

# Tax/Subsidy

by Sophia Tutorial



## WHAT'S COVERED

This tutorial will cover the effect of taxes and subsidies on both consumers and sellers.

Our discussion breaks down as follows:

1. Taxes and Impact on Market Outcome
2. Tax Incidence and Elasticity
  - a. Inelastic Demand
  - b. Elastic Supply
  - c. Elastic Demand
  - d. Inelastic Supply
3. Subsidy Incidence and Elasticity
  - a. Elastic Demand
  - b. Inelastic Demand

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## 1. Taxes and Impact on Market Outcome

It is common knowledge that we pay taxes on many things. We pay taxes on our income at three levels--local, state, and federal. We also pay a lot of taxes on goods and services.

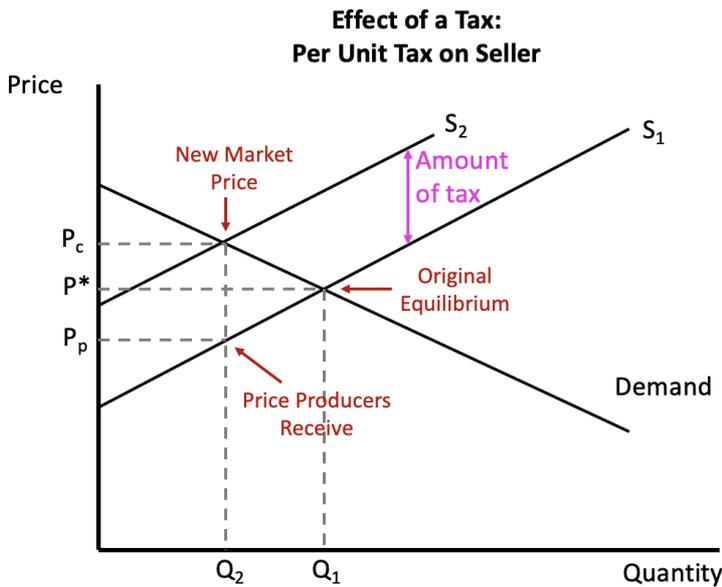
In economics, we consider how taxes alter the market outcome. By analyzing a graph, we notice how the equilibrium quantity being purchased or being supplied is impacted, as well as how the price we pay is affected.

**Tax** is defined as an additional cost of supply or purchase levied to alter consumer behavior and/or to increase government revenue. The purpose of a tax could be either to change our behavior to get us to buy less of something, or to increase government revenue, or a combination of the two.

Here is a basic graph of a tax. Let's assume that it represents the effect of taxing cigarettes, which is a common example of a tax. In the case of a tax, since it is an increased cost to the producer, the supply curve shifts to the left, with two results:

- Increases the price consumers pay (new market price)

- Decreases price producers receive



Looking at the graph above, the original equilibrium was at  $Q_1$  and  $P^*$ .

With a decrease in supply comes movement along the demand curve, and the new market price being paid is  $P_c$ , as indicated on the graph.

However, the price that producers are actually going to receive is down at  $P_p$ , because the amount of the tax is the distance between the supply curves.

Notice we are purchasing a lower quantity as the price we pay rises, which is the law of demand. As prices go up, we buy a lower quantity.



#### TERM TO KNOW

#### Tax

An additional cost of supply or purchase levied to alter consumer behavior and/or increase government revenue

## 2. Tax Incidence and Elasticity

Now, the next question is, who is actually impacted in this scenario? What is the **tax incidence**, which is the economic "burden" of tax? Is it the consumer or the producer? Is it a combination?

Generally, it is going to be a combination, but let's examine who bears more of the burden.

It certainly depends on the good or service, and it involves the concept of **elasticity**, which is the measurement of change in quantity demanded or supplied, showing the sensitivity of one variable to characteristics of another variable. In other words, how responsive is something to something else?



#### TERMS TO KNOW

## Tax Incidence

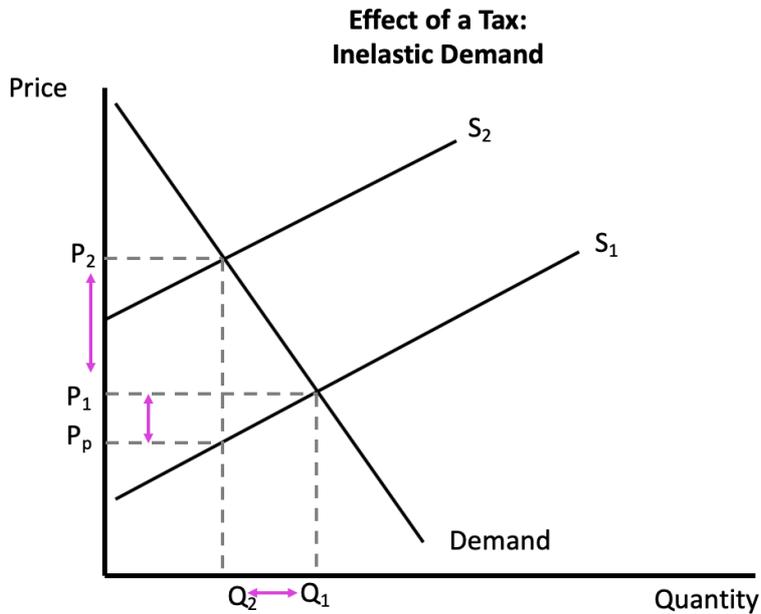
The economic "burden" of a tax

## Elasticity

Measurement of change in quantity demanded (supplied) which indicates the sensitivity of one variable to characteristics of another variable or income

### 2a. Inelastic Demand

Here is an inelastic demand curve. Notice how it is fairly straight up and down--or very inelastic--meaning that consumers are not overly responsive to a price change.



So, as we shift supply to the left to account for the amount of the tax, several things happen:

- Producers with this inelastic demand can raise the price to cover most of the tax without losing many sales, as evidenced in the shift from P<sub>1</sub> to P<sub>2</sub>.
- Consumers bear most of the burden in the form of higher prices, while the small amount shown between P<sub>1</sub> and P<sub>p</sub> is all that the producers will bear in terms of the burden.



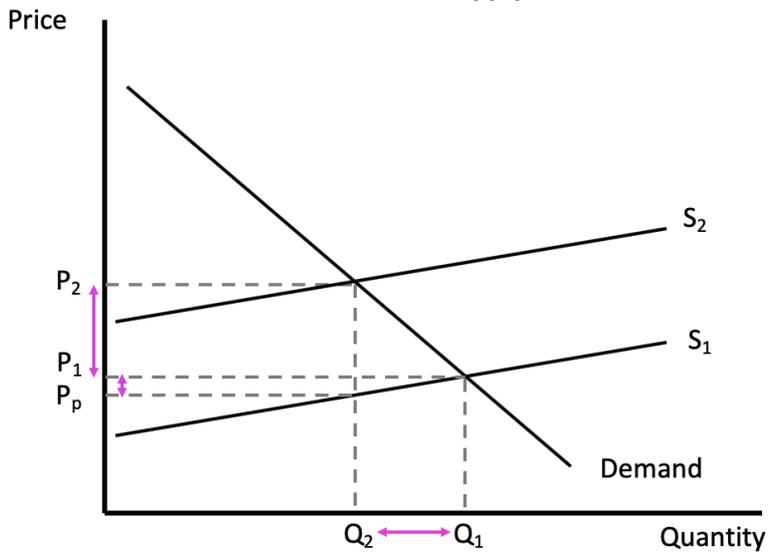
HINT

Remember, the distance between the supply curves is the tax.

### 2b. Elastic Supply

Similarly, if we look at a situation when supply is elastic supply, it will have a very similar outcome as above.

### Effect of a Tax: Elastic Supply



- Producers can raise the price significantly to cover most of the tax--again, without losing many sales.
- Once again, consumers bear most of the burden in the form of higher prices (the difference between  $P_1$  and  $P_2$ ), while producers bear this tiny amount represented by the difference between  $P_1$  and  $P_p$ .

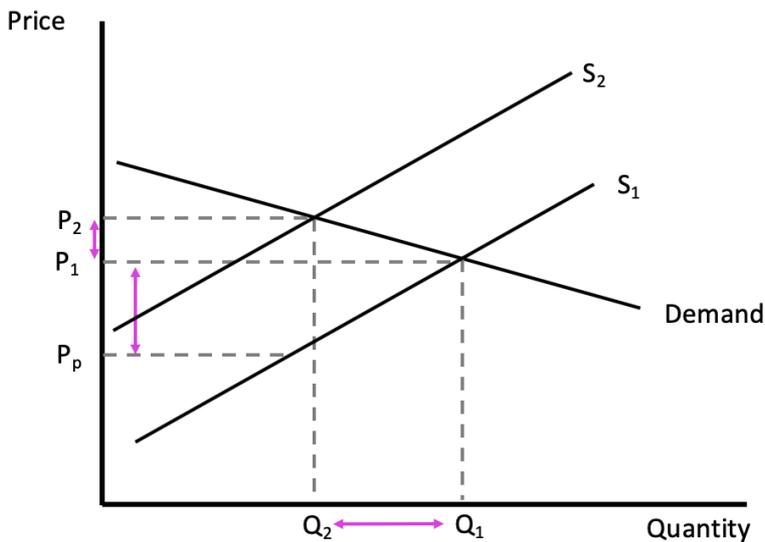


Inelastic demand and elastic supply have similar outcomes.

### 2c. Elastic Demand

An opposite situation occurs when we have a very elastic demand compared to supply.

### Effect of a Tax: Elastic Demand

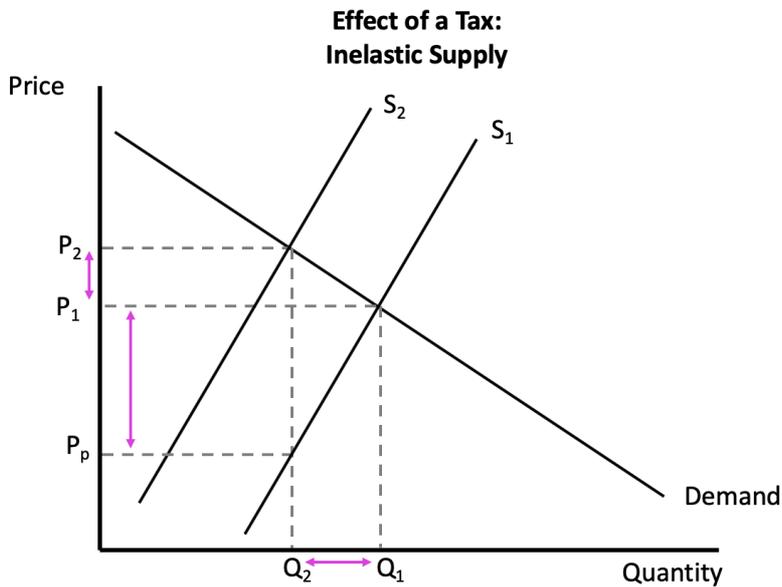


- Notice how the producers cannot raise the price much at all without losing a lot in sales, as the supply shifts to the left.
- Producers bear most of the burden in the form of tax, shown in the difference between  $P_1$  and  $P_p$ , while consumers only bear the small amount shown between  $P_1$  and  $P_2$ .

Even with that small increase in price, notice the change in quantity. This is because we, as consumers, are very responsive to the price change with elastic demand.

## 2d. Inelastic Supply

The last scenario to discuss is one of inelastic supply. Again, this will have a very similar outcome as with the elastic demand.



- Producers cannot raise the price much without losing a lot in sales (the difference between  $P_1$  and  $P_2$ ).
- Producers bear the majority of the burden (amount between  $P_1$  and  $P_p$ ).



HINT

Again, notice how elastic demand and inelastic supply have similar outcomes.

### IN CONTEXT

Many items have different elasticities along their demand curve. Items like cigarettes and alcohol have relatively elastic demand at lower prices, but then relatively inelastic demand at higher prices.

When they raise the tax initially, it can generate a significant response in terms of consumers cutting back on buying cigarettes. Perhaps this reflects the people who were on the border, such as those who wanted to quit anyway or those casual smokers, who might cut back now that they have to pay a tax.

However, as that tax gets higher and higher and higher, we reach the inelastic portion of the demand curve for cigarettes. This is because these are the people who have not responded to the price change--and they are likely not going to respond to the price change.

They are addicted to cigarettes and will continue smoking, regardless of price. Therefore, the impact of the tax can be quite different as it gets higher and higher, because of the inherent characteristics of particular items.

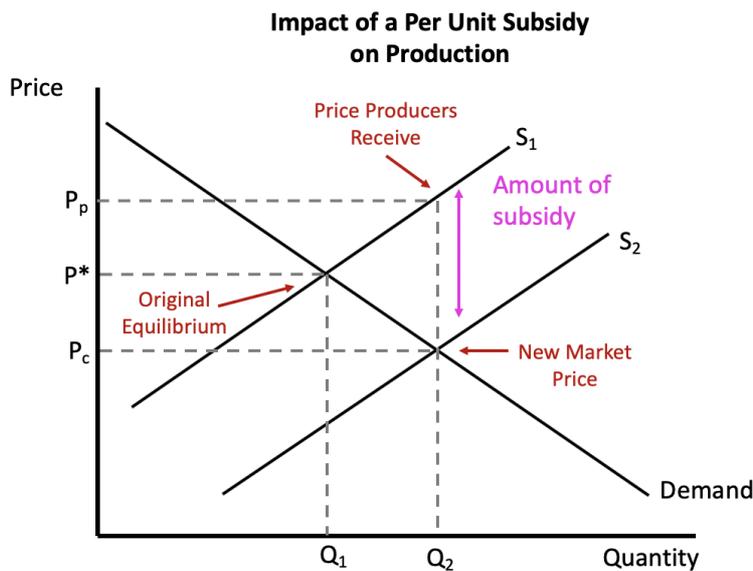
# 3. Subsidies and Impact on Market Outcome

A **subsidy** is a sum paid, typically by the government, to either suppliers or consumers to assist in the production or purchase of a good or service. The point of a subsidy is to get supply increased.



In essence, we are simply reversing the process. You will notice that whenever there is a subsidy, supply will be clearly increasing, versus decreasing as with a tax.

The effect of a subsidy is that the supply curve shifts to the right, as shown below. The initial price and quantity ( $P^*$ ,  $Q_1$ ) shift to its new point of equilibrium at ( $P_c$ ,  $Q_2$ ).



The price that consumers are paying is now lower ( $P_c$ ), while the price that producers are receiving--because the amount of the subsidy is the distance between the two supply curves--is higher, at  $P_p$ .



Keep in mind, that to fund this subsidy, tax revenue will need to be used from some other source.



## Subsidy

Sum paid (typically by a government entity) to either suppliers or consumers to assist in the production or purchase of a good or service

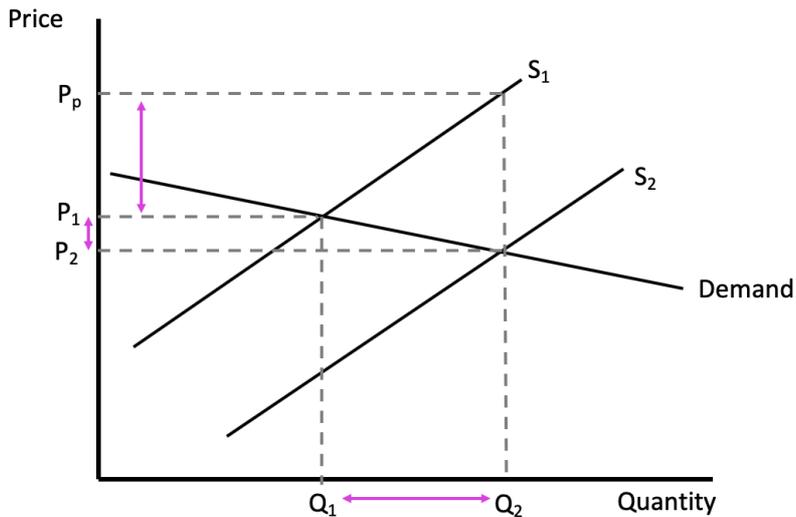
# 4. Subsidy Incidence and Elasticity

Now, let's go through the same exercise as before, although in this case, it is slightly different because the question is not about who is bearing the burden, but rather who collects the subsidies.

## 4a. Elastic Demand

With elastic demand, you can see that producers will actually receive more of the subsidy. The price does not fall by very much, but people are much more responsive and buy a lot more. Therefore, the producers actually receive more of it, because people are buying a greater quantity.

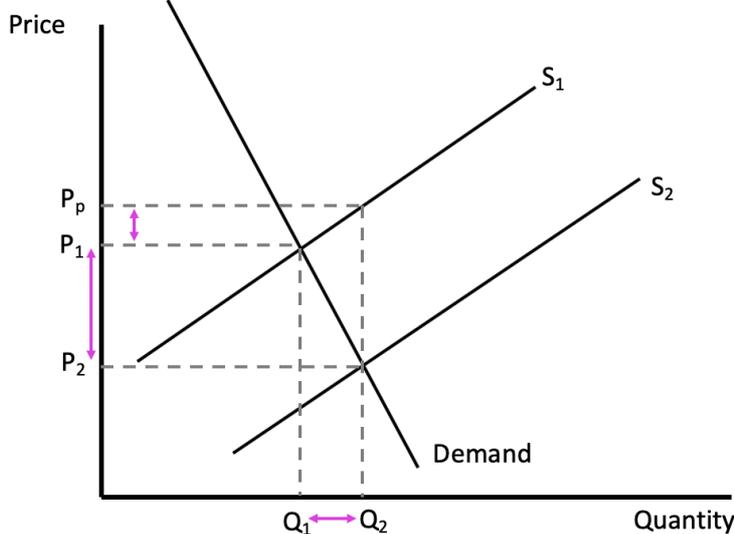
**Impact of a Per Unit Subsidy on Elastic Demand**



#### 4b. Inelastic Demand

With inelastic demand, consumers will receive more of it, which is the opposite of what happens with a tax. In the graph, notice the significant portion that consumers are receiving, compared to the small portion that represents how much the producers would receive.

**Impact of a Per Unit Subsidy on Inelastic Demand**



### SUMMARY

Today we learned about the **impact of taxes and subsidies on the market outcome** or the prices paid by consumers and producers. We discussed who might bear the majority of the burden, or "pay" the **incidence**, depending on the **elasticity** of the supply and demand, by exploring each of the scenarios: **inelastic demand and supply**, and **elastic supply and demand**.



## TERMS TO KNOW

**Elasticity**

Measurement of change in quantity demanded (supplied) which indicates the sensitivity of one variable to characteristics of another variable or income.

**Subsidy**

Sum paid (typically by a government entity) to either suppliers or consumers to assist in the production or purchase of a good or service.

**Tax**

An additional cost of supply or purchase levied to alter consumer behavior and/or increase government revenue.

**Tax Incidence**

The economic "burden" of a tax.