QUANTITATIVE ANALYSIS ON THE DEMAND AND SUPPLY OF AGRICULTURAL PRODUCTS

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Introduction

Agricultural products are always and usually termed food items. With the constant growing population of the world and increased drive for acquisition of food (agricultural produce) as well as increased need for raw materials by industries which are mostly agricultural products. Although the production of synthetic supplement tend to reduce the great drive for requests of agricultural products, there can still hardly be called substitutes for agricultural products which are vital for survival. It can be seen that there will always be an undiluted demand for agricultural products as long as humans strive to stay alive and healthy.

Demand often represents and expressed desire for a product. But in the field of economics and business, an expressed desire may not necessarily mean making purchase/sales of the product. Hence in economics/business, demand is an effective desire for a particular product or service at a particular time, hence making desire and ability to purchase the key components of demand. It is necessary to study this concept as it is a requisite for analyses of a profitable business venture. The law of demand pin points the relationship between the quantity of goods willing to be purchased and the price at that point in time. It explains that a rise in the price of a particular commodity (product or service) will lead to a decline in the demand of the product, while a reduction in the price will have the opposite effect (increased demand).

Supply on the other hand, deals with the willingness of a producer to make available end products (agricultural produce). It is the quantity of a good or service offered by a producer for sale at different unit prices in a given market at a particular price. The law of supply also envisions the same concept as that of demand. It holds that an increase in the price of a particular good or service, will lead to increase in supply of the product, and vice versa. It is understandable that as a producer, one of the major aim of producing is to make profit and minimal or reduction of prices of the good or services reduces the profit margin to be achieved.

Demand and supply are almost inseparable as they are two sides of a coin and are both affected by supply. Equilibrium is to be maintained at all times within a market to prevent shortages or surpluses. This can only be identified in full by the use of quantitative analysis of demand and supply. For agricultural goods (mainly crops) it is usually observed that due to seasonality and poor storage (Especially in Africa) there is always a case of surpluses where buy there is excess goods but little demand hence reduction in price to stimulate demand and purchase of the surplus. And as for shortage, this comes on the occasion of the end of season, when scarcity of
the good has led to increased demand of the product. This hence leads to the increase in price of the available shortages to meet demand.

**Elasticities and the Quantitative Analysis of Supply and Demand**

So far, we have focused on a qualitative analysis of changes in prices and quantities (i.e., the directional movement of prices and quantities resulting from demand and supply changes). Often it is important to understand the magnitudes, and relative magnitudes, of these movements. Consider two examples. (1) It was discussed above that an increase in price will result in a fall in the quantity of the good demanded, ceteris paribus. Nothing was said about whether the change in quantity was large or small, either in absolute terms or relative to the change in price. (2) We have discussed that an increase in demand will result in increases in both equilibrium price and quantity. However, we have said nothing about what determines whether the change in either price or quantity is large or small.

The following is an example of how quantitative analysis is important.

You own a maize farm where sales are really low. The manager proposes to lower price in order to increase revenues. (When all units of an output are sold at the same price, total revenue equals price times quantity.) Will a price reduction result in an increase in revenues? Understanding the law of demand (e.g., the number maize sold will increase if the price is lowered) is not sufficient to answer this question. Information is needed regarding the responsiveness of the quantity demanded to price.

**Consider the effect on revenues in the following example.**

<table>
<thead>
<tr>
<th></th>
<th>Price per kg of maize</th>
<th>Number sold per week</th>
<th>Total revenue per week</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Case A</strong></td>
<td>N50</td>
<td>50</td>
<td>N2500</td>
</tr>
<tr>
<td></td>
<td>N40</td>
<td>100</td>
<td>N4000</td>
</tr>
<tr>
<td><strong>Case B</strong></td>
<td>N50</td>
<td>500</td>
<td>N25,000</td>
</tr>
<tr>
<td></td>
<td>N40</td>
<td>550</td>
<td>N22,000</td>
</tr>
</tbody>
</table>

Together, the two cases show that even knowing that a reduction in price from N50 to N40 will result in the sale of 50 additional kilograms per week is not sufficient to determine whether lowering price is a good policy. One needs to know whether the changes are relatively large or small. Note that the reduction in price represents a 20 percent change in both cases. In case A, there is a 100 percent increase in the quantity demanded. However, in case B, there is only a 10 percent increase in the quantity demanded. In case A, the 100 percent change in quantity is
large relatively to the 20 percent reduction in price, resulting in an increase in revenues. In case B, the 10 percent increase in quantity is relatively smaller compared to the 20 percent price reduction, with the result being that revenues fall when price is reduced.

This example shows that the absolute changes in the price and quantity (e.g., a 50 unit reduction) do not provide a complete picture. What is needed is a measure of the percentage change in the quantity demanded relative to the percentage change in price.

In general, Elasticity is a measure of responsiveness to a stimulus. The concept is applicable whenever quantifiable variables are systematically related (i.e., there is a causal relationship).

Examples:
- What is the responsiveness of weight of cow to amount of feed fed?
- What is the responsiveness of your grade in this course to hours of study time?
- What is the responsiveness of wheat production to rain fall?

More generally, we are interested in the following:
- What is the responsiveness of the quantity demanded to a change in the good’s own price?
- What is the responsiveness of the quantity demanded to a change in the price of a related good?
- What is the responsiveness of the quantity demanded to a change in income?
- What is the responsiveness of the quantity of labor supplied to a change in the wage rate?

More generally, the quantity of a good demanded depends upon the following factors:
- The good's own price.
- The consumer's income.
- The prices of related goods.
- The tastes and preferences of the consumer.
- Expectations and other special influences (e.g., weather).

We are interested in the responsiveness of the quantity demanded to changes in each of these determinants. (Note that the stimulus must be quantifiable in order to calculate an elasticity; which is problematic in the case of tastes and preferences.)

Similarly, the quantity of a good supplied will depend upon the following factors:
- The good's own price.
- Prices of inputs used to produce the good.
- The technology regarding the transformation of inputs into the output.
- The prices of other goods the seller (sellers) could supply.
- Expectations.

We are interested in the responsiveness of the quantity supplied to changes in each of these factors.
Knowing the responsiveness of quantity demanded and quantity supplied to these factors and understanding the implications of such responsiveness is central to understanding the workings of markets.

The price elasticity of demand measures the responsiveness of the quantity demanded to the good's own price and is defined to be the percentage change in the quantity demanded that results per one percent change in price.

\[ E_D = \frac{\text{percent change in the quantity demanded}}{\text{percent change in price}} \]

**Examples:**

1. Suppose that a 10 percent increase in the price of beef results in a 4 percent decrease in the quantity of beef demanded. \( E_D = \frac{4\%}{10\%} = 0.4 \). In this case, the quantity of cigarettes demanded will go down by 0.4 percent for each 1.0 percent increase in price; the percentage change in the quantity demanded is only four-tenths or 0.4 as large as the percentage change in price.

2. Suppose a 10 percent increase in the price of frozen chicken results in a 25 percent reduction in the quantity demanded (i.e., number of frozen chicken). \( E_D = \frac{25\%}{10\%} = 2.5 \).

Here the quantity demanded will decrease 2.5 percent for each one percent increase in price. The percentage change in the quantity demanded is 2.5 times as big as the percent change in price.

Comparing the two examples, the demand for Frozen Chicken is more responsive to price than is the demand for Beef.

**Calculating the Price Elasticity of Demand.**

Consider the following diagram and suppose that as a result of a fall in the price of a good from level \( P_1 \) to level \( P_2 \), the quantity demanded increases from level \( Q_1 \) to level \( Q_2 \) units. The formula for the price elasticity of demand is as follows.

\[ E_D = \frac{\text{percent change in the quantity demanded}}{\text{percent change in price}} \]

\[ = \frac{\% \Delta Q_d}{\% \Delta P} = \frac{\frac{\Delta Q_d}{Q_d} \cdot 100}{\frac{\Delta P}{P} \cdot 100} = \frac{\frac{\Delta Q_d}{Q_d}}{\frac{\Delta P}{P}} = \frac{Q_d}{\frac{(Q_2 - Q_1)}{(P_2 - P_1)}} \]
Midpoint method: \( Q_d = \frac{(Q_1 + Q_2)}{2} \) and \( P_d = \frac{(P_1 + P_2)}{2} \)

In Case A of the maize sales example, the elasticity is calculated as follows:

**Mechanical calculation:**

\[
E_D = \frac{\frac{\Delta Q_d}{Q_d}}{\frac{\Delta P}{P}} = \frac{\frac{(100-50)}{50}}{\frac{(40-50)}{45}} = \frac{\frac{50}{50}}{\frac{10}{45}} = \frac{7/5}{10/45} = \frac{-2}{3} \times \frac{4.5}{10} = -\frac{9}{30} = -0.3
\]

It follows that the price elasticity of demand is \( E_D = 3.0 \). (Be sure that you can provide an intuitive interpretation of what it means that \( E_d = 0.3 \).)

**Several points are important.**

- Note that the minus sign is dropped. (This is only done for the price elasticity of demand.)
- The formula is based on percentage changes, not unit changes.
- The average price and quantity (midpoints) are entered for \( P \) and \( Q_d \), respectively, so that the direction of change in \( P \) and \( Q \) are unimportant.

It is important that as a business person be able to calculate the price elasticity of demand, as well as other elasticity measures. However, it is far more important that you have a clear understanding of what these elasticities measure and how the elasticities are central to understanding the extent to which given exogenous changes cause prices and quantities to change.

A linkage is said to be "more elastic" as the response to a given stimulus is relatively larger. In the case of the price elasticity of demand, a larger value of \( E_D \) reflects the fact that the quantity demanded is more responsive to price.

Demand is said to be **elastic** (with respect to own price) if \( E_D > 1 \).

**Note:**

\( E_D > 1 \) implies that percent change in the quantity demanded will be larger than the percent change in price; \( \% \Delta Q_d > \% \Delta P \).

Demand is said to be **inelastic** (with respect to own price) if \( E_D < 1 \).

**Note:**

\( E_D < 1 \) implies that percent change in the quantity demanded will be less than the percent change in price; \( \% \Delta Q_d < \% \Delta P \).

Demand is said to be **unit elastic** (with respect to own price) if \( E_D = 1 \).

**Note:**

\( E_D = 1 \) implies that percent change in the quantity demanded will equal the percent change in price; \( \% \Delta Q_d = \% \Delta P \).

**Factors that affect the price elasticity of demand (i.e., affect how responsive the quantity demanded is to the good's price):**

- Goods that are necessities typically have relatively lower price elasticities of demand. For example, the price elasticity of demand for food has been estimated to be 0.58 compared to an estimated price elasticity of demand for furniture of 1.26.
• Goods having ready substitutes typically have higher price elasticities of demand. For example, the price elasticity of demand for gasoline has been estimated to be about 0.4 whereas the price elasticity of demand for natural gas has been estimated to be about 1.4.

• Note that when a market/good is narrowly defined, the price elasticity of demand will typically be larger, as there are more ready substitutes for the narrowly defined good. In the case of the demand for food, the price elasticity of demand will be smaller than in the case of the demand for ice cream. Ice cream has more substitutes than does food broadly defined.

• As buyers have a longer period of time to respond to the price change, the price elasticity of demand will be higher. In the case of movies, the price elasticity of demand has been estimated to be 0.87 in the short-run and 3.7 in the long-run.

Rather than using information about price and quantity changes to calculate the price elasticity of demand, knowledge of the price elasticity can be used to infer how the quantity demanded would change for any given price change.

The formula \( E_D = \frac{\% \Delta Q_d}{\% \Delta P} \) implies that \( \% \Delta Q_d = E_D \cdot \% \Delta P \).

For example, if the price elasticity of demand is 2.5, a 5 percent increase in price would lead to a 12.5% (= 2.5 x 5%) reduction in the quantity demanded.

In a similar way, knowledge of the price elasticity of demand will allow inferences regarding how large a change in a good's price must be in order to bring about a given change in the quantity demanded. For example, suppose that the price elasticity of demand for beef by old people is 0.7 and policymakers want to reduce beef intake by old people by 35%. What increase in price would be needed to bring this about?

\[
E_D = 0.7 = \frac{\% \Delta Q_d}{\% \Delta P} = \frac{35\%}{?} \quad \text{or} \quad \frac{\% \Delta P}{E_D} = \frac{35\%}{0.7} = 50\% 
\]

Thus, a 50 percent increase in price would bring about a 35% reduction in the quantity demanded.

Make sure that you can calculate the elasticities for the demand schedule and demand curve shown below. As business is concerned, be sure you understand what the numbers represent.

<table>
<thead>
<tr>
<th>Price</th>
<th>Quantity demanded (1000s)</th>
<th>Price elasticity</th>
<th>Revenues (N1000s)</th>
<th>TR = PQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>N7</td>
<td>1</td>
<td>4.33</td>
<td>N7</td>
<td></td>
</tr>
<tr>
<td>N6</td>
<td>2</td>
<td>2.20</td>
<td>N12</td>
<td></td>
</tr>
<tr>
<td>N5</td>
<td>3</td>
<td>1.29</td>
<td>N15</td>
<td></td>
</tr>
<tr>
<td>N4</td>
<td>4</td>
<td>0.78</td>
<td>N16</td>
<td></td>
</tr>
<tr>
<td>N3</td>
<td>5</td>
<td>0.45</td>
<td>N15</td>
<td></td>
</tr>
<tr>
<td>N2</td>
<td>6</td>
<td>0.23</td>
<td>N12</td>
<td></td>
</tr>
</tbody>
</table>

\[ E_D = 4.33 \quad E_D > 1 \]

\[ E_D = 1 \quad E_D = 1 \]

\[ E_D = 0.23 \quad E_D < 1 \]
Note that the price elasticity of demand at the midpoint on the demand curve (i.e., at point b) is 1.0. Here demand is unit elastic. Between points a and b, demand is elastic. Below point b on the demand curve demand is inelastic.

**Price elasticity and the linkage between price and revenue changes**

Suppose that the above demand schedule reflects the demand for water in a desert community. You own land containing the only water source, a spring. What price would maximize your revenues from water sales?

The table shows the total revenue for each of several different prices. It is seen there that a price of N4 and corresponding sales of 4,000 units result in the largest revenues.

Consider changes in price and the corresponding changes in revenues and how this relationship varies with the price elasticity of demand. Note that a reduction in price increases revenues in those cases where the price elasticity of demand is greater than one. However, when the price elasticity of demand is less than one, a reduction in price results in a reduction in total revenue.

To see why, reconsider the definition of total revenue. When all units of a good, Q, are sold at the same price, P, total revenue, TR, will be TR = P x Q.

The law of demand implies that changes in P and Q will be in opposite directions. Without additional information, it is not possible to say whether such a change in price will cause total revenue to increase or decrease.

As an example, consider an increase in price and the resulting decrease in the quantity demanded. What happens to total revenue?

\[ TR = P \times Q \]

\[ ? \uparrow \downarrow \]

**Note:**

*If the percentage reduction in Q is smaller than the percentage increase in P, total revenue will rise.*

As an example, suppose that the price increases from N2 to N3, causing the quantity demanded to go down from 6 units to 5 units. With the percentage increase in price (50%) being larger than the percentage reduction in quantity (16.66 percent), total revenue increases (from N2,000 to N2,700).

The percentage reduction in the quantity demanded being smaller in magnitude compared to the percentage increase in price is reflected in demand being price inelastic. Again,

\[ E_D = \frac{\% \Delta Q_d}{\% \Delta P} < 1 \text{ implies that } \% \Delta Q_d < \% \Delta P. \]

Now consider the case where demand is price elastic; \[ E_D = \frac{\% \Delta Q_d}{\% \Delta P} > 1. \]

**Note:** If the resulting percentage increase in the quantity demand exceeds the percentage reduction in price, total revenues will necessarily rise.
The following table summarizes these and the other possible cases.

<table>
<thead>
<tr>
<th>Price elasticity of demand</th>
<th>Direction of price change</th>
<th>Direction of quantity change</th>
<th>Direction of total revenue change</th>
<th>( TR = P \times Q )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( E_D &gt; 1 ) (elastic demand)</td>
<td>( \downarrow P )</td>
<td>( \uparrow Q )</td>
<td>( \uparrow TR )</td>
<td>Because the percentage increase in ( Q ) is larger than the percentage decrease in ( P ), total revenues rise.</td>
</tr>
<tr>
<td>( E_D &lt; 1 ) (inelastic demand)</td>
<td>( \uparrow P )</td>
<td>( \downarrow Q )</td>
<td>( \downarrow TR )</td>
<td>Because the percentage decrease in ( Q ) is larger than the percentage increase in ( P ), total revenues fall.</td>
</tr>
</tbody>
</table>

(The above table is intended to improve understanding of the various cases.)

**These special cases imply the following general patterns.**

When demand is price elastic (i.e., \( E_D > 1 \)), there is inverse (negative) relationship between changes in price and total revenue. For example, a reduction in price will result in an increase in total revenue.

When demand is price inelastic (i.e., \( E_D < 1 \)), there is a positive relationship between changes in price and total revenue. For example, a reduction in price will result in a decrease in total revenue.

If demand has unit elasticity (i.e., \( E_D = 1 \)), a change in price will leave revenues unchanged.

The "total revenue test" along with the fact that the demand for many farm products is price inelastic is important in understanding why "good weather is often bad for farmers' incomes."

Reconsider the demand curve shown above. Note that the price elasticity of demand is not the same as the slope of the demand curve. For a linear demand the slope is constant, implying that a one-dollar reduction in price will result in a constant (here one unit) increase in quantity demanded, no matter when you are along the demand curve. However, the price elasticity of demand goes from perfectly elastic (\( E_D = \infty \)) at point a, where the linear demand intersects the price axis, to perfectly inelastic (\( E_D = 0 \)) at point c where the demand curve intersects the horizontal axis. In general, elasticity is not the same as slope.
Consider the demand curves in figures 1a and 1b. A natural question is which demand curve is more elastic. Do not jump to the conclusion that the flatter demand (1b) is necessarily more elastic. In general, this cannot be inferred by only comparing slopes. Remember that the price elasticity of demand on any linear demand curve goes from zero to infinity. Thus, comparing the price elasticities on two demand curves is not easily done visually, in general.

The relative elasticities on the two demand curves depend upon where you are on the two curves.

There is a special case where a straightforward elasticity comparison is possible. Consider the point (i.e., price-quantity combination) at which two alternative demand curves for a product intersect. Consider demand curve \( D_1 \) or \( D_2 \) in figure 2. For both demands, the quantity demanded would be 1000 units if the price were N1.00. What if the price were N0.80 instead? In the case of \( D_1 \), the quantity demanded would be 1200 units per period. If, instead, the demand were \( D_2 \), the quantity demanded would be 1400 units.
In the price range N0.80 to N1.00, the price elasticity of demand on D₁ is .8182. The corresponding elasticity on D₂ is 1.5. At the point at which the two demand curves intersect, the steeper demand curve is relatively less elastic – the flatter demand curve is relatively more elastic. This is true in general and will often prove useful.

Consider two alternative demand curves for a particular good. At the point where they intersect, the flatter demand curve will be relatively more elastic with respect to price, as compared to the steeper demand curve.

As noted above, the price elasticity of demand will be larger the longer the time period buyers have to adjust to price changes. Thus, one interpretation of D₁ and D₂ in the above diagram is that D₁ shows how the quantity demanded changes in the short-run as a result of a price change from N1.00 and D₂ shows the long-run change in the quantity demanded. Another interpretation is that we consider two hypothetical cases in which demand is more responsive to price in one case (D₂) than the other (D₁).

An increase in supply will result in a decrease in equilibrium price and an increase in equilibrium quantity. It is seen that the magnitudes of the changes in equilibrium price and quantity depend upon the price elasticity of demand.

![Figure 3](image)

First consider the initial equilibrium. With supply curve Sᵃ, the initial equilibrium is at price P₀ and quantity Q₀ whether the demand curve is D₁ or D₂. Now consider the effects of an increase in supply from Sᵃ to Sᵇ.

Case 1: In the case where demand is D₁, the increase in supply will result in the equilibrium price decreasing from P₀ to P₁ and the equilibrium quantity increasing from Q₀ to Q₁.

Case 2: In the case where demand is D₂, the increase in supply will result in the equilibrium price decreasing from P₀ to P₂ and the equilibrium quantity increasing from Q₀ to Q₂.
Both of these cases are consistent with our earlier finding that an increase in supply will lead to a decrease in equilibrium price and an increase in equilibrium quantity. However, these cases demonstrate results regarding the magnitudes of these changes. Note that at the initial equilibrium $D_2$ is relatively more elastic than is $D_1$. Furthermore, in case 2 (as compared to case 1) there is a larger increase in the equilibrium quantity and a smaller reduction in equilibrium price. The explanation is as follows. After the supply has increased, there is an excess supply (surplus) at the price $P_0$. The result will be that the market price falls, and will continue to fall until the surplus is eliminated. Part of this surplus will be eliminated by the fall in price bringing about a reduction in the quantity supplied (a movement along the new supply curve $S^b$). In addition and of central focus here, the reduction in price will bring forth an increase in the quantity demanded (a movement along the pertinent demand curve). When demand is relatively more elastic with respect to price, a given price reduction will cause a relatively larger increase in the quantity demanded. Equivalently, a relatively smaller decrease in price is needed to bring about a given increase in the quantity demanded. Thus, with the initial surplus at $P^0$ and a given supply response, the equilibrium price need not fall by as much to eliminate the surplus and bring demand and supply forces back into equilibrium. Correspondingly, the increase in equilibrium quantity will be larger as demand is more price elastic.

**Note:** For a given increase in supply the increase in equilibrium quantity will be larger and the decrease in equilibrium price will be smaller as the demand is more elastic with respect to price.

Special cases: Figure 4 shows the special case where demand $D_1$ is perfectly inelastic. Note that with $E_D = 0$, the reduction in price has no effect on the quantity demanded. The result is that the equilibrium quantity does not change at all. However, the market price experiences a relatively large decrease because this is needed to have the quantity supplied to fall sufficiently to eliminate the surplus at $P_0$. Note, even though there is an increase in demand, the actual number of units supplied ($Q_0$) does not change.

![Figure 4](image.png)
Now consider the special case where demand is perfectly (infinitely) elastic, as shown by $D_2$. Here the increase in supply only increases the equilibrium quantity, with no change in the equilibrium price.

There are a number of other important elasticity concepts. As noted above, the elasticity concept is applicable whenever quantifiable variables are systematically related. The logic in computing such elasticities is always the same. If changes in variable $X$ result in changes in variable $Y$, the elasticity of $Y$ with respect to $X$ equals the percentage change in $Y$ per one percent change in $X$;

$$E = \frac{\text{percent change in the level of } Y}{\text{percent change in the level of } X}$$

Note that the causation goes from $X$ to $Y$; the change in $X$ results in a change in $Y$. The variable causing the change ($X$) goes in the denominator and the variable that changes in response ($Y$) enters the numerator. It is the percentage change in the variable being affected per unit change in the variable causing the effect.

**The following are important examples.**

Consider a change in income, $I$, that results in a change in the quantity demanded, $Q_d$.

The income elasticity of demand is

$$E_I = \frac{\text{percent change in the quantity demanded}}{\text{percent change in income}} = \frac{\Delta Q_d}{Q_d} \frac{\Delta I}{I}$$

What if an 8 percent increase in income results in a 4 percent increase in the quantity of chicken demanded? The income elasticity of demand for chicken would be $0.5 = \frac{4\%}{8\%}$.

**Note:** The sign of the elasticity is dropped only in the case of the price elasticity of demand. This is done because the law of demand implies that $E_D$ is always negative. Thus, the negative sign does not convey any useful information. In other cases, the sign is important and should not be dropped.

For example, the sign of $E_I$ conveys important information. If $E_I > 0$, the good is normal. It is an inferior good if $E_I < 0$.

Similarly, you can calculate the **cross-price elasticity of demand**, e.g., the elasticity of the demand for apples with respect to the price of oranges. Note that the sign of the cross-price elasticity shows whether the goods are complements or substitutes.

Another important elasticity is the **price elasticity of supply**, which measures the responsiveness of the quantity supplied to the good’s own price. It is the percentage change in the quantity supplied per one percent change in price.
\[ E_S = \frac{\text{percent change in the quantity supplied}}{\text{percent change in price}} = \frac{\Delta Q_S}{Q_S} \frac{\Delta P}{P} \]

**Example:** Suppose that the quantity of labor supplied increases by 5 percent when the wage rate increases 15 percent. What is the value of the price elasticity of supply and what is the intuitive interpretation of this value?

Note that the midpoint method can be used to calculate all elasticities. Also, in all the elasticities other

**Factors that affect the price elasticity of supply:**
- Production capacity: are inputs needed in production available at going market prices?
- The time period under consideration

These factors affect the abilities of suppliers to change the amount of the good they produce.

The slope of the supply curve is not the same as the price elasticity of supply. Even if the supply curve is linear (i.e., has a constant slope), the price elasticity of supply generally will change as you move along the supply curve. Thus, you can’t in general compare the slopes of two demand curves to determine their relative elasticities. However, as with demand, there is a special case.

**Applications Of Demand And Supply Analysis Under Perfect Competition**

**Application on Farm Products**

There is perfect competition in the market for farm products. Farm products like wheat or rice are usually standardized. As defined by Samuelson, “Farming is an up and down industry.” This is for the reason that it based on the farmer. Moreover agriculture is subject to the law of diminishing returns earlier that in industry because (i) land is limited in supply, (ii) Agricultural operations are largely dependent on nature and (iii) economies of large scale production are not available except on very large farms in nations like America and Australia.

**The prices of farm products are determined by demand and supply.**

**Demand for Farm Products** – Farm products generally drop under the category of requisites commodities and that their demand is inelastic. This means that when the price of a farm product drops its demand will not hike much and when its demand will not drop much.

**Supply of Farm Products** – The supply of farm products is also less elastic. The less elastic supply is due to the inelasticity of the factors of production at the discarding of the farmers. The cultivable land of producers is fixed and inflexible. Further, all costs of farm production are fixed and the proportion of variable costs is very insignificant. So irrespective of the volume a farmer produces, his costs do not vary.

**Price Determination** – The price of a farm product is ascertained at a point where its demand and supply curves intersect each other.
Agricultural Price Support

In the developing nations, state provides the facility of price support to the farm producers and at the same time, it gives farm commodities at fair price to farmers. It also gives price support so that the prices of farm products do not drop below specified levels. The state also fixes minimum prices to protect farmers’ earnings from price fluctuations of farm products and to create bumper stocks to prevent feasible future shortages of farm products. The specified level of minimum prices is called price floor.

The excess is eradicated by the state government in three ways.

Supply, i.e. limiting the estate of land for the farmers to grow specified agricultural products

Motivating demand i.e. new uses for farm products are sought and

Purchasing surpluses i.e. certain farm products are bought and stored by the state for future use as “buffer stocks”.

Price Control

Sometimes the state may think it required to impede in the market progression and set maximum (low) price limits for some basic goods. These are known as price ceilings. Producers of such merchandise cannot charge prices higher than the ceiling prices i.e. the maximum prices fixed by the government.

Price ceilings are normally levied on many indispensable consumer goods during combat on other crucial inflationary periods to put off them from increasing above a certain level. In the case of such products the maximum prices fixed by the state are below the equilibrium price. At a price lower than the equilibrium price, the quantity supplied which leads to the shortage of the product. This requirements the prologue of rationing by the state whereby constraint is levied on the volume of a good that a consumer can buy.

Black Market

Black market of a product is the market in which merchandise is sold illegitimately by the sellers at a price than the controlled legal maximum price or ceiling price. It enlarges on account of surplus demand in the market. Some buyers are equipped to pay a higher price for acquiring more volume of the produce. Sellers are also concerned in the black market to sell the products at higher prices and earn more profits.

The working of black market is represented in the figure where D and S are demand and supply curves. They intersect at point E and determine OP market price and OQ market quantity. But the available quantity of the product is OQ1 due to OP2 price ceiling. But the demand is OQ2 and Q2Q1 is the shortage of the commodity. Hence the buyers are ready to offer OP1 price for procuring more units of product.
If the total quantity OQ1 is sold in the black market, the total amount paid by the consumers will be OP1 YQ1. But the receipts of the producers will only be OP2 XQ1 since the price ceiling. Thus the amount OP1 YQ1 – OP2 XQ1 = P1 YXP2 will be the extra gain black marketers shown by the shaded area. Nevertheless the entire supply is usually not sold in the black market, because of price laws.

**Consumer's surplus and Producer’s surplus**

Demand and supply study is very essential in knowing consumer’s surplus and producer’s surplus. Consumer’s surplus is the disparity amidst the total value that consumer is willing to pay and payment that they essentially makes for the purchase of product. The total value that a consumer is ready to pay is the region under the demand curve. On the other hand what he essentially pays is the market price line.

Producer’s surplus is the region above the supply curve and beneath the market price line. It is the disparity amidst the actual amount that a producer receives by selling a given volume of a product and the minimum amount that he expects to receive for its same quantity.

In the figure, the demand curve and SS1 is the supply curve. Both overlap at E and determine OP price and PE is the market price line. OQ is the equilibrium quantity. The consumer’s surplus on OQ units of the product is the area EPD and the producer’s surplus on the same units of the product is ESP. The sum of consumer’s and producer’s surplus will be the maximum when the market structure is perfectly competitive.

**References**

