

Quantitative Literacy: Thinking Between the Lines

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Chapter 4: Personal Finance

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Lesson Plan

- ▶ Saving money: The power of compounding
- ▶ Borrowing: How much car can you afford?
- ▶ Savings for the long term: Build that nest egg
- ▶ Credit cards: Paying off consumer debt
- ▶ Inflation, taxes, and stocks: Managing your money

Chapter 4 Personal Finance

4.5 Inflation, taxes, and stocks: Managing your money

Learning Objectives:

- ▶ Understand Consumer Price Index (CPI), inflation, rate of inflation, and deflation
- ▶ Determine the buying power formula and the inflation formula
- ▶ Understand and calculate taxes and stock price
- ▶ Determine the Dow Jones Industrial Average (DJIA) changes

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4.5 Inflation, taxes, and stocks: Managing your money

- ▶ **Consumer Price Index (CPI):** a measure of the average price paid by urban consumers for a “market basket” of consumer goods and services.
- ▶ **Inflation:** an increase in prices.
- ▶ **The rate of inflation:** measured by the percentage change in the CPI over time.
- ▶ **Deflation:** when prices decrease, the percentage change is negative.

$$\text{Percentage change} = \frac{\text{Changes in CPI}}{\text{Previous CPI}} \times 100\%$$

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▶ **Example:** Suppose the CPI increases this year from 200 to 205. What is the rate of inflation for this year?

▶ **Solution:**

1. The change in CPI = $205 - 200 = 5$.

2. The percentage change = $\frac{\text{Changes in CPI}}{\text{Previous CPI}} \times 100\%$
 $= \frac{5}{200} \times 100\% = 2.5\%$

Thus, the rate of inflation is 2.5%.

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Buying Power Formula

$$\text{Percent decrease in buying power} = \frac{100 i}{100 + i}$$

Where i is the inflation rate expressed as a percent (not a decimal).

- ▶ **Example:** Suppose the rate of inflation this year is 5%. What is the percentage decrease in the buying power of a dollar?
- ▶ **Solution:** $i = 5\%$;

$$\text{Percent decrease in buying power} = \frac{100 i}{100 + i} = \frac{(100 \times 5)}{(100 + 5)}$$

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Inflation Formula

$$\text{Percent rate of inflation} = \frac{100 B}{100 - B}$$

Where B is the decrease in buying power expressed as a percent (not a decimal).

- ▶ **Example:** Suppose the buying power of a dollar decreased by 2.5% this year. What is the rate of inflation this year?
- ▶ **Solution:** $B = 2.5\%$;

$$\text{Percent rate of inflation} = \frac{100 B}{100 - B} = \frac{(100 \times 2.5)}{(100 - 2.5)}$$

This is about 2.6%.

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- ▶ **Example (calculating the tax: a single person):** In the year 2000, Alex was single and had a taxable income of \$70,000. How much tax did she owe?

- ▶ **Solution:**

TABLE 4.5 2000 Tax Table for Singles

If Taxable Income		The Tax is		
Is over	But not over	This amount	Plus this %	Of the excess over
Schedule X—Use if your filing status is Single				
\$0	\$26,250	—	15%	\$0
26,250	63,550	\$3,937.50	28%	26,250
63,550	132,600	14,381.50	31%	63,550
132,600	288,350	35,787.00	36%	132,600
288,350	—	91,857.00	39.6%	288,350

- ▶ According to Table 4.5, Alex owed \$14,381.50 plus 31% of the excess taxable income over \$63,550. The total tax is:
$$\$14,381.50 + 0.31 \times (\$70,000 - \$63,550) = \$16,381.00$$

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▶ **Example:** In the year 2000, Betty and Carol were single, and each had a total income of \$75,000. Betty took a deduction of \$10,000 but had no tax credits.

Carol took a deduction of \$9,000 and had an education tax credit of \$1,000. Compare the taxes owed by Betty and Carol.

▶ **Solution:**

1. **Betty:** the taxable income = $\$75,000 - \$10,000 = \$65,000$.

By Table 4.5, Betty owes \$14,381.50 plus 31% of the excess taxable income over \$63,550. The total tax is:

$$\$14,381.50 + 0.31 \times (\$65,000 - \$63,550) = \$14,831.00$$

Betty has no tax credits, so the tax she owes is \$14,831.00.

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2. **Carol:** the taxable income = $\$75,000 - \$9,000 = \$66,000$.

By Table 4.5, Carol owes $\$14,381.50$ plus 31% of the excess taxable income over $\$63,550$. The total tax is:

$$\$14,381.50 + 0.31 \times (\$66,000 - \$63,550) = \$15,141.00$$

Carol has a tax credit of $\$1,000$, so the tax she owes is:

$$\$15,141.00 - \$1,000 = \$14,141.00$$

Betty owes:

$$\$14,831.00 - \$14,141.00 = \$690.00$$

more tax than Carol.

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For every \$1 move in any Dow company's stock price, the Dow Jones Industrial Average (DJIA) changes by about 7.56 points.

- ▶ **Example (Finding changes in the Dow):** Suppose the stock of Walt Disney increases in value by \$3 per share. If all other Dow stock prices remain unchanged, how does this affect the DJIA?
- ▶ **Solution:** Each \$1 increase causes the average to increase by about 7.56 points. So, \$3 increase would cause an increase of about $3 \times 7.56 = 22.68$ points in the Dow.

Chapter 4 Personal Finance: **Chapter Summary**

- ▶ **Savings:** simple interest or compound interest

- ▶ Formulas: simple interest earned

- period interest rate

- balance after t periods

- APY

- Present value or Future value

- Number of periods to double

- ▶ **Borrowing:** an installment loan

- ▶ Formulas: Monthly payment

- Amount borrowed

- ▶ Fixed-rate mortgage vs. ARM



Chapter 4 Personal Finance: **Chapter Summary**

- ▶ **Saving for the long term: Build the nest egg (Annuity)**
 - ▶ Formulas: Balance after t deposits
 - Needed deposit
 - Monthly annuity yield
 - Nest egg needed
- ▶ **Credit cards**
 - ▶ Formulas: Amount subject to finance charges
 - Balance after t minimum payments
- ▶ **Inflation, taxes, and stocks**
 - ▶ Understand CPI, taxes, DJIA

