TOPIC IV: MARKETS IN ACTION - Applications of S&D and E_d&E_s

A. Using E_d and E_s to increase our understanding of the impact of a change in S or D.
B. Price ceilings and price floors
C. Trade quotas
D. Per unit taxes, tariffs, and subsidies
E. Changes in S&D - impact on P_e and Q_e as a function of E_d&E_s

CONCEPTS AND PRINCIPLES

Using the tools “of elasticity” to extend our original S&D analysis - we can now begin to examine not only the direction of changes in P and Q but also the magnitude of changes. Also, we now begin to see how to use S&D analysis to examine the consequences of various types of governmental policies on the market place. These are just examples. They represent only a small fraction of the ways in which governments and markets interact. The key idea is how do government polices affect market incentives.

Our focus is on what happens to market conditions in relation to three broad types of government intervention: price ceilings and price floors, quotas, and taxes, tariffs, subsidies.

In thinking about each of these applications (and all applications) we can also begin to consider more than just how a change in the market will affect P_e and Q_e. In particular we will consider the magnitude of changes in P_e and Q_e as a function of E_d and E_s. This is done essentially by considering a change in the market under conditions in which demand is relatively elastic (or inelastic) or supply is relatively elastic (or inelastic).

The general method for combining S&D analysis with the concepts of E_d and E_s can be looked as follows:

1) Consider whether a change in market conditions leads to a change in S, a change in D, or somehow restricts market price or market quantity sold.

2) Given the change in market, how is the impact on P_e and Q_e dependent up whether D is relatively elastic or inelastic or whether S is relatively elastic or inelastic.
A change in demand:

An example is useful here. Suppose the demand for heating oil increases as a result of a very severe winter.

We know the increase in demand will lead to an increase in $P_E$ and $Q_E$, but by how much?

Consider the two graphs shown above. The one on the left represents a case where $S$ is relatively elastic. The one on the right represents a case where $S$ is relatively inelastic. Note the differences on the changes in $P_E$ and $Q_E$.

The conclusion we can draw is that the more elastic the supply of heating oil, the smaller the increase in $P_E$ and the larger the increase in $Q_E$.

The method of analysis here is relatively simple. Investigate the impact of a change in demand or a change in supply by examining the consequences of varying the relative elasticity of demand or the relative elasticity of supply.

In the examples which follow, this method is applied to various supply and demand situations, in particular ways in which government policy impacts markets.
A change in Supply:

Suppose an increase in the price of raw materials leads to a decrease in supply. We know Pe will increase and Qe will decrease. But, by how much?

Consider the two graphs below.

What we see, is in both cases, Pe increases and Qe decreases.

But, in the graph on the right, price increases by a smaller amount and quantity decreases by a larger amount. The more elastic the demand, the smaller the increase in price and the larger the decrease in quantity demanded.
**PRICE CONTROLS**

**Price floors** -- an imposed constraint on the **minimum** allowable market price. If the price floor is above the market equilibrium price the floor creates a surplus -- a surplus that the market cannot remedy through a decrease in price. If the price floor is set below the market equilibrium price, the floor has no impact on the market (it is nonbinding).

**Price ceilings** -- an imposed constraint on the **maximum** allowable market price. If the price ceiling is below the market equilibrium price the ceiling creates a shortage -- a shortage that the market cannot remedy through an increase in price. If the price ceiling is set above the market equilibrium price, the ceiling has no impact on the market (it is nonbinding).

**Application**

Question: If the minimum wage is increased from $w_1$ to $w_2$ how will affect the market for minimum wage workers and how will the impact depend on the elasticity of demand and the elasticity of supply?

Answer: As shown in both panels below, when the minimum wage is increased the surplus of workers (unemployment) grows. In both panels, if the minimum wage is $w_1$, unemployment is $QS_1 - QD_1$. When the minimum wage is increased to $w_2$, unemployment grows to $QS_2 - QD_2$.

Further, the impact on unemployment of the increase in minimum wage is smallest when demand and/or supply are relatively more inelastic, as shown by comparing the panel on the left to the panel on the right.

**NOTE:** Since the imposition of a price floor or price ceiling only changes the market price, there is no change in demand or supply in that market, only a change in quantity demanded and quantity supplied.
QUOTAS

Quotas are government imposed constraints on the maximum allowable quantity traded for a particular imported good. That is, quotas restrict the quantity that the foreign suppliers can sell to the importing country.

We see in the graphs below, that quotas have the effect of “limiting” supply. More specifically, we think of supply as becoming perfectly inelastic at the quota. Beyond the quota, at all possible prices the quantity supplied is restricted to the maximum quantity defined as the quota. We see that in these graphs the quota decreases the equilibrium quantity and increases the equilibrium price.

What would we mean by a non-binding quota? When would this occur?

Application

Question: How does the imposition of a binding quota affect a market and how does that affect depend on the elasticity of demand?

Answer: The quota restricts supply (decreases supply) so that supply is perfectly inelastic at the point of the quota, $Q_2$ in the panels show below.

As shown by comparing the two panels below, if demand is relatively elastic, a quota on imports will have a smaller impact on $P_e$.

Note that the affect on equilibrium quantity does not depend on the elasticity of demand. In both panels, the new equilibrium quantity is $Q_2$. 

![Graphs showing demand and supply with and without quotas](image-url)
Excise tax -- a per unit tax placed on the sale of a commodity. For every unit sold, the seller must pay the amount of the excise tax to the government. This tax essentially increases the cost per unit of providing the good, by the amount of the tax. Thus, the tax will decrease the supply of the good.

Tariff -- a per unit tax on imported goods. Essentially, a tariff is simply an excise tax on imported goods.

Subsidy to sellers -- a per unit payment (negative tax) on the sale of a commodity. A subsidy paid to seller will increase supply.

Subsidy to buyers -- a per unit payment (negative tax) on the purchase of a commodity. A subsidy paid to buyers will increase demand.

Application

Question: How does the imposition of an excise tax affect the equilibrium price and the equilibrium quantity and how is this impact dependent on the elasticity of demand and the elasticity of supply?

Answer: As shown in the S&D panels which follow on the next page, the excise tax will decrease supply. Further, it can be seen from examining the four panels, that:

a) the more inelastic the demand the greater the increase in the $P_e$ - top left vs top right;
b) the more elastic the supply the greater the increase in the $P_e$ - bottom right vs bottom left;

c) the more elastic the demand, the greater the decrease in $Q_e$ - top right vs top left;
d) the more elastic the supply, the greater the decrease in $Q_e$ - bottom right vs bottom left.

Further, note that the price of the good does not increase by the full amount of the tax.

The extent to which the price increases is called the “burden of the tax on the buyer.” The difference between the tax and the price increase must be paid by the seller. This is called the “burden of the tax on the seller.”

Question: Thinking about the figures on the next page,

1) When would the burden of the tax fall entirely on the buyer?
2) When would the burden of the tax fall entirely on the supplier.

Think about the following. The government’s total revenue from the tax is the amount of the tax multiplied times the quantity sold after the tax is imposed. How does the total revenue from the tax depend on $E_D$ and $E_S$?
In the four panels show below, an excise tax has been placed on the suppliers of the product. In each case the supply curve shifts vertically upward by the amount of the excise tax.

The top two panels show identical supply curves, with a relatively more elastic demand in the right panel. The bottom two panels show identical demand curves, with a relatively more elastic supply in the right panel.

See the discussion on the previous page for an interpretation of the impact of imposing the excise tax.
QUESTIONS

Short Answer

1. A decrease in the minimum wage will always decrease the wage rate received by minimum wage workers. But, what about the total wages to all workers who work at minimum wage jobs? When will a drop in the minimum wage result in an increase in the total wages to all minimum wage workers?

2. Under what conditions would the legalization of the selling of marijuana have no impact on the quantity consumed. Show graphically.

3. True or False -- explain. Ceteris paribus, government revenues from each gallon of gasoline sold from a 5 cent per gallon increase in excise tax on gasoline are the same regardless of whether the demand for gasoline is relatively elastic or inelastic.

4. True or False -- explain. Ceteris paribus, total government revenues from a 10 cent per gallon increase in excise tax on gasoline are the same regardless of whether the demand for gasoline is relatively elastic or inelastic.

5. True or False -- explain. Ceteris paribus, the imposition of a binding price ceiling will lead to a relatively larger shortage if demand and supply are relatively elastic.

6. True or False -- explain. Ceteris paribus, the imposition of a $200 per unit subsidy to buyers of "high efficiency heating system units" will have a relatively small impact on quantity purchased if supply is highly inelastic.

7. True or False -- explain. Ceteris paribus, a binding quota on imports of "foreign made clothing" by the U.S. will have only a small impact on the price of foreign made clothing in the U.S. if the demand for foreign made clothing in the U.S. is highly inelastic.

8. True or False -- explain. Ceteris paribus, the burden of a $.35 excise tax on gasoline will fall on the buyer of gasoline.

9. True or False -- explain. Ceteris paribus, a $1,000 per car tariff placed on Japanese cars imported into the U.S. would increase the price of Japanese cars sold in the U.S. by $1,000.

10. True or False -- explain. Ceteris paribus, a $1,000 per car tariff placed on Japanese cars imported into the U.S. would have no impact on the quantity of Japanese cars sold in the U.S..

11. True or False -- explain. Ceteris paribus, a $5,000 rebate to first time home buyers would increase both the supply of and demand for new homes.

12. True or False -- explain. Ceteris paribus, a $5,000 rebate to first time home buyers would lead to an increase in the price of new homes. But, the price increase would be less than $5,000.
13. True or False -- explain. Ceteris paribus, a binding quota on imports of Japanese cars into the U.S. would have the greatest impact on equilibrium market price and quantity sold if the U.S. demand for Japanese cars is relatively elastic.

14. True or False -- explain. Ceteris paribus, a nonbinding interest rate ceiling will have no impact on the market for loans.

15. True or False -- explain. Ceteris paribus, a binding interest rate ceiling will cause a greater shortage of loans the more elastic the supply and demand for loans.

16. True or False -- explain. Ceteris paribus, an interest rate ceiling of 3% (currently rates are around 15% to 21%) on credit cards would be of great benefit to students because of the low interest charges they would have to pay on their credit card balances.

Multiple Choice

1. Price ceilings:
   A. set a maximum for market prices.
   B. set a minimum for market prices.
   C. increase the market equilibrium price.
   D. decrease the market equilibrium price.
   E. both B and C.

2. The increase of a nonbinding interest rate ceiling on loans will lower quantity demanded and increase quantity supplied of loans.
   A. True
   B. False

3. Which of the following statements regarding the expected effects of a price control in a competitive market is true?
   A. A nonbinding price floor will generate a shortage since price is held below the equilibrium price.
   B. A price floor below the equilibrium price will generate a quantity exchanged that is equal to the equilibrium quantity.
   C. A price ceiling below the equilibrium price will generate an increase in supply since there is a shortage in the market.
   D. A price floor above the equilibrium price will generate a larger quantity exchanged than equilibrium quantity since sellers will supply more at a lower price.
4. Assume there is a binding import quota placed on European cars slated to be imported into the U.S. The impact on the market for U.S. made cars would be a(n):

A. increase in demand and increase in supply.
B. increase in demand and increase quantity supplied.
C. movement up the demand curve and up the supply curve.
D. movement up the demand curve and down the supply curve.

5. Price floors:

A. set a maximum for market prices.
B. set a minimum for market prices.
C. increase the market equilibrium price.
D. decrease the market equilibrium price.

6. The burden on consumers of an excise tax placed on gasoline will be greatest:

A. the more elastic the demand for gasoline.
B. the more inelastic the demand for gasoline.
C. the more inelastic the supply of gasoline.

7. Assume the government decides to increase excise taxes on cigarettes, partly to increase revenues and partly to reduce cigarette consumption. If the price elasticity of demand for cigarettes is \( E_d = 0.5 \), by how much would the price of cigarettes have to increase in order to generate a 30% decrease in the quantity of cigarettes demanded?

A. 5%
B. 15%
C. 45%
D. 60%

8. Suppose the government wants to raise money by means of a per-unit excise tax on a particular commodity. Which of the following demand and supply curve combinations best meet this requirements?

A. relatively inelastic supply and demand
B. relatively elastic supply and demand
C. relatively elastic demand and inelastic supply
D. relatively inelastic demand and elastic supply
9. The imposition of a binding quota on imported sugar would have the greatest impact on sugar prices if:
   
   A. the demand for sugar is highly inelastic.
   B. the demand for sugar is highly elastic.
   C. the supply of sugar with no quota is highly elastic.
   D. the supply of sugar with no quota is highly inelastic.

10. Assume 5 million packs of cigarettes are sold annually at a price of $2 per pack. The government is considering imposing a tax of $.50 per pack. A budget official is quoted as saying "this tax will raise $2.5 million in tax revenue next year." What is the official assuming about the market for cigarettes?
   
   A. demand is relatively elastic.
   B. demand is perfectly elastic.
   C. demand is relatively inelastic.
   D. demand is perfectly inelastic.

11. Suppose the government proposes to keep cheese prices "up" through government purchases of cheese. For a given difference between the equilibrium price and the support price, government purchases will be smallest:
   
   A. the higher the elasticity of supply and the lower the elasticity of demand.
   B. the lower the elasticity of supply and the higher the elasticity of demand.
   C. the higher the elasticity of supply and the higher the elasticity of demand.
   D. the lower the elasticity of supply and the lower the elasticity of demand.

12. Assume a binding wage floor is increased for "unskilled" labor. Given a longer time period for adjustment, one would expect:
   
   A. the resulting unemployment to increase.
   B. the resulting unemployment to decrease.
   C. the demand for unskilled workers to decrease.
   D. the demand for unskilled workers to increase.

13. An excise tax will have the smallest burden on the consumer (in terms of higher prices) if a tax is placed on which of the following products?
   
   A. clothing
   B. shoes
   C. tennis shoes
   D. Reebok tennis shoes
14. Congress is currently considering raising the excise tax on ammunition. If the goal is to decrease the amount of ammunition used, Congress' goal will be most successful:

A. the more elastic the demand for ammunition and the more elastic the supply of ammunition.
B. the more elastic the demand for ammunition and the less elastic the supply of ammunition.
C. the less elastic the demand for ammunition and the more elastic the supply of ammunition.
D. the less elastic the demand for ammunition and the less elastic the supply of ammunition.

15. If sugar is sold in a perfectly competitive market, the removal of a binding quota on imported sugar would have the smallest impact on sugar prices if:

A. the demand for sugar is highly inelastic.
B. the demand for sugar is highly elastic.
C. the increase in demand caused by the removal is large.
D. the increase in demand caused by the removal is small.

16. There is currently a strong debate on the benefits and costs of increasing the minimum wage. Proponents of the law argue that an increase would have very little impact on unemployment. Their argument would be the strongest if:

A. demand and supply of labor is highly elastic.
B. demand and supply of labor is highly inelastic.
C. there are only small reductions in the demand for labor when the wage is increased.
D. there are only small increases in the supply of new workers when the wage is increased.

17. Suppose the government wants to decrease consumption of several goods by implementing a per-unit excise tax on those goods. In which of the following demand and supply curve combinations would the government's goal be most successful?

A. highly inelastic supply and demand
B. highly elastic supply and demand
C. highly elastic demand and highly inelastic supply
D. highly inelastic demand and highly elastic supply