Inflation

Hershey's "5 cent" chocolates

A Google search says:

"When Milton S. Hershey began selling pre-wrapped sweet chocolate bars in about 1895, different sized bars sold for 2 cents, 3 cents, 5 cents and 10 cents. When Hershey's Milk Chocolate was introduced in 1900, the standard size bar retailed for 5 cents. The 5 cent bar was the standard until it was discontinued in 1969."

The truth is that as time went by, the "5 cent" chocolate bar was getting smaller and smaller. Just before its discontinuation, it was about the size of a credit card ...

- This is a vivid example of the loss of *purchasing power* of a monetary unit, i.e., inflation

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The inflation rate

- $p(t)$ ... denotes the **price level function**, e.g., the **Consumer Price Index**
- Unlike, for instance, the accumulation function, the price level function is a vague concept and it depends on the context of a given problem
- Regardless of the convention/methodology we use to define $p(t)$, once it is defined, we can proceed to define the inflation rate using $p(t)$
- $r_{[t_1,t_2]}$ ... the inflation rate on the interval $[t_1, t_2]$, i.e.,

$$r_{[t_1,t_2]} = \frac{p(t_2) - p(t_1)}{p(t_1)}$$

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Inflation adjusted interest rate

- Assume that one can buy 1 chocolate bar for \$1 at time zero
- If one invests \$1 for one year at the effective interest rate i, then one ends up with

$$\$(1+i)$$

at the end of that year
- At the same time, assume that the inflation rate over one unit of time equals r; this means that one chocolate bar at the end of the year costs

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- Thus, for the amount of money on the account at the end of the year, one can get

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Inflation adjusted interest rate (cont'd)

- One's purchasing power at the end of the year has changed from what it was at time zero; we define the inflation adjusted (or real) interest rate j so that

$$1 + j = \frac{1 + i}{1 + r}$$

A more serious example

An insurance company is making annual payments under the settlement provisions of a personal injury lawsuit.
A payment of $24,000 has just been made and 10 more payments are due.

Future payments are **indexed to the Consumer Price Index** calculated by the Bureau of Labor Statistics. It is *assumed* that the CPI will increase at 5% per year.

- Assuming that the nominal (annual) rate of interest i equals 0.08, we get that the inflation adjusted rate of interest equals

$$j = \frac{0.08 - 0.05}{1 + 0.05} = 0.028571$$

- *Caveat:* As a rule of thumb, it might be convenient to approximate the real rate of interest by $i - r$. In the above situation, we would get $0.08 - 0.05 = 0.03$; note that this approximation recipe consistently *overestimates* the real interest rate
- *Reading assignment:* See the discussion on page 62 about the behavioral facet of inflation and adjusting to inflation

Assignment: Examples 1.14.6 and 1.14.7 in the textbook

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