

# Making Sense of the Capitalization Rate

The conversion of a series of periodic payments made or received over time to a capital sum (Present Value) is one of the more important financial functions. Yet many who use the [capitalization method](#) to establish value are not quite clear about what it is.

What is a 'Cap Rate'?

A capitalization rate is the rate at which a capital sum returns annual income. For example, a capital sum in the amount of \$1,000,000 returns income at the rate of 6.0% per year (\$60,000). The capitalization rate is 6.0% p.a.

The derivation of a capitalization rate follows a basic formula for the valuation of *perpetual annuities*:

The basic formula for the Present Value of a future sum is:

$$PV = \frac{PMT}{(1+i)^n}$$

where **PMT** is the payment per period, **n** is the number of the future period, and **i** is the discount rate per period n .

It can be demonstrated mathematically that when the PMT remains equal and is to be received over an *infinite* number of future periods,

$$PV = \frac{PMT}{(1+i)^1} + \frac{PMT}{(1+i)^2} + \frac{PMT}{(1+i)^3} + \frac{PMT}{(1+i)^n} + \dots + \infty$$

the series reduces to the expression:

$$PV = \frac{PMT}{i}$$

[\(Click here for proof\)](#)

Therefore a capitalization rate is a *single* (discount) rate which converts an infinite series of PMTs to a Present Value (PV).

This series assumes that the PMT occurs at the end of each period, (an [Ordinary, Perpetual annuity](#)). If the PMT occurs at the beginning of each period ( a Perpetual Annuity-Due), the formula becomes:

$$PV = \frac{PMT}{i} * (1+i)$$

## Common Uses of the Capitalization Rate

The most common uses of the capitalization rate are:

1. To determine the amount required (PV) to fund a perpetual annuity given a desired PMT.
2. To determine the Fair Market Value of income-producing property using the "Income Approach to Value" method.
3. To determine the value of a stock by capitalizing its dividend.

Each of these applications is covered in some detail in the text, but it is worth noting that the capitalization approach (using the formulas presented above) assumes: 1) that the PMT will *never* change, and 2) that the PMT will continue *forever*. Therefore, while the "cap rate" is an easy method of establishing current value (PV), it harbors these two very unlikely assumptions.

In addition, capitalizing a stock's dividend to arrive at value presently has very limited use since the average dividend payout on the Standard & Poor's 500 Index in 2010 has now declined to only 1.99%.

### Capitalizing Stock Earnings

In the case of stocks which pay little or no dividends, some analysts resort to capitalizing reported earnings (not paid dividends). This is an inappropriate use of the capitalization method of establishing value since, as we have seen, the capitalization method assumes a regular PMT which is projected to continue forever. When the earnings per share number (EPS) is inserted into this formula, it is treated as a regularly paid dividend, which it is not.

A stock's capitalization rate is the reciprocal of the P/E ratio only when earnings are fully distributed as paid dividends. For example, REITs are now required to distribute at least 90% of total earnings in the form of paid dividends. In this instance, the capitalization of a REIT's earnings may yield an *approximate* estimate of value based on cashflow.

But in those cases in which a company retains most of its earnings, capitalization of a meager dividend payout will not reflect the value of the stock. In these cases the value of its stock should be determined by discounting the future payments and the estimated net gain to be realized upon sale at the end of the holding period.

Present Value should be estimated by Discounted Cashflow Analysis, and not by a capitalization of annual earnings.

### Capitalizing Real Estate Income

Most real estate appraisers continue to rely heavily on the *Income Approach To Value* method in establishing the market value of income-producing real estate. The most common avenue to this value is the capitalization of a property's Net Operating Income:

$$\text{Fair Market Value} = \frac{\text{Net Operating Income}}{\text{Capitalization Rate}}$$

The Net Operating Income most frequently used is an estimate of the *next* period's (year's) income after operating expenses, but the discount rate used is most often determined by collecting data from recently sold properties similar to the one in question. Therefore prospective Net Operating Income is typically divided by retrospective capitalization rates. When interest rates are changing rapidly during periods of inflation and deflation, the results may contain significant errors in market value. For example, using a higher historical cap rate when current interest rates are

declining may result in an undervaluation of the asset, but overvaluing the asset will result when current interest rates are rising.

It is important to note that the Net Operating Income statement of a real property is not equivalent to the “Net Operating Income” statement prepared for a publicly-held company. The latter is primarily prepared for the purpose of reporting taxable earnings after taxes, interest, depreciation and amortization deductions. The NOI of an income property is an EBITDA number: earnings before interest, (income) taxes, depreciation and amortization.

### Adjusting the Capitalization Rate for Growth

If a growth factor is to be applied to the PMT, perhaps in the case of an annuity to offset inflation or, in the case of an income property to reflect rising net operating income, a simple adjustment can be made to the capitalization formula. Using **g** for the rate of growth in the PMT, the formula becomes:

$$\text{Ordinary Annuity: } PV = \frac{PMT}{i-g}$$

$$\text{Annuity-Due: } PV = \frac{PMT}{i-g} * (1+i)$$

These formulas are valid so long as **g** does not equal or exceed **i**.

It is also important that the period for **n**, **i** and **PMT** be the same. If **g** is used, it must be expressed in the same time-frame as well.

Always use the time-frame of the PMT as the determining time frame: e.g. if the PMT is monthly be sure that **n** and **i** are expressed on a monthly basis; if the time frame of the PMT is quarterly, all other variables must be expressed quarterly, etc....

The more one understands the capitalization approach to establishing value, the more attractive Discounted Cashflow Analysis becomes.

**PROOF**

Let  $a = \frac{\text{PMT}}{(1+i)}$  and let  $x = \frac{1}{(1+i)}$

Then the formula becomes:

$$\text{PV} = a + ax + ax^2 + ax^3 + ax^4 + ax^5 \dots\dots\dots$$

Multiplying both sides by x we have,

$$x\text{PV} = ax + ax^2 + ax^3 + ax^4 + ax^5 \dots\dots\dots$$

Subtracting the last equation from the first, we have,

$$\text{PV} - x\text{PV} = a$$

$$\text{PV}(1-x) = a$$

$$\text{PV} = \frac{a}{(1-x)} = \frac{\text{PMT}}{(1+i)} \div \left(1 - \frac{1}{(1+i)}\right) = \frac{\text{PMT} * (1+i)}{(1+i) (1+i-1)}$$

Therefore,

$$\text{PV} = \frac{\text{PMT}}{i}$$

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