



Formulas and Ratios Defined and Explained

For Educational Purposes Only—Not a prospectus or offering

Consult Your Attorney or Accountant Before Investing

The information contained herein is for educational purposes only. Consult your Certified Public Accountant and/or Legal Counsel in making any investment or loan decisions on a given project.

Ratios Explained

In the investment, mortgage and equity funding industry investors and lenders use a variety of ratios (formulas) to help them make a decision about a specific investment, loan or company. What follows are many of the most common ratios and formulas used to help the layperson understand the calculations that sophisticated investors and lenders use when making a decision about a specific transaction.

Loan-to-Value (LTV) Ratio

The **loan-to-value (LTV) ratio** expresses the amount of a first mortgage lien as a percentage of the total appraised value of real property. For instance, if a borrower wants \$130,000 to purchase a house worth \$150,000, the LTV ratio is $\$130,000/\$150,000$ or 87%.

Loan to value is one of the key risk factors that lenders assess when qualifying borrowers for a mortgage. The risk of default is always at the forefront of lending decisions, and the likelihood of a lender absorbing a loss in the foreclosure process increases as the amount of equity decreases. Therefore, as the LTV ratio of a loan increases, the qualification guidelines for certain mortgage programs become much more strict. Lenders can require borrowers of high LTV loans to buy mortgage insurance to protect the lender from the buyer default, which increases the costs of the mortgage.

An appraiser typically determines the valuation of a property, but there is no greater measure of the actual real value of one property than an arms-length transaction between a willing buyer and a willing seller. Typically, banks will utilize the lesser of the appraised value and purchase price if the purchase is “recent.” What constitutes recent varies by institution but is generally between 1–2 years.

Low LTV ratios (below 80%) carry with them lower rates for lower-risk borrowers and allow lenders to consider higher-risk borrowers, such as those with low credit scores, previous late payments in their mortgage history, high debt-to-

income ratios, high loan amounts or cash-out requirements, insufficient reserves and/or no income documentation. Higher LTV ratios are primarily reserved for borrowers with higher credit scores and a satisfactory mortgage history. The full financing, or 100% LTV, is reserved for only the most credit-worthy borrowers.

In the United States, conforming loans that meet *Fannie Mae* and *Freddie Mac* underwriting guidelines are limited to an LTV ratio that is less than or equal to 80%. Conforming loans above 80% are subject to private mortgage insurance. For properties with more than one mortgage lien, such as stand-alone seconds and home equity lines of credit (HELOC), the individual mortgages are also subject to combined loan to value (CLTV) criteria. The LTV for the stand-alone seconds and HELOCs would simply be their respective loan balance as a percentage of the total appraised value of real property. However, in order to measure the riskiness of the borrower, one should look at all outstanding mortgage debt as a percentage as a percentage of the total appraised value of real property (CLTV).

Combined Loan To Value (ratio) (CLTV) is the proportion of loans (secured by a property) in relation to its value.

The term "*Combined Loan To Value*" adds additional specificity to the basic **Loan to Value** that simply indicates the ratio between one primary loan and the property value. When "Combined" is added, it indicates that additional loans on the property have been considered in the calculation of the percentage ratio.

The aggregate principal balance(s) of all mortgages on a property divided by its appraised value or Purchase Price, whichever is less. Distinguishing CLTV from LTV serves to identify loan scenarios that involve more than one mortgage. For example, a property valued at \$100,000 with a single mortgage of \$50,000 has an LTV of 50%. A similar property with a value of \$100,000 with a first mortgage of \$50,000 and a second mortgage of \$25,000 has an aggregate mortgage balance of \$75,000. The CLTV is 75%.

Combined Loan to Value is an amount in addition to the Loan to Value, which simply represents the first position mortgage or loan as a percentage of the property's value.

Debt-to-Income (DTI) Ratio

A **debt-to-income ratio** (often abbreviated **DTI**) is the percentage of a consumer's monthly gross income that goes toward paying debts. (Speaking precisely, DTIs often cover more than just debts; they can include certain taxes, fees, and insurance premiums as well. Nevertheless, the term is a set phrase that serves as convenient, well-understood shorthand.) There are two main kinds of DTI, as discussed below.

The two main kinds of DTI are expressed as a pair using the notation x/y (for example, 28/36).

The first DTI, known as the *front ratio*, indicates the percentage of income that goes toward housing costs, which for renters is the rent amount and for homeowners is PITI (PITI includes mortgages principal and interest, mortgage insurance premium [when applicable], hazard insurance premium, property taxes, and homeowners association dues [when applicable]).

The second DTI, known as the *back ratio*, indicates the percentage of income that goes toward paying all recurring debt payments, including those covered by the first DTI, and other debts such as credit card payments, car loan payments, student loan payments, child support payments, alimony payments, and legal judgments.

In order to qualify for a mortgage for which the lender requires a debt-to-income ratio of 28/36:

- Yearly Gross Income = \$45,000 / Divided by 12 = \$3,750 per month income.
- \$3,750 Monthly Income x .28 = \$1,050 allowed for housing expense.
- \$3,750 Monthly Income x .36 = \$1,350 allowed for housing expense plus recurring debt.

Operating Profit (OP)

The profit earned from a company's normal core business operations. The value does not include any profit earned from the company's investments (such as stock in another business that company holds interest). This term is synonymous with EBIT. (See below)

Earning Before Interest and Taxes (EBIT)

An indicator of a company's profitability, calculated as revenue minus expenses, excluding taxes and interest. EBIT is also referred to as "operating earnings", "operating profit", and "operating income", as you can rearrange the formula to be calculated as follows:

$$\text{EBIT} = \text{Revenue} - \text{Operating Expenses}$$

In other words, EBIT is all profits taken into account before interest payments and income taxes. An important factor contributing to the widespread use of EBIT is the way in which it nulls the effects of the different capital structures and tax rates used by different companies. By excluding both income taxes and interest expenses, the figure hones in on the company's ability to profit and thus makes it easier for cross-company comparisons.

Earning Before Interest and Taxes before Depreciation and Amortization (EBITDA)

EBIT was the precursor to EBITDA, which takes the process two steps further by removing two non-cash items from the equation—depreciation and amortization.

$$\text{EBITDA} = \text{Revenue} - \text{Expenses (excluding interest, taxes, depreciation, \& amortization)}$$

Earning Before Interest, Taxes and Depreciation (EBITD)

An indicator of a company's financial performance.

$$\text{EBITD} = \text{Revenue} - \text{Expenses (excluding interest, taxes and depreciation)}$$

This method attempts to gauge a company's profitability before any legally required payments.

*Using EBITD and EBITDA should yield very similar results.

Return on Total Assets (ROTA)

A ratio that measures a company's earnings before interest and taxes (EBIT) against its total net assets. The ratio is considered an indicator of how effectively a company is using its assets to generate earnings before contractual obligations must be paid.

To calculate ROTA:

$$\text{ROTA} = \text{EBIT (where EBIT} = \text{Net Income} + \text{Interest} + \text{Taxes)} / \text{Total Net Assets}$$

The greater the company's earnings in proportion to the assets (the greater the coefficient from this calculation) the more effectively the company is said to be using its assets.

*to calculate ROTA, you must obtain the net income from the company's income statement then add back interest and/or taxes that were paid during the year. The resulting number will reveal the company's EBIT.

Capitalization (Cap) Rate

Capitalization rate (or "cap rate") is a measure of the ratio between the net operating income produced by an asset (usually real estate) and its capital cost (the original price paid to buy the asset) or alternatively its current market value. The rate is calculated in a simple fashion as follows:

$$\text{Annual net operating income} / \text{cost (or value)} = \text{Capitalization Rate}$$

For example, if a building is purchased for \$1,000,000 sale price and it produces \$100,000 in positive net operating income (the amount left over after fixed costs and variable costs are subtracted from gross lease income) during one year, then:

$$\$100,000 / \$1,000,000 = 0.10 = 10\%$$

The asset's capitalization rate is ten percent.

Capitalization rates are an indirect measure of how fast an investment will pay for itself. In the example above, the purchased building will be fully capitalized (pay for itself) after ten years (100% divided by 10%). If the capitalization rate were 5%, the payback period would be twenty years. Note that in real estate appraisal in the U.S. use net operating income. Cash flow equals net operating income

minus debt service. Where sufficiently detailed information is not available, the capitalization rate will be derived or estimated from net operating income to determine cost, value or required annual income.

Cash Out Refinancing

Cash out refinancing (in the case of real property) occurs when a loan is taken out on property already owned, and the loan amount is above and beyond the cost of transaction, payoff of existing liens, and related expenses.

Conforming and Nonconforming Loans

Conforming loans

In the U.S., for conforming loans, the following limits are currently typical:

- Conventional financing limits are typically 28/36.
- FHA limits are typically 31/43.
- VA limits are only calculated with one DTI of 41. (This is effectively equal to 41/41, although VA does not use that notation.)

Nonconforming loans

Back ratio limits up to 55 have become common in recent years for nonconforming loans. The recent spate of defaults by subprime borrowers may produce a market correction that revises these limits downward again. However, how large the adjustment will be remains to be seen.

Historical limits

The business of lending and borrowing money has evolved qualitatively in the post-World-War-II era. It was not until that era that the FHA and the VA (through the G.I. Bill) led the creation of a mass market in 30-year, fixed-rate, amortized mortgages. It was not until the 1970s that the average working person carried credit card balances. Thus the typical DTI limit in use in the 1970s was PITI <25%, with no codified limit for the second DTI ratio (the one including credit cards). In other words, in today's notation, it could be expressed as 25/25, or perhaps more accurately, 25/NA, with the NA limit left to the discretion of lenders on a case-by-case basis. In the following decades these limits gradually climbed higher, and the second limit was codified (coinciding with the evolution of modern credit scoring), as lenders determined empirically how much risk was profitable. This empirical process continues today.

Consumer Credit Scoring

In the United States, a **credit score** is a number that is based on a statistical analysis of a person's credit report, and is used to represent the creditworthiness of that person—the likelihood that the person will pay his or her debts. A credit score is primarily based on credit report information, typically from the three major credit bureaus: *Equifax*, *Experian*, and *TransUnion*. All credit scores are not the same because each credit bureau uses its own scoring mechanism. Many

lenders use third party credit scoring systems developed by companies such as *Fair Isaac* (FICO) to evaluate the creditworthiness of a borrower.

Lenders, such as banks and credit card companies, use credit scores to evaluate the potential risk posed by lending money to consumers and to mitigate losses due to bad debt. Using credit scores, lenders determine who qualifies for a loan, at what interest rate, and to what credit limits. While the most widely known score in the United States is FICO (the most widely used in the mortgage industry), there are many others, such as NextGen, VantageScore, and the CE Score.

Lenders have used credit scores for over 35 years. Because a score does not consider race, sex or ethnicity, it is generally considered to be the most fair and objective underwriting tool available to lenders.

NOTE: Platinum Business Group, Ltd is not a licensed financial planner, broker/dealer, or insurance agent. Platinum Business Group, Ltd has established strategic alliances with licensed professionals that enjoy years of experience in this field.

Revised: 03.12.09