Inflation: Real and Actual Dollars

1. Real and Actual Dollars
   with Inflation all dollars are not the same
When inflation is considered in an economic analysis, money is expressed by two measures: real and actual dollars. We will see that either measure can be used for an analysis, but it is important to understand the distinction between the two.

2. This Lecture
   Define real and actual dollars
   Change between real and actual dollars based on time and inflation rate.
   Express cash flows in real or actual dollars
The lecture defines the two terms, shows how to change from one to the other, and shows how to use them to describe cash flows.

3. Real or Actual
   Consider an estimated cash flow n years from today.
   If the cash flow is expressed in terms of constant-value dollars, we say the amount is in real (or year-0, or constant) dollars.
   If the cash flow is expressed in terms of the dollars that will be used in n years, we say the amount is in actual (or year-n, or current) dollars.
When we speak of an amount of cash at a different time than the present, we must explain whether the amount is corrected for inflation or not. Constant value or real dollars have the same buying power at any time. Dollars that are actually spent at some time are called actual dollars. When inflation has a positive rate, the cost to buy something may be constant in real terms, but will be greater in actual dollar terms. Understanding this important distinction is central to economic analyses.
4. From Real to Actual

The general inflation rate is \( i \) per year (a fraction).

We assume the general inflation rate is a constant value for all years in the future.

An amount \( C \) at year \( n \) is expressed in real dollars. The amount in actual dollars is:

When estimating future costs we usually use a single inflation rate for the future. In the example we use the general inflation rate as measured by the CPI. The cost of an item in real dollars is \( C \). We compute the cost in actual dollars after \( n \) years as one plus the inflation rate raised to the \( n \)th power. Since the inflation rate is almost always positive, the cost in actual dollars is greater than the cost in real dollars. The formula is the same as the compounding formula so we can use the \( F/P \) factor for evaluation. The formula does not find an equivalent value at year \( n \). Rather, it changes the measure of cost from real to actual dollars.

5. Retirement Plans

A 25 year old college graduate has just been hired for her first job. She brags that she will save enough money to retire at 55 with one million dollars. But wait. Let's assume a 3% annual inflation rate over her 30 year career. If she wants her retirement fund to have the value of one million of today's dollars, how much must she save?

When the college student is planning for her retirement, she is probably thinking of the 1 million dollars in terms of today's dollars. If she could retire today, she thinks she can live happily with 1 million dollars. But after 30 years, that amount will not buy what it can today. How big must her retirement be in actual dollars to have the spending power of 1 million of today's dollars?

6. Actual Dollars

The $1 million is in real dollars. Changing it to actual dollars we find that she will have to save almost $2.5 million.

She will start spending her retirement money in 30 years. Money spent is always measured in actual dollars. The actual dollar equivalent assuming 3% inflation is almost 2 and half million dollars. Wouldn’t she be disappointed if she only saved 1 million?

7. Real to Actual Cash Flow

Use the general inflation rate

If you have a cash flow expressed in real dollars, it is expressed in actual dollars by inflating the amounts individually for each period. When the real dollar cash flow is a uniform series, the actually dollar cash flow is a geometric series.
8. **College Tuition**

   In 2005 the average tuition and fees at the University of Texas at Austin for 30 semester credit hours was $5,734. This is for Texas residents. A student enters high school in 2005. How much should he expect to pay for tuition for the four years starting in 2009? Assume college costs go up at the same rate as general inflation and assume that is 3%.

   The tuition cost today is almost $6000. We will assume that the tuition will be the same in 2009 and thereafter in real dollars.

9. **Actual Tuition**

   The table below shows the actual estimated tuition costs.

   The table shows the effects of inflation on tuition. In actual dollars it is increasing, but in real dollars it is the same as today. With the assumed inflation rate, $7,052 spent in year 2012 will have the same buying power as $5,734 today.

10. **From Actual to Real**

    The general inflation rate is \( f \) per year (a fraction).

    The amount \( D \) at year \( n \) is expressed in actual dollars. The amount expressed in real dollars is:

    Now we turn to the problem of changing an actual dollar amount to real dollars. The translation formula is the same as the discounting formula. We use the general inflation rate as measured by the CPI in the discount factor.

11. **Actual to Real**

    **Cash Flow**

    Use the general inflation rate

    Our illustration is the same as the one used earlier except now we start with the actual dollars. The amounts in each year are deflated by the general inflation rate. Of course, we obtain the uniform series that we started with. You should note from our examples that the amount at time 0 did not change. Amounts at time 0 are the same in real or actual dollars because there is no passage of time.

12. **Real College Tuition**

    Since we assumed that tuition increases at the same rate as general inflation the real tuition is the same as today’s tuition.

    Using the tuition example, we compute the real value of the tuition cost. Since we inflated the payments with general inflation, the real value of the tuition is the same as it is today.
13. Different Inflation Rates
   If college tuition grows at 5% but the general inflation rate is 3%, tuition grows in both actual and real dollars.
   It seems more likely that tuition will grow at a greater rate than general inflation. If that happens, tuition increases in both actual and real dollars. The actual values are the ones the student will actually pay. The real values measure those costs in constant value dollars.

14. Summary
   Actual dollars are what you spend. They measure the costs of things in the economy.
   The actual dollar prices of things increase with time because of inflation. To compare costs for the same thing at different points in time, the effects of inflation must be removed.
   When discussing the costs of things at different points in time it is almost always more reasonable to express the costs in real dollars instead of actual dollars. We remove the effects of inflation by changing actual costs to real costs.

15. Summary
   Real dollars are constant value dollars based on one point in time. Prices at different times can be compared with real dollars.
   Change between real and actual dollars with the general inflation rate.
   It is important that inflation be considered for economic analyses.
   Since most economies experience inflation most of the time, it is important that inflation be considered in economic analyses. We address how this is done in the remainder of this lesson.