regardless of the price. That is, the tax simply represents a 10 unit shift down of the demand curve. Explain the intuition underlying your empirical results.

Pre-tax: \( Q_{farm}^* = 7.74, P_{farm}^* = 1387, P_{soda}^* = 96, P_{other}^* = 35 \)
Post-tax: \( P_{soda} = 95 - 0.5Q, Q_{farm}^* = 7.68, P_{farm}^* = 1383, P_{soda}^* = 91, P_{other}^* = 35 \)
Wheat Slips on Forecasts for Rain in Russia, U.S.
(Agrimoney, October 19, 2015)

So will winter wheat seedlings get much-needed rains at last? Moisture looks on the horizon for the US southern Plains and for the former Soviet Union, in both of which regions rains have been too sparse to ensure good establishment of winter grains planted ahead of the 2016 harvest. "Weather forecasters and models continue to suggest some relieving rainfall this week and possibly next," said Tobin Gorey at Commonwealth Bank of Australia. Also, "rains spread across the Plains hard red winter wheat belt starting at midweek, leading to much-improved moisture for fall establishment", Commodity Weather Group said.

Let's consider the U.S. wheat market and the associated impacts on this market. Suppose that the "retail" demand for wheat represents the demand for exports and the demand for domestically consumed wheat. The farm level market will represent U.S. wheat producers.

Suppose that the export and domestic retail demand curves are characterized as:

\[
\begin{align*}
P_{\text{export}} &= 500 - Q \\
P_{\text{domestic}} &= 400 - 0.25P
\end{align*}
\]

The processing and marketing represent aspects such as grain elevation, loading and unloading on train cars, transportation, and domestic and international shipping costs. This function is characterized as:

\[
Q_{\text{P&M}} = 50 + 0.1P
\]

The production of wheat involves labor, seed costs, harvest costs, and other fixed costs. The supply functions for these inputs are as follows:

\[
\begin{align*}
P_L &= 200 + 0.5Q \\
Q_{\text{seed}} &= 50 + 2P \\
P_{\text{harvest}} &= -100 + 3Q \\
P_{FC} &= 200
\end{align*}
\]

(1) Provide a graphical representation of the potential changes in the markets given the information about increased rains in Russia and the United States. Characterize the initial "retail" and farm markets (including the initial equilibrium conditions) and then the markets after changes.

(2) Determine the equilibrium quantity (in million metric tons) and price (in dollars per metric ton) at the farm level, and the prices at the "retail" level (in dollars per metric ton), prior to the changes.

(3) Determine the new equilibrium farm and retail level conditions after the changes. Assume that the rains decrease fixed costs for U.S. producers by $20. The rains in Russia will reduce the price that U.S. suppliers receive from their world consumers by $50, regardless of the quantities sold. Explain the intuition underlying your empirical results.

Pre-rain: \( Q_{\text{farm}}^* = 73.8, \ P_{\text{farm}}^* = 570, \ P_{\text{exp}}^* = 426, \ P_{\text{dom}}^* = 382 \)

Post-rain: \( P_{FC} = 180, \ P_{\text{export}} = 450 - Q, \ Q_{\text{farm}}^* = 71.8, \ P_{\text{farm}}^* = 542, \ P_{\text{exp}}^* = 378, \ P_{\text{dom}}^* = 382 \)