ECON 110, Prof. Hogendorn

Problem Set 1 Answers

1. *Niko.* In 2001, Niko bought four video game consoles: one from Microsoft for $300, one from Sony for $300, and two from Nintendo for $200 each.

   In 2006 Niko checked out the prices for systems from each manufacturer. A new console from Microsoft cost $280, a new console from Sony cost $400, and a new console from Nintendo cost $250.

   (a) The 2001 quantities are 1, 1, and 2. The cost in 2001 was

   $$1 \times 300 + 1 \times 300 + 2 \times 200 = 1000$$

   The cost in 2006 of this combination would be

   $$1 \times 280 + 1 \times 400 + 2 \times 250 = 1180$$

   Thus the 2006 price index (with 2001=100) is

   $$\frac{1180}{1000} = 118\%$$

   Note that it doesn't matter whether Niko actually pruchased more consoles in 2006, we just need the base year quantities to see how much inflation there was.

   (b) In part (a) we found 118% inflation over a period of 5 years. That is approximately 3.6% per year. By the rule of 70, this is about 70/3.6=19.4 years for prices to double.

   Alternatively, the rule of 70 says that it takes about 70/18 = 3.9 5-year periods for prices to double. Since 3.9 × 5 = 19.4, the answer is the same.

(c) Presumably everyone agrees that these new consoles have better features than the old ones. If Niko values these new features 18% more than the old ones, then the inflation has no effect on Niko's welfare. If he values them more than 18% more, he is actually better off.

(d) As a unit of account, Playstation 2's aren't too bad. They currently sell for around $40 give or take, which means all current prices would need to be divided by 40 to put them in terms of PS2s. This would be reasonably convenient, so they make a pretty good unit of account.

As a medium of exchange, PS2s are pretty bulky and fragile to carry around and make exchanges with. More problematic, they cannot be divided into smaller parts without breaking them, creating a significant inconvenience in using them in exchange.

As a store of value, PS2s have a problem: they are becoming increasingly obsolete, and therefore their use value is declining. But at least no new ones are being produced, so people would have some protection against inflation caused by creating more money.

2. *Movies_a.*

(a) We need to deflate today's price back to the previous years. We know that today's price is 207% of 1983's price, and in turn 1978's price is 65.2% of 1983's. So the formulas are:

$$p_{1978} = \$7 \cdot \frac{65.2}{207} = \$2.20 \qquad p_{1948} = \$7 \cdot \frac{24.1}{207} = \$0.82$$

(b) The 2008 CPI is obviously 100. For 1948, we just need to divide the 1983-base CPI of 24.1 by the 1983-base CPI for 2008 of 207, or 11.6. For 1978, a similar operation yields 65.2/207= 31.5.

(c) During the 30 year period 1948–78, movie prices doubled x times, where x solves $0.36 \times 2^x = 2.34$. We find this using logarithms:

$2^x = 6.5 \Rightarrow x\ln(2) = \ln(6.5) \Rightarrow x = 2.7$. To double 2.7 times in 30 years means to double approximately once in 11.1 years, which by the Rule of 70 implies $70/\pi = 11.1$ or $\pi = 6.3\%$. Doing the same calculation for the 1978–2008 period gives $\pi = 3.7\%$. Now if we do the same with the CPI, we get different numbers. From 1948–78 gives $\pi = 3.34\%$ and from 1978–2008 gives $\pi = 3.8\%$.

(d) It is true that movie prices are a *component* of the CPI, so when they go up, they affect the CPI. But in addition to inflation, some of the movie price changes are *real* price changes, reflecting movies becoming more or less expensive relative to other *goods*, rather than purely *nominal* price changes with respect to the value of the dollar only.

In this case, it appears that the real price of movies relative to other goods rose dramatically over the period 1948–78, and then fell very slightly from 1978 to 2008. Most likely, your own movie-going buying power is about the same as your parents', but much less than your grandparents'.

3. *SUVs_a.*

(a) The derivatives are:

$$\frac{dq^d}{dp} = -6040.5p^{-2.5} < 0 \qquad \frac{d^2q^d}{dp^2} = 15101.25p^{-3.5} > 0$$

The first derivative is negative (for any value of p), thus the function must slope down. The second derivative is positive, thus the slope must be getting less steep as price increases.

The graph looks is like in part (d).

(b) Setting demand equal to supply gives:

$$
\begin{aligned}
4027p^{-1.5} &= 258.3p \\
15.59 &= p^{2.5} \\
p = 3 \qquad & q = 775
\end{aligned}
$$

(c) Gas is a complement to SUVs. If the price of a complement rises, it produces a negative demand shift. Therefore, we would expect to see a lower demand for SUVs at *any* price of SUVs, and the demand curve $q^d = 3700p^{-1.5}$ is the more likely result.

(d) Setting demand equal to supply gives:

$$
\begin{aligned}
3700p^{-1.5} &= 258.3p \\
14.32 &= p^{2.5} \\
p = 2.90 \qquad & q = 749
\end{aligned}
$$

The graph of what happened is:
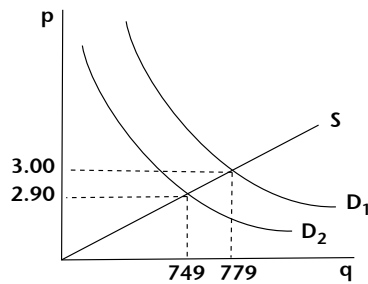
4. *Shifters_a.*

   (a) Technology affects only supply. An improvement means a greater quantity supplied at any given price, hence a right shift of the supply curve. Market equilibrium price falls and quantity rises.

   (b) "Desire" reflects tastes, which affect the demand curve. Increased desire means a higher quantity demanded at any given price, hence a right shift of the demand curve. Market equilibrium price rises and quantity rises.

   (c) Since wages of *all* workers fall, we can expect two effects. First, for any particular good, demand will shift to the left because of lower incomes (assuming the good is a normal good). Second,

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the lower wage is a lower cost to firms, so supply will shift to the right. The market equilibrium price will definitely fall, but the effect on quantity exchanged is indeterminate.

This type of problem is important in macroeconomics, and we will build a more complete model of this situation later in the course.