Real Estate Finance
Glossary of Basic Terms and Calculations

Cash flow

Gross potential income (GPI)	The total income a property could earn if all units and commercial space were 100% occupied for an entire year ***Gross potential income = monthly rent X number of units X 12***
Effective gross income (EGI)	Gross potential income, adjusted to reflect a reasonable vacancy rate ***Effective gross income = gross potential income – vacancy***
Net operating income (NOI)	Income less operating expenses ***NOI = gross effective income – operating expenses***
Before-Tax Cash Flow	Net operating income less debt service **Before-tax cashflow = NOI – debt service**

Property Value Calculations

Total asset value	The total value of a piece of property, most commonly calculated by dividing NOI by an appropriate capitalization rate, essentially treating first year's net income as a perpetuity (an amount of money received forever) ***Total asset value = NOI / cap rate***
Capitalization rate ("cap rate")	The rate of return applied to NOI to calculate a total asset value for a property. This is also used as a measure of a property's profitability: ***Cap rate = NOI / Total asset value*** Calculate cap rates by: • Extrapolating from recent sales; or • Calculating a "weighted average cost of capital" (below) You can use this formula to solve for any of these variables: ***Value = NOI / cap rate***

	Cap rate = NOI / value
	NOI = Cap rate x value
	This basic formula – NOI / Value or cost – is also referred to as "return on investment" (ROI).
Weighted average cost of capital ("WACC") or Mortgage- equity analysis to calculating a cap rate	The overall cost of financing, including a blend of debt and equity, weighted to capture the relative prevalence of each in the entity's financial structure. The weighted average cost of capital is generally used as the capitalization rate (or put differently, the cap rate should represent the weighted average cost of capital for the project) ***WACC = (cost of equity X percentage of equity in overall financing) + (debt annual constant X percentage of debt in overall financing)***
Equity	Cash provided by the owner of a property at purchase; or later on, the total value of a property minus the outstanding debt ***Equity = total asset value – debt***
Cost of equity, or Return on equity, or Cash-on-cash return	The annual return required for equity investment; should be comparable to returns available for investments of comparable risk (i.e., stock returns for comparably risky securities). This calculation treats return as the cash provided to the equity investor after paying all expenses and debt service. **Return on equity = Before-tax cashflow / equity invested**
Debt, or leverage	The amount of borrowed funds used to pay for the total asset cost
Return on Investment (ROI)	The ratio of Net Operating Income to the total funds invested (or total asset cost). Same formula as Cap Rate. **Return on Investment = NOI / Total cost or asset value**
Payback period	The number of years in which an investment is recovered, not taking time value of money into account. Divide the cost or investment amount by the annual savings or incremental cashflow. **Payback period = cost / savings or extra cashflow per year**

Breakeven occupancy	The occupancy rate necessary to just cover operating expenses and debt service; the minimal occupancy rate at which you can cover your must-pay bills. **Breakeven occupancy =** **(expenses + debt service) / gross potential income**

Debt Calculations

Debt-to-value ratio	The percentage of the total asset represented by outstanding debt. Can be calculated for total debt (including soft loans), or "hard" debt only. ***Debt-to-value ratio = Debt / Total asset value or cost***
Debt service	The monthly or annual required payment to a lender, including both interest and repayment of principal *To calculate debt service in Excel, use the PMT function:* ***i*** *is the monthly interest rate (annual rate divided by 12),* ***nPer*** *is the number of months in the amortization period (years multiplied by 12),* ***PV*** *is the beginning principal. You can leave* ***FV*** *and* ***Type*** *blank.*
Annual constant	The percentage of the total original loan principal which must be paid as debt service every year. The annual constant represents payments of both interest and principal, although the relative balance of the two will change over time. The annual constant can be calculated based on the interest rate and term of the loan, and will always be greater than the interest rate. ***Annual constant = annual debt service / total loan amount*** *To calculate the annual constant using Excel, use the PMT function:* ***i*** *is the monthly interest rate (annual rate divided by 12),* ***nPer*** *is the number of months in the amortization period (years multiplied by 12),* ***PV*** *is* ***-12****. You can leave* ***FV*** *and* ***Type*** *blank.*
Debt service coverage ratio	The ratio of NOI to required debt service payments. The higher this ratio, the more "cushion" in the budget to ensure that even in negative circumstances, there will be enough cash flow from operations to repay debt ***Debt service coverage ratio = NOI / debt service***

	The debt service coverage ratio is also used by lenders to determine the maximum amount they would be willing to lend, based on NOI: ***Debt service = NOI / debt service coverage ratio*** ***Total debt = debt service / annual constant***
Maximum supportable debt	Either: calculate loan-to-value ratio x total asset value; OR Use debt service coverage ratio to determine the maximum amount loan amount based on NOI: ***Maximum debt service = NOI / debt service coverage ratio*** ***Maximum debt = max. annual debt service / annual constant*** *To calculate the maximum supportable debt using Excel, use the PV function:* ***i*** *is the monthly interest rate (annual rate divided by 12),* ***nPer*** *is the number of months in the amortization period (years multiplied by 12),* ***PMT*** *is the maximum monthly payment amount (the annual maximum debt service divided by 12). You can leave* ***FV*** *and* ***Type*** *blank.*
Amortization	The portion of debt service which goes to repay principal ***Debt service payment – interest = amortization***
Positive leverage	When the cost of debt (annual constant) is less than the cost of equity ***Positive leverage: Annual constant < ROI < Return on equity***
Negative leverage	When the cost of debt (annual constant) is higher than the cost of equity ***Negative leverage: Annual constant > ROI > Return on equity***

Time Value of Money

Discount rate *or* Interest rate *or* Hurdle rate	Any interest rate used to calculate the time value of money, determining the value today of cash flows that will be delivered in the future
Present value	The current value of a cashflow to be received at some predetermined time in the future.

*To calculate present value in Excel, use the **PV** function: **i** is the annual interest rate, **nPer** is the number of years, **PMT** is zero, and **FV** is the future cash amount. You can leave **Type** blank.*

Future value

The future value of a given amount of cash, invested for a period of time at a given interest rate. Enter PV, N and I, and hit the FV key to solve.

*To calculate future value in Excel, use the **FV** function: **i** is the annual interest rate, **nPer** is the number of years, **PMT** is zero, and **PV** is the current cash investment amount. You can leave **Type** blank.*

Taxes and Tax Credits

Expenses (for tax purposes)

Costs which are subtracted from revenues to determine taxable income. Expenses are generally used to offset net income in the same year as the cash outlay occurs.

Capital costs

Costs which, for tax purposes, are divided into portions and used to reduce net income over a series of years, rather than being subtracted from revenues in the year in which the actual cash outlay occurred. The costs of acquiring and constructing a building are capital costs, as are major repairs such as roof replacement, and the cost of durable goods such as refrigerators. Routine maintenance costs, on the other hand, are expensed.

Depreciation

The portion of capital costs used to reduce taxable income in a given year. The costs of acquiring and constructing residential buildings is depreciated over 27.5 years; the amount for a given year is determined by dividing the total depreciable cost, or "basis," by 27.5. This is known as "straight-line depreciation." The cost of acquiring and constructing a commercial building is depreciated over 39 years.

Depreciable basis

Total costs which can be depreciated. The depreciable basis of a building will include all of the costs, including transaction costs, required to bring it to the point where it is ready for occupancy. Land costs are never included in depreciable basis, nor are reserves.

Book value

The book value of a property equals the original cost minus the sum of all of the depreciation which has been taken up to that point.

Book value = Cost – accumulated depreciated

Taxable income from operations	The taxable income for a piece of real estate equals total rents and other income, less operating expenses, less interest expense, less depreciation. Loan amortization (repayment of principal) and payments to replacement reserves are NOT deducted from revenues for purposes of determining taxable income. ***Taxable income =*** ***Revenues – operating expenses – interest expense – depreciation*** Or ***Taxable income =*** ***Cash flow after financing + reserves + amortization – depreciation*** Or ***Taxable income =*** ***NOI + reserves – interest expense – depreciation***
Taxable profits from sale (capital gains)	Taxable profits from the sale of an asset, or capital gains, equal the difference between the sale price and the book value of an asset (see definition of book value above): ***Capital gains = sale price – book value***
Capital gains tax (taxes due on sale)	Capital gains tax (or tax on sale) can be calculated by multiplying the capital gains tax rate by the capital gain (gain on sale): ***Capital gains tax = capital gains tax rate x gain on sale***
Eligible tax credit basis	Equivalent to depreciable basis. Must be separated into acquisition basis (building value only) and rehab basis (construction-related costs).
Qualified basis	Eligible tax credit basis times the lesser of the percentage of low-income units or the percentage of low-income floor space ***Qualified basis = eligible basis x % of low-income units or floor space (whichever fraction is smaller)***
Maximum tax credits	The maximum annual tax credits for which a project is eligible equals the qualified tax credit basis times the relevant tax credit percentage rate ("4%" rate for tax-exempt-bond-financed projects and building acquisition costs, and 9% for

	new construction and rehab costs). This calculation yields the ANNUAL allocation, which will be available to investors every year for 10 years. Note that many states impose further limits on maximum 9% awards per unit or per project. ***Maximum tax credit allocation = qualified basis x 4% or 9% tax credit rate***
Tax credit equity	The amount of equity investors contribute to a tax credit project in exchange for the tax credits and other benefits. Generally expressed as cents/dollar of 10-year tax credit benefits. For example, $.95/dollar pricing for a project with a $500,000 tax credit allocation would equal .95 times $5,000,000 ($500,000 per year for 10 years), or $4,750,000. ***Tax credit equity = price per dollar x annual allocation x 10***
First-year tax credits	Annual tax credit allocation multiplied by average qualified occupancy. To calculate average qualified occupancy, add the percentage of apartments occupied by qualified residents in each month of the year, and divide by 12. ***First-year tax credits = annual allocation x average qualified occupancy (percentage of qualified occupancy for each month added together & divided by 12)***
Recapture	For the years BEFORE units fell out of compliance, 33% of the amount of credits attributable to those units, plus interest (i.e., if 10% of the units are out of compliance on a building with a $500,000 credit allocation, the amount recaptured will be .33 x .10 x $500,000, or $16,500 per year). ***Recapture amount = .33 x percentage of non-compliant units x annual allocation x number of years prior to non-compliance*** Starting the year in which the units fell out of compliance, all credits attributable to the non-compliant units will be forfeited (i.e. in the example above, 10% of $500,000, or $50,000, will be forfeited every year starting in the initial year of non-compliance).
Capital accounts	Maintained for each investor: ***Capital account = initial investment – historic tax credits + profits – losses – cash distributions***
Cash required to pay tax on sale at minimum non-profit purchase price	Non-profits may have the right to exercise a right of first refusal at the end of the compliance period for the outstanding debt plus any tax liability. To calculate the amount of cash necessary to fully cover the tax liability, first calculate the tax

on sale that would be owed if the property were sold for the value of the outstanding debt with no additional cash:

Taxes on sale for existing debt = Capital gains tax rate x (existing debt – book (depreciated) value of property)

To calculate total cash required, divide this amount by 1 minus the capital gains tax rate:

Cash on sale = taxes on sale for existing debt ÷ (1 – tax rate)