Elasticity Case Study Solution: Stockholm Congestion Charge

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Questions for discussion

1. By what percentage did the cost of traveling across the inner-city cordon change:

    a. For all trips in non-exempt vehicles between 2005 and 2006?

$$\frac{12.8}{25.5} = 50\%$$

A 50 percent increase. For purposes of calculating elasticity, the symmetrical percent change would be more appropriate:

$$\frac{12.8}{25.5 + \frac{1}{2}12.8} = 40\%$$

A 40 percent change.

b. For peak-period trips in private vehicles between 2015 and 2016?

$$\frac{30.7 - 17.9}{31.5 + 17.9} = 26\%$$

A 26 percent increase. For purposes of calculating elasticity, the symmetrical percent change would be more appropriate:

$$\frac{30.7 - 17.9}{31.5 + \frac{1}{2}(17.9 + 30.7)} = 23\%$$

A nine percent change.

2. By what percent did the volume trips crossing the cordon change:

    a. For all trips in non-exempt vehicles between 2005 and 2006?

$$\frac{30,021 - 21,114}{30,021} = 30\%$$

There was a 30 percent reduction in traffic volumes.

For purposes of calculating elasticity, it would be more sensible to use the symmetrical percent change:

$$\frac{30,021 - 21,114}{\frac{1}{2}(30,021 + 21,114)} = 35\%$$

A 35% difference in traffic volumes.

b. For peak-period trips in private vehicles between 2015 and 2016?

$$\frac{13,570 - 11,878}{13,570} = 12\%$$

A 12 percent reduction.

For purposes of calculating elasticity, it would be more sensible to use the symmetrical percent change:

$$\frac{13,570 - 11,878}{\frac{1}{2}(13,570 + 11,878)} = 13\%$$

3. What was the price elasticity of demand for travel across the cordon:

a. For all trips in non-exempt vehicles between 2005 and 2006?

$$\frac{35\%}{40\%} = 0.88$$

b. For peak-period trips in private vehicles between 2015 and 2016?

$$\frac{13\%}{23\%} = 0.56$$

4. What was the change in consumer surplus associated with:

a. The introduction of the congestion charge in 2006?

$$(30,021 - 21,114)(25.5) + \frac{1}{2}(12.8)(30,021 - 21,114)$$

$$227,128.5 + 57,004.8 = 284,133.3$$

A reduction in consumer surplus of SEK 284 133.3

b. The increase in the congestion charge in 2016?

$$(13,570-11,878)(31.5+17.9)+\frac{1}{2}(30.7-17.9)(13,570-11,878) = 94,377.6$$

A reduction in consumer surplus of SEK 94 37.6

5. For the consumer surplus changes in both 2006 and 2016, how much of the change was experienced by people who continued to drive across the cordon and how much was experienced by those who shifted to other modes or reduced their trips to and from the inner city?

2006:

$$\frac{227,128.5}{284,133.3} = 80\%$$

80 percent of reduction in total consumer surplus came from drivers who continued to drive across the cordon.

2016:

$$\frac{83,548.8}{94,377.6} = 89\%$$

89% of the reduction in consumer surplus can from people who continued to drive across the cordon.

6. What other information would you need to fully account for the costs and benefits of the congestion charge for people who live or work in Stockholm?

For benefits to drivers, you would need to account for differences in travel time. There are also costs and benefits to non-drivers (externalites) such as traffic noise, air pollution, greenhouse gas emissions.