

Real and nominal calculations using the GDP deflator

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This is an extension of chapter 12. You must know how to do the kinds of calculations shown here for the final exam.

The table on the next page is an expanded version of Table 12-3, ranging from 1929 to 2009. Nominal and real GDP are tabulated by government statisticians who may or may not know what they're doing. We can calculate the GDP deflator ourselves by dividing nominal GDP by real GDP and multiplying by 100. For example, for 1986 the figure is $100 \times 4460.1 / 7086.5 = 62.9$. Before doing this, we must pick a year as the base year and assign a 100 to that year. The year 2005 was chosen for this table, which is evident because real and nominal GDP values are the same for that year.

Suppose we want to compare bus fares in 1959 and 2009. The bus fare was \$0.20 in 1959 and \$2.00 in 2009. In nominal terms it has risen tenfold. When we convert to real (inflation-adjusted) prices we will see a much smaller increase or perhaps even a decrease.

Convert each price to 2005 dollars by multiplying that price by 100 and dividing by the GDP deflator for that year. For 1959, the real bus fare becomes $\$0.20 \times 100 / 18.3 = \1.09 . For 2009, the real bus fare is $\$2.00 \times 100 / 109.8 = \1.82 . The real bus fare has gone up, but less than the nominal bus fare. We have used the GDP deflator to take the inflation out of the bus fare increase.

We can convert real and nominal changes to percentages. In nominal terms, the increase was

$$\frac{2.00 - 0.20}{0.20} \times 100\% = 900\%$$

In real terms it was

$$\frac{1.82 - 1.09}{1.09} \times 100\% = 67\%$$

You must know how to

- Calculate GDP deflators given nominal and real GDP figures.
- Use GDP deflators to convert nominal to real prices.
- Calculate percentage changes in either nominal or real prices.

Bonus question:

- What bus fare in 2009 would represent an increase that exactly kept pace with price inflation, meaning no change in the real bus fare?

Problem: buses have changed since 1959. Back then they were not air-conditioned, had no wheelchair lifts or bike racks, and had noisier and dirtier engines. So you're getting more for your money. The price comparison is distorted by these changes, as it is for many goods and services – especially those that didn't exist in 1959!

Year	Nominal GDP	Real GDP	GDP Deflator	Year	Nominal GDP	Real GDP	GDP Deflator
1929	103.6	977.0	10.6	1969	984.4	4,261.8	23.1
1930	91.2	892.8	10.2	1970	1,038.3	4,269.9	24.3
1931	76.5	834.9	9.2	1971	1,126.8	4,413.3	25.5
1932	58.7	725.8	8.1	1972	1,237.9	4,647.7	26.6
1933	56.4	716.4	7.9	1973	1,382.3	4,917.0	28.1
1934	66.0	794.4	8.3	1974	1,499.5	4,889.9	30.7
1935	73.3	865.0	8.5	1975	1,637.7	4,879.5	33.6
1936	83.8	977.9	8.6	1976	1,824.6	5,141.3	35.5
1937	91.9	1,028.0	8.9	1977	2,030.1	5,377.7	37.8
1938	86.1	992.6	8.7	1978	2,293.8	5,677.6	40.4
1939	92.2	1,072.8	8.6	1979	2,562.2	5,855.0	43.8
1940	101.4	1,166.9	8.7	1980	2,788.1	5,839.0	47.7
1941	126.7	1,366.1	9.3	1981	3,126.8	5,987.2	52.2
1942	161.9	1,618.2	10.0	1982	3,253.2	5,870.9	55.4
1943	198.6	1,883.1	10.5	1983	3,534.6	6,136.2	57.6
1944	219.8	2,035.2	10.8	1984	3,930.9	6,577.1	59.8
1945	223.0	2,012.4	11.1	1985	4,217.5	6,849.3	61.6
1946	222.2	1,792.2	12.4	1986	4,460.1	7,086.5	62.9
1947	244.1	1,776.1	13.7	1987	4,736.4	7,313.3	64.8
1948	269.1	1,854.2	14.5	1988	5,100.4	7,613.9	67.0
1949	267.2	1,844.7	14.5	1989	5,482.1	7,885.9	69.5
1950	293.7	2,006.0	14.6	1990	5,800.5	8,033.9	72.2
1951	339.3	2,161.1	15.7	1991	5,992.1	8,015.1	74.8
1952	358.3	2,243.9	16.0	1992	6,342.3	8,287.1	76.5
1953	379.3	2,347.2	16.2	1993	6,667.4	8,523.4	78.2
1954	380.4	2,332.4	16.3	1994	7,085.2	8,870.7	79.9
1955	414.7	2,500.3	16.6	1995	7,414.7	9,093.7	81.5
1956	437.4	2,549.7	17.2	1996	7,838.5	9,433.9	83.1
1957	461.1	2,601.1	17.7	1997	8,332.4	9,854.3	84.6
1958	467.2	2,577.6	18.1	1998	8,793.5	10,283.5	85.5
1959	506.6	2,762.5	18.3	1999	9,353.5	10,779.8	86.8
1960	526.4	2,830.9	18.6	2000	9,951.5	11,226.0	88.6
1961	544.8	2,896.9	18.8	2001	10,286.2	11,347.2	90.6
1962	585.7	3,072.4	19.1	2002	10,642.3	11,553.0	92.1
1963	617.8	3,206.7	19.3	2003	11,142.1	11,840.7	94.1
1964	663.6	3,392.3	19.6	2004	11,867.8	12,263.8	96.8
1965	719.1	3,610.1	19.9	2005	12,638.4	12,638.4	100.0
1966	787.7	3,845.3	20.5	2006	13,398.9	12,976.2	103.3
1967	832.4	3,942.5	21.1	2007	14,077.6	13,254.1	106.2
1968	909.8	4,133.4	22.0	2008	14,441.4	13,312.2	108.5
				2009	14,256.3	12,987.4	109.8

Source: Bureau of Economic Analysis