

Economics 101
Fall 2013
Answers to Homework 3
Due Tuesday, October 22, 2013

Directions: The homework will be collected in a box **before** the lecture. Please place your name, TA name and section number on top of the homework (legibly). Make sure you write your name as it appears on your ID so that you can receive the correct grade. Late homework will not be accepted so make plans ahead of time. **Please show your work.** Good luck!

Please realize that you are essentially creating “your brand” when you submit this homework. Do you want your homework to convey that you are competent, careful, and professional? Or, do you want to convey the image that you are careless, sloppy, and less than professional. For the rest of your life you will be creating your brand: please think about what you are saying about yourself when you do any work for someone else!

PART I: Demand-Supply and its Application to International Trade

1. The basics of international trade

Suppose the domestic demand for insulin in Nomansland is perfectly inelastic and is given by the equation:

$$Q = 60$$

The domestic supply of insulin is given by the following equation:

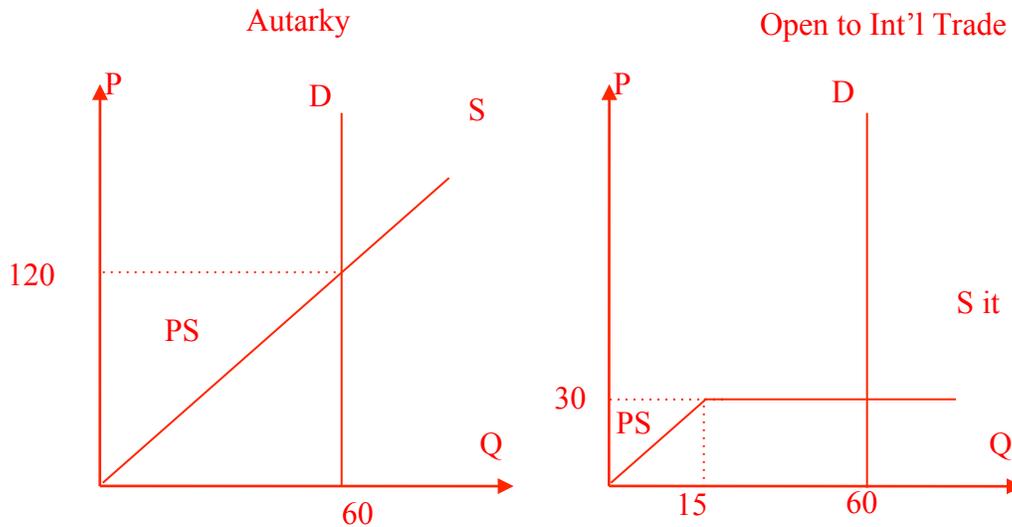
$$P = 2Q$$

where P and Q are the price per unit of insulin in dollars and the quantity of insulin in units, respectively.

- (a) Suppose Nomansland is initially in autarky (that is, Nomansland market for insulin is closed). Find the equilibrium price, equilibrium quantity and producer surplus in this market. Graphically illustrate your answers.

Equilibrium price can be solved by substituting the domestic demand into the domestic supply equation, this gives $P = \$120$ per unit of insulin and $Q = 60$ units of insulin.

Producer surplus can be found as the area above the supply curve and under the price producers receive at the quantity sold, so $1/2 \times 120 \times 60 = \3600 .



- (b) Let the world price be \$30 per unit of insulin and let Nomansland open this market to international trade. Find the price that insulin trades for in Nomansland. How many units of insulin are consumed and how many are imported or exported in Nomansland when this market opens to trade? What is the producer surplus for domestic producers? Graphically illustrate your answers.

Since the world price of \$30 is lower than domestic equilibrium price, the country will import at the world price; hence, the price of insulin in Nomansland is \$30.

At the price of \$30, consumers consume 60 units. (Note that the demand is perfectly inelastic, so the quantity demanded is not sensitive to price.)

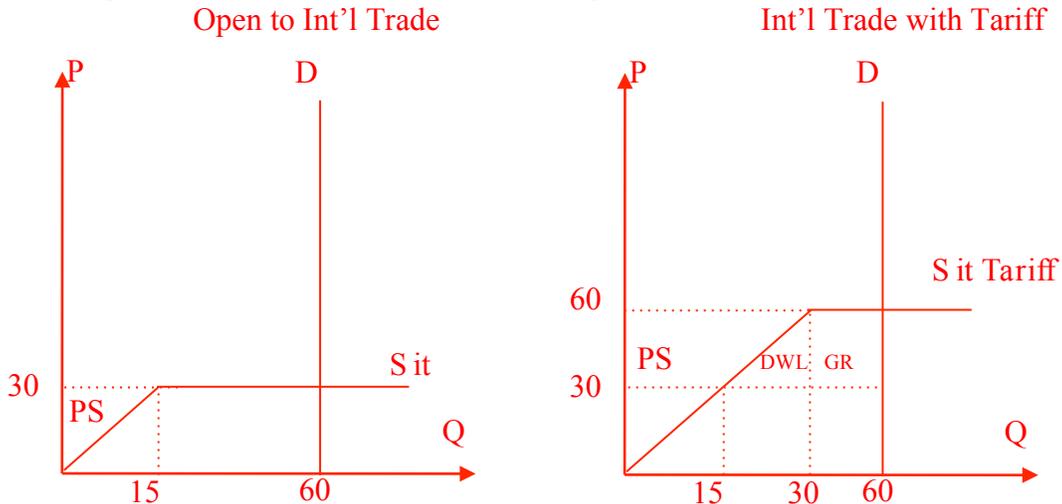
Since the price is \$30 per unit, domestic producers are willing to supply up to $Q = 30/2 = 15$ units, leaving $60 - 15 = 45$ units that need to be imported.

Producer surplus is the area above the supply curve and under the price producers receive (\$30) at the quantity sold (15 units) so $1/2 \times 30 \times 15 = \225

- (c) Suppose the Nomansland government imposes a tariff of \$30 per unit of insulin imported. Find the price that insulin trades for in Nomansland given this tariff. How many units of insulin are consumed and how many are imported given this tariff? What is the producer surplus for domestic producers when this tariff is imposed in this market? Given the tariff, how much revenue will the government raise and what is the size of the deadweight loss? Graphically illustrate your answers.

The price of insulin with the tariff in Nomansland will be \$60 per unit of insulin. Since this price with the tariff is lower than the domestic equilibrium price, the country will still import insulin given the tariff price. At the tariff price of \$60, consumers are willing to consume 60 units. (Note that the demand is perfectly inelastic.) Since the price after the tariff is \$60 per unit, domestic producers are willing to supply up to $Q = 60/2 = 30$ units, leaving $60 - 30 = 30$ units of insulin that need to be imported. Producer surplus is the area above the supply curve and under the price producers receive (\$60) at the quantity sold (30 units) so $1/2 \times 60 \times 30 = \900 .

Since the imported 30 units are subject to the \$30 per unit tariff, the tariff revenue is $\$30 \times 30 = \900 . The deadweight loss is the triangular area generated by the tariff which exhibits the inefficiency of production. There is no second triangle from under-consumption in this case. Hence, the deadweight loss is $\frac{1}{2} \times (30 - 15) \times 30 = \225 .



- (d) Suppose the Nomansland government imposes an import quota for insulin of 30 units instead of the tariff described in (c). Given this import quota (and no tariff), find the price that insulin will trade for in Nomansland. Given this import quota, how many units of insulin are consumed and how many are imported? Given this import quota, what is the producer surplus for domestic producers? How much revenue will the quota holder raise and what is the size of the deadweight loss? Graphically illustrate your answers.

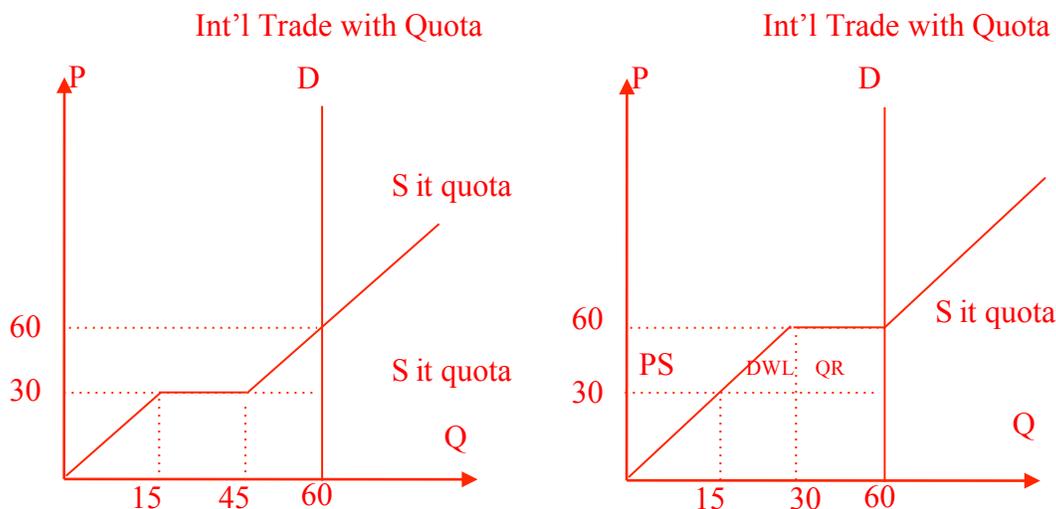
To derive the supply curve of insulin in Nomansland when the import quota is imposed, first realize that domestic producers will produce the first 15 units of insulin. Then 30 units of insulin will be imported as a lower cost alternative than having domestic producers produce additional units of insulin. Once the imported limit is reached any additional insulin will have to be produced by the domestic producers: thus, the import quota effectively shifts the domestic supply curve horizontally to the right by 30 units of insulin. Thus, the new supply curve incorporating the import quota is given by:

$$P = 2Q, \quad \text{when } 0 \leq Q \leq 15 \quad (\text{Domestic production before importation})$$

$$P = 30, \quad \text{when } 15 \leq Q \leq 45 \quad (\text{Importation under quota})$$

$$P = 2Q - 60, \quad \text{when } Q \geq 45 \quad (\text{Domestic production after quota})$$

Solve for the equilibrium price under the import quota by equating $P = 2Q - 60$ and $Q = 60$, so $P = 60$. Quantity consumed in Nomansland with the import quota is $Q = 60$ units of insulin, of which 30 units are imported due to the imposition of the import quota. To illustrate producer surplus, deadweight loss and quota revenue, rearrange the order of the import quota and the domestic production on the graph. Producer surplus is the area above the supply curve and under the price producers receive (\$60) at the quantity sold, (30 units) so $\frac{1}{2} \times \$60 \times 30 = \900 . Since 30 units are imported at the world price of \$30 but sold in Nomansland for \$60 per unit, the quota revenue is $\$30 \times 30 = \900 . The deadweight loss is the triangular area generated by the quota, which exhibits the inefficiency of production; there is no second triangle from under-consumption in this case. Hence, the deadweight loss is $\frac{1}{2} \times (30 - 15) \times 30 = \225 .



2. The counterfactual analysis

(Hint: As always, although you are not instructed to draw diagrams, it is helpful to do so.) Suppose Monona is initially a small closed economy that consumes and produces carp. The domestic demand and supply curves are given by the following equations where Q is the quantity of cars and P is the dollar price per carp:

Domestic demand: $Q = 1000 - 2P$

Domestic supply: $Q = 3P - 600$

- (a) Calculate the equilibrium price and quantity, consumer surplus, producer surplus and total surplus under autarky (that is, when Monona has a closed carp market).

Note that the demand and supply curves can be written in P -intercept form of $P = 500 - 0.5Q$ and $P = 200 + Q/3$, respectively.

The autarky equilibrium is solved by equating domestic demand, $Q = 1000 - 2P$, and domestic supply, $Q = 3P - 600$; thus, $P = \$320$ per carp and $Q = 360$ cars.

Consumer surplus is $1/2 \times (500 - 320) \times 360 = \32400

Producer surplus is $1/2 \times (320 - 200) \times 360 = \21600

Total surplus is $\$32400 + \$21600 = \$54000$

Suppose Monona opens the carp market to international trade. The world price of a carp is \$250.

- (b) Calculate the price and quantity consumed in the domestic carp market. Would Monona import or export carp and how many units are imported or exported? What is the total surplus in the economy? Would the domestic producers favor opening the carp market to international trade?

Since the world price is lower than the domestic price, Monona would import cars. At the price of \$250, there will be $Q = 1000 - 2(250) = 500$ cars consumed in Monona and

$Q = 3(250) - 600 = 150$ carps produced domestically. This leaves 350 carps to be imported.

Consumer surplus is $1/2 \times (500 - 250) \times 500 = \62500

Domestic producer surplus is $1/2 \times (250 - 200) \times 150 = \3750

Total surplus in Monona is $\$62500 + \$3750 = \$66250$; however, the domestic producers would not favor international trade as their surplus decreases in comparison to autarky.

- (c) A prohibitive import tariff is a tariff such that imports are not incentivized, namely, no import occurs after such a tariff is implemented. The economy reverts to autarky equilibrium. What is the prohibitive import tariff in the market for carp in Monona? Calculate the size of the deadweight loss that results from imposition of a prohibitive import tariff.

When a tariff is implemented in a market, it raises the price of the good in that market above the world price for the good by the amount of the tariff per unit. The prohibitive import tariff can be easily computed from the difference between the autarky price and the world price. Such a tariff discourages all importation, as it is equally expensive to import carp or domestically produce carp. The prohibitive tariff is $\$320 - \$250 = \$70/\text{carp}$. The deadweight loss generated is the forgone surplus when the economy reverts from international trade to autarky, $\$66250 - \$54000 = \$12250$.

Suppose there is no tariff or quota intervention in the market for carp in Monona, but that the market for carp in Monona is open to international trade. Furthermore, suppose that the world price of carp remains at $\$250/\text{carp}$. Monona, if it opens this market to trade, will be able to acquire new fishery radar technology. The new radar will improve productivity and shift the domestic supply curve to:

New domestic supply curve: $Q = 3P - 300$

However, domestic producers are considering a campaign against the free trade policy that would open the carp market to trade. This campaign would result in the removal of the new radar technology and the economy would revert back to the equilibrium found under autarky.

- (d) Is it beneficial for domestic producers to campaign against opening the carp market to international trade? Explain your answers by calculation the benefit to producers of the two policies and then comparing the two policies.

To answer this question you need to consider the equilibrium under international trade with the new domestic supply curve and compare this equilibrium with the equilibrium under autarky in part (a). With the new radar technology and the world price of carp equal to $\$250$ per carp we have, $Q = 1000 - 2(250) = 500$ carps consumed in Monona and $Q = 3(250) - 300 = 450$ carps produced domestically. This leaves 50 carps to be imported. Producer surplus becomes $1/2 \times (250 - 100) \times 450 = \33750 under international trade and with the new radar technology. Hence, it is not beneficial for producers to campaign against the international trade since their surplus decreases from $\$33750$ to $\$21600$ should Monona revert to autarky.

PART II: Elasticity

3. The percentage problem and the basics of elasticity

- (a) Suppose your hourly wage falls from \$20 to \$10. What is the regular percentage decrease? What is the arc percentage decrease?

$$\text{Regular percentage change} = (10 - 20)/20 = -10/20 = -50\%$$

$$\text{Arc percentage change} = (10 - 20)/[(10 + 20)/2] = -10/15 = -66.67\%$$

- (b) Suppose your hourly wage increases from \$10 to \$20. What is the regular percentage decrease? What is the arc percentage decrease? Compare your result to part (a).

$$\text{Regular percentage change} = (20 - 10)/10 = 10/10 = 100\%$$

$$\text{Arc percentage change} = (20 - 10)/[(20 + 10)/2] = 10/15 = 66.67\%$$

We can observe that arc percentage change calculation gives the same result, in absolute value terms, regardless of the direction of the change. This is not the case with the regular percentage change calculation.

- (c) Suppose the price of celeriac decreases from \$80 to \$60, and the quantity demanded increases from 100 to 150 bushels. What is the price elasticity of demand using the standard percentage formulas? What is the arc price elasticity of demand?

$$\text{Regular percentage change in price} = (60 - 80)/80 = -20/80 = -25\%$$

$$\text{Regular percentage change in quantity demanded} = (150 - 100)/100 = 50/100 = 50\%$$

The price elasticity of demand using standard percentage formulas is:

$$|\% \text{ Change in Quantity} / \% \text{ Change in Price}| = |50\% / -25\%| = 2$$

$$\text{Arc percentage change in price} = (60 - 80)/[(60 + 80)/2] = -20/70 = -2/7 = -28.57\%$$

(Keep the fraction! It's easier to work with.)

$$\text{Arc percentage change in quantity} = (150 - 100)/[(150 + 100)/2] = 50/125 = 2/5 = 40\%$$

The arc price elasticity of demand is:

$$|\% \text{ Change in Quantity} / \% \text{ Change in Price}| = |(2/5) / (-2/7)| = |7/5| = 1.4$$

- (d) Suppose the price of celeriac increases from \$60 to \$80, and quantity demanded decreases from 150 to 100 bushels. What is the point price elasticity of demand? What is the arc price elasticity of demand? Compare your calculations here with the calculations you made in (c).

$$\text{Regular percentage change in price} = (80 - 60)/60 = 20/60 = 1/3 = 33.33\%$$

$$\text{Regular percentage change in quantity demanded} = (100 - 150)/150 = -50/150 = -33.33\%$$

The price elasticity of demand using standard percentage formulas is:

$$|\% \text{ Change in Quantity} / \% \text{ Change in Price}| = |-33.33\% / 33.33\%| = 1$$

$$\text{Arc percentage change in price} = (80 - 60)/[(80 + 60)/2] = 20/70 = 2/7 = 28.57\%$$

$$\text{Arc percentage change in quantity} = (100 - 150)/[(100 + 150)/2] = -50/125 = -2/5 = -40\%$$

The arc price elasticity of demand is:

$$|\% \text{ Change in Quantity} / \% \text{ Change in Price}| = |(-2/5) / (2/7)| = |7/5| = 1.4$$

We can observe that the arc price elasticity of demand will give the same result regardless of the direction. This is not the case with the price elasticity of demand calculated using standard percentage change formulas.

- (e) Suppose the demand for rutabaga is given by:

$$\text{Demand: } Q = 50 - 0.5P$$

Find the price elasticity of demand when price is \$60 using the point elasticity of demand formula.

Remember to check the way the demand curve has been written! Rearrange to obtain P -intercept form as $P = 100 - 2Q$. When price is \$60, $P = 60$, the quantity demanded is $Q = 20$. Using the point elasticity of demand formula:

$$|(1/\text{Slope of demand curve}) \times (P/Q)| = |(1/-2) \times (60/20)| = 1.5$$

- (f) From the demand curve in part (e), what is the price elasticity of demand when the price decreases from \$60 to \$40 using the standard percentage change formulas? What is the arc price elasticity of demand? Compare your findings to those you found in (e).

When prices are \$60 and \$40, the quantity demanded are 20 and 30 bushels, respectively.

$$\text{Regular percentage change in price} = (40 - 60)/60 = -20/60 = -1/3 = -33.33\%$$

$$\text{Regular percentage change in quantity} = (30 - 20)/20 = 10/20 = 1/2 = 50\%$$

The point price elasticity of demand is:

$$|\% \text{ Change in Quantity} / \% \text{ Change in Price}| = |(1/2) / (-1/3)| = 1.5$$

$$\text{Arc percentage change in price} = (40 - 60)/[(40 + 60)/2] = -20/50 = -40\%$$

$$\text{Arc percentage change in quantity} = (30 - 20)/[(30 + 20)/2] = 10/25 = 40\%$$

The arc price elasticity of demand is:

$$|\% \text{ Change in Quantity} / \% \text{ Change in Price}| = |40\% / -40\%| = 1$$

The elasticities calculated using three different formulas do not necessarily give the same results despite the same starting point at the price of \$60.

4. Own-price elasticity, cross-price elasticity and total revenue

The marketing team of Burton Snowboard is analyzing her demand for two types of snowboard – Professional and Standard models. At Thanksgiving sales, the Professional board is discounted from the original price of \$1,000. At this Thanksgiving sales, it is reported that the point cross-price elasticity of demand for the Standard board was 0.5 when there was a decrease in the quantity demanded of Standard boards by 10%. Also, you are told a total of 1,000 Professional boards have been sold at the sale, and the arc price elasticity of demand for Professional boards is equal to 1.

- (a) From the cross-price elasticity of demand, what can be said about the substitutability and complementarity of the two models?

Since the cross-price elasticity of demand is positive, the two models are substitutes.

- (b) What is the new price of the Professional snowboard after the discount? (Hint: You have to use the regular percentage change formula here)

Given the original price of the Professional board of \$1000, the decrease in the quantity demanded of Standard boards by 10% and the point cross-price elasticity of demand for the Standard board of 0.5, we can setup the equation to solve for the new price of Professional board, where x is such price, as:

Cross-price elasticity of demand = (% Change in quantity demanded of Standard boards)/(% Change in price of Professional boards)

Substitute the values from the known information:

$$0.5 = -10\% / [(x - 1000)/1000]$$

$$0.5 = -(1/10) / [(x - 1000)/1000] = -100 / (x - 1000)$$

$$0.5x = 400, \text{ so } x = 800.$$

The new price of the Professional board is \$800.

- (c) What is the original quantity demanded of the Professional snowboard before the decrease?

From the arc own-price elasticity of demand of 1, the original and new price of Professional board of \$1000 and \$800, the new quantity demanded of 1000 boards, we can setup the equation to solve for the original quantity demanded of Professional boards, where y is such quantity, as:

Arc own-price elasticity of demand = (% Change in quantity demanded of Professional boards)/(% Change in price of Professional boards)

Substitute the values from the known information:

$$-1 = \{(1000 - y)/[(1000 + y)/2]\} / \{(800 - 1000)/[(800 + 1000)/2]\}$$

$$-1 = \{(1000 - y)/[(1000 + y)/2]\} / (-200/900)$$

$$-9 = (1000 - y)/(1000 + y)$$

$$9000 - 9y = 1000 - y, \text{ so } y = 800 \text{ Professional boards.}$$

The original quantity demanded of the Professional board is 800 boards.

- (d) What is the equation for the demand curve for Professional boards? Assume this demand curve is linear.

From the quantity demanded of 1000 and 800 boards at the price of \$800 and \$1000, respectively, one can simply find the equation for the demand curve using the standard slope-intercept form. The demand curve is given by $P = 1800 - Q$.

- (e) What is the total revenue from selling Professional boards before the Thanksgiving sales and during the Thanksgiving sales?

Before the sales: 800 boards are sold at the price of \$1000, the total revenue is \$800,000.
During the sales: 1000 boards are sold at the price of \$800, the total revenue is \$800,000.

- (f) The name “Black Friday” is there for a reason; it is the time of the year that shopkeepers can make “black” profitable numbers instead of “red” loss numbers. Has Burton Snowboard succeeded in maximizing her revenue at the Thanksgiving sales? If not, suggest the price and quantity such that she can maximize her revenue.

Clearly the revenue has not changed before and during the sales. One can maximize the revenue in a linear demand equation by setting the price at the midpoint of the equation. From the equation of $P = 1800 - Q$. Burton Snowboard should decrease the price to \$900 instead of \$800, since the midpoint of the demand curve corresponds to the price of \$900. The quantity of Professional boards sold will be 900 boards, yielding the maximized revenue of \$810,000.

5. Income elasticity and total revenue

Suppose the demand curves for Cookies and Apples in the city of Mendota are given by:

$$\text{Cookies: } P = 110 - Q + I$$

$$\text{Apples: } P = 100 - 0.5Q - 0.5I$$

where P is dollar price, Q is quantity in units and I is income expressed in thousands of dollars. Let the price of cookies and apples remain constant at \$10 per unit for both goods.

- (a) Suppose the income in the city of Mendota is \$100,000 ($I = 100$), what is the quantity demanded for cookies and apples?

Substituting $I = 100$ and $P = 10$ in each demand equation, one can solve for the quantity demanded for cookies and apples of 200 units and 80 units, respectively.

- (b) Suppose the income in the city of Mendota increases to \$150,000 ($I = 150$), what is the quantity demanded for cookies and apples?

Substituting $I = 150$ and $P = 10$ in each demand equation, one can solve for the quantity demanded for cookies and apples of 250 units and 30 units, respectively.

- (c) What is the income elasticity of demand for both goods when income increases from \$100,000 ($I = 100$) to \$150,000 ($I = 150$)? For each good, what can be concluded in terms of sensitivity to changes in income?

From the information obtained in parts (a) and (b), one can calculate the income elasticity of demand for both goods as:

$$\text{Income elasticity of demand} = \% \text{ Change in Quantity} / \% \text{ Change in Income}$$

$$\text{Percentage change in income} = (150 - 100)/100 = 50\%$$

$$\text{Percentage change in quantity demanded for cookies} = (250 - 200)/200 = 25\%$$

$$\text{Percentage change in quantity demanded for apples} = (30 - 80)/80 = -62.5\%$$

Income elasticity of demand for cookies = $25\% / 50\% = 1/2 = 0.5$
Income elasticity of demand for apples = $-62.5\% / 50\% = -5/4 = -1.25$

One can conclude that cookies are a normal good as the income elasticity of demand is positive, while apples are an inferior good as the income elasticity of demand is negative.

- (d) Suppose the income in the city of Mendota is \$100,000 ($I = 100$), does the price of \$10 per unit in each good maximize the revenue? If not, propose the price and quantity for each good that maximizes the revenue.

When $I = 100$, the demand for cookies and apples are given by:

$$\begin{aligned}\text{Cookies:} & \quad P = 210 - Q \\ \text{Apples:} & \quad P = 50 - 0.5Q\end{aligned}$$

The midpoint of each demand curve, which maximizes total revenue in each good, corresponds to:

$$\begin{aligned}\text{Cookies:} & \quad P = 105, Q = 105 \\ \text{Apples:} & \quad P = 25, Q = 50\end{aligned}$$

Hence, the price of \$10 per unit for each good does not maximize the revenue from selling each good.

6. Elasticity and taxation

Consider the market for automobiles in Beijing City and Qingdao City (These two cities are located in China). Suppose the demand for automobiles in Beijing is given by:

$$Q = 10000$$

The demand for automobiles in Qingdao is:

$$Q = 8000 - 2P$$

The market supply for the two markets is identical, given by:

$$Q = 2P - 2000$$

Assume these two markets are totally separated from one another. (Chinese currency unit is RMB.)

- (a) Find the equilibrium price and quantity in the automobile market in both Beijing and Qingdao.

In Beijing: solve the two equations of $Q = 10000$ and $Q = 2P - 2000$, so the equilibrium price is $P = 6000$ and the equilibrium quantity is $Q = 10,000$ cars.

In Qingdao: solve the two equations of $Q = 8000 - 2P$ and $Q = 2P - 2000$, so the equilibrium price is $P = 2500$ and the equilibrium quantity is $Q = 3000$ cars.

- (b) Calculate the price elasticity of demand in both Beijing and Qingdao at equilibrium.

In Beijing: since the demand is perfectly inelastic, the price elasticity of demand is 0.

In Qingdao: rearrange the demand equation to obtain P -intercept form $P = 4000 - 0.5Q$; thus, at $P = 2500$ and $Q = 3000$, the price elasticity of demand is:
 $|(1/\text{Slope of demand curve}) \times (P/Q)| = |(1/-0.5) \times (2500/3000)| = 5/3 = 1.67$

- (c) Calculate the price elasticity of supply in both Beijing and Qingdao at equilibrium.

Rearrange the supply equation to obtain P -intercept for $P = 0.5Q + 1000$
 In Beijing: at $P = 6000$ and $Q = 10000$, the price elasticity of supply is:
 $(1/\text{Slope of supply curve}) \times (P/Q) = (1/0.5) \times (6000/10000) = 1.2$
 In Qingdao: at $P = 2500$ and $Q = 3000$, the price elasticity of supply is:
 $(1/\text{Slope of supply curve}) \times (P/Q) = (1/0.5) \times (2500/3000) = 5/3 = 1.67$

Now suppose the local government in Beijing imposes an excise tax of RMB 1,000/car on the producers of automobiles and the local government in Qingdao imposes an excise tax of RMB 500/car on consumers of automobiles.

- (d) Calculate the government revenue, consumers' tax incidence, producers' tax incidence, and deadweight loss in both Beijing and Qingdao due to the excise tax in each city.

In Beijing: the supply is shifted up by RMB 1000/car; thus, $P = 0.5Q + 2000$ after tax. Solve for the equilibrium price and quantity with tax by equating $P = 0.5Q + 2000$ (supply with tax) and $Q = 10000$ (demand), so $P^T = 7000$ and $Q^T = 10000$. The price producers receives is $P^{net} = 7000 - 1000 = 6000$. Since 10000 cars sold are subjected to RMB 1000/car, the government revenue is $10000 \times 1000 = \text{RMB } 10 \text{ million}$. Since the demand is perfect inelastic, producers' tax incidence is RMB 0, consumers' tax incidence is RMB 10 million and there is no deadweight loss.

In Qingdao: the demand is shifted down by RMB 500/car; thus $P = 3500 - 0.5Q$ after tax. Solve for the equilibrium price and quantity with tax by equating $P = 0.5Q + 1000$ (supply) and $P = 3500 - 0.5Q$ (demand with tax), so $Q^T = 2500$ and price producers receive $P^{net} = 2250$. The price consumers pay is $P^T = 2250 + 500 = 2750$. Since 2500 cars sold are subjected to RMB 500/car, the government revenue is $2500 \times 500 = \text{RMB } 1.25 \text{ million}$. Equilibrium price without tax was RMB 2500, but producers now receive RMB 2250/car and consumers now pay RMB 2750/car. Thus, producers' tax incidence is $(2500 - 2250) \times 2500 = \text{RMB } 625000$ and consumers' tax incidence is $(2750 - 2500) \times 2500 = \text{RMB } 625000$. The deadweight loss is $1/2 \times (3000 - 2500) \times 500 = \text{RMB } 125000$.

- (e) Compare the fraction of the economic incidence borne by consumers to the total tax incidence in both cities. Explain your results in terms of elasticity.

In Beijing, consumers' tax incidence is 100% of the total tax incidence, since the demand in Beijing is perfectly inelastic.

However, consumers' tax incidence in Qingdao is 50% of the total tax incidence, since the demand and supply in Qingdao have equal elasticity.