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PROPERTY VALUATION

(BG3 ALT S6)

Section 9 –

Valuation Formula

Real Estate Business Management Program

Year 3 – Work study program

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Property Valuation (BG3 ALT S6)

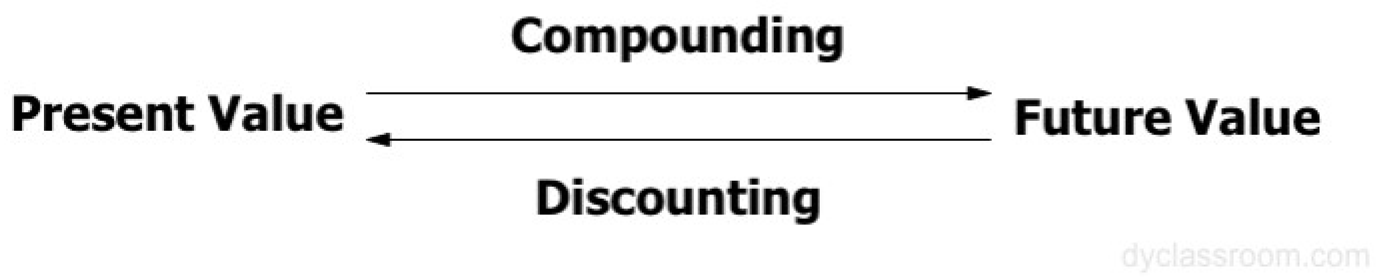
Agenda

1. Compounding and Discounting.
2. Valuation Formulae.
3. Compounding.
4. Discounting.

Property Valuation (BG3 ALT S6)

1. Compounding and Discounting

- Compounding helps us to find the future value of a present value (or amount) that is compounded for a given interest rate for a given number of years.



- Compounding uses the principle of Compound Interest.

- Discounting helps us to find the present value or present worth of money for a given future value (or amount).

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2. Valuation Formulae

Compounding tables	Amount of £1	$(1+i)^n$
	Annuity	$i+\frac{i}{(1+i)^n-1}$
	Amount of £1 per annum	$\frac{(1+i)^n-1}{i}$
Discounting tables	Present value of £1	$\frac{1}{(1+i)^n}$ or $(1+i)^{-n}$
	Years' purchase	$\frac{1-\left(\frac{1}{1+i}\right)^n}{i}$
	Annual sinking fund	$\frac{s}{(1+s)^n-1}$
Other tables	Years' purchase of £1: dual rate adjusted for tax	$\frac{1}{i+\left(\frac{s}{(1+s)^n-1}\times\frac{1}{1-t}\right)}$
	Years' purchase of £1 in perpetuity	$\frac{1}{i}$
	Years' purchase of reversion of £1 to a perpetuity	$\frac{1}{i(1+i)^n}$

Key:
i – interest expressed as a decimal fraction
n – the number of years
s – sinking fund rate expressed as a decimal fraction
t – tax rate expressed as a decimal fraction

Source: Osborn S and Scarrett D (2014) Property Valuation: The Five Methods (3rd edn) [e-book]. London

3. Compounding

Amount of £1

This is the compound interest formula.

The amount to which a single deposit of £1 will grow in a given number of years and at a stated rate of interest.

Amount of £1 = $(1 + i)^n$

Where:

i = interest rate per year (expressed as a decimal).

n = number of years.

3. Compounding

Amount of £1

We can calculate how much an investment is worth in the future if the interest rate is known and fixed, by using the compound interest principle (i.e. using the Amount of £1 formula).

Amount of £1 = $(1 + i)^n$ $(1 + 0.06)^5 = 1.3382256$.

The sum of £100,000 will accumulate to £100,000 x 1.3382 = £133,823 in 5 years' time assuming an interest rate of 6% per annum.

Note: 1.06 x 1.06 x 1.06 x 1.06 x 1.06 = 1.3382256.

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3. Compounding

Amount of £1 per annum

- This formula calculates the amount to which annual deposits of £1 each year will grow in a given number of years and at a stated rate of interest.
- This is used for regular payments made a regular intervals of time at a single interest rate.
- Amount of £1 per annum formula:

$$\frac{(1 + i)^{n} - 1}{i}$$

Where:

i = interest rate (in decimals).

n = number of years.

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3. Compounding

Amount of £1 per annum - Example

Your client pays a service charge of £2,500 per annum and their lease has 8 years unexpired. The client wishes to know the overall cost of the service charge to the business at an interest rate of 4% (based on their current borrowing rate). This is a series of payments, and the output is the total payable including interest.

Amount of £1 per annum formula

$$\frac{(1 + 0.04)^8 - 1}{0.04} = \frac{(1.36856905) - 1}{0.04} = 9.21422626$$

Annual service Charge:	£ 2,500	per annum.
x Amount of £1 per annum for 8 years at 4%	9.21422626	
Total Service Charge Liability	£23,035.50	

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4. Discounting

These are the formula we use most in Valuation:

- Present Value of £1 (PV).
- Present Value of £1 p.a. in perpetuity deferred n years (PV of £1 p.a. in perp. deferred) or Years Purchase of reversion of £1 to a perpetuity (YP perp. deferred).

4. Discounting

Present Value of £1 (PV)

Present value of £1 gives the sum which needs to invested today (at a known interest rate) to earn a greater sum in the future.

Why is the Present Value of £1 formula useful?

- To determine how much you need to set aside now to achieve a known sum in future.
- To compare investment options.

Note:

Discounting is the inverse (opposite) of the compounding process, whereby the Present Value of an investment is found by ‘deducting’ the compound interest that would have accumulated on an invested sum of money.

4. Discounting

Present Value of £1 (PV) - Example

Say an investor wants to earn a sum of money in the future (say £50,000 in 3 years' time), and the interest rate is known (say 6%), the Present Value of £1 formula calculates how much they need to invest today to achieve that future sum.

Present Value (PV) of £1

$$\frac{1}{(1 + 0.06)^3} = \frac{1}{(1.191916)} = 0.839619$$

Future Sum:	£ 50,000
x PV of £1	0.839619
Present Value	£41,980.95

The investor needs to set aside £41,980.95 now at an interest rate of 6% p.a. in order to have a sum of £50,000 in 3 years.

4. Discounting

Present Value of £1 (PV) – Example (Comparing options)

An investor might be faced with the following choice:

Assuming a 5% discount rate.

(Option 1) to receive £500 in 1 years' time, or

(Option 2) £550 in 2 years' time.

The investor will select the option that has the highest Present Value.

4. Discounting

Present Value of £1 (PV) – Example (Comparing options)

Option A:

£500 in one years' time.

PV = $1/(1.05)^1$ x £500.

PV = 0.9523809524 x £500.

PV = £476.19.

Option B:

£550 in two years' time.

PV = $1/(1.05)^2$ x £550.

PV = 0.9070294785 x £550.

PV = £498.87.

The prudent investor would choose to receive £550 in 2 years times – as this option has the highest present value.

4. Discounting

Present Value of £1 per annum (Years Purchase)

This is a very important formula in property valuation.

Today’s value of the right to receive a series of annual payments for a given number of years, discounted at a stated rate of interest.

PV of £1 per annum = $\frac{\left(1-\left(\frac{1}{(1+i)^{n}}\right)\right)}{i}$

Where:

i = discount rate (expressed as a decimal).

n = number of years.

4. Discounting - Present Value of £1 per annum (Years Purchase)

Why is this formula useful?

For property valuation purposes, the Valuer is not primarily interested in the Present Value of a future lump sum. Instead, the Valuer wants to establish the ‘Present Day’ value of a future stream of rental income. Hence the use of the formula for the Present Value of £1 per annum: Rental payment for property are a series of regular payments and this formula can help us find the Present Value (Capital Value) of these regular payments. The formula is often used in a property context when investors are trying to ascertain what to pay for a fixed-term lease which is producing a rent.

4. Discounting - Present Value of £1 per annum (Years Purchase)

Example:

An investment has an income of £50,000 per annum (each year) for the next 20 years. The appropriate rate of return would be 8%. What capital sum would you pay now to receive this future income stream?

To find the value of this now, we multiply the annual income by the PV of £1 per annum (YP).

To find the PV of £1 p.a. , you could calculate the formula from first principles [remember the interest rate is entered as a decimal 0.08].

$$= \frac{1-\left(\frac{1}{(1+i)^n}\right)}{i} = \frac{1-\left(\frac{1}{(1+0.08)^{20}}\right)}{0.08} = \frac{1-\left(\frac{1}{4.6610}\right)}{0.08} = \frac{1-0.2145}{0.08} = \frac{0.7855}{0.08} = 9.8188$$

The Present Value (capital value / value now) of the investment that has an income of £50,000 per annum for the next 20 years is £50,000 x 9.8188 = £490,940 or do the calculation in 2 stages:

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4. Discounting - Present Value of £1 per annum (Years Purchase)

PV of £1 per annum in 2 stages: $\frac{\left(1-\left(\frac{1}{(1+i)^n}\right)\right)}{i} = \frac{1-(PV)}{i}$

Step 1

Find PV of £1 in 20 years' time assuming 8% interest rate.

PV of £1 = $\frac{1}{(1+i)^n}$ i = 0.08 and n = 20 years

PV of £1 = $\frac{1}{(1+0.08)^{20}} = \frac{1}{1.46610} = 0.2145$

PV of £1 in 20 years at 8% = 0.2145.

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Rate	8.00%
Years	**PV of £1**
1	0.925926
2	0.857339
3	0.793832
4	0.735030
5	0.680583
6	0.630170
7	0.583490
8	0.540269
9	0.500249
10	0.463193
11	0.428883
12	0.397114
13	0.367698
14	0.340461
15	0.315242
16	0.291890
17	0.270269
18	0.250249
19	0.231712
20	0.214548
Total	**9.818147**

4. Discounting - Present Value of £1 per annum (Years Purchase)

PV of £1 per annum in 2 stages: $\frac{\left(1-\left(\frac{1}{(1+i)^n}\right)\right)}{i} = \frac{1-(PV)}{i}$

Step 2

Substituting in the answer from the PV of £1 formula above (0.2145) into $\frac{1-(PV)}{i}$

$$\text{(YP) PV of £1 p.a.} = \frac{1-PV}{i} = \frac{1-0.2145}{0.08} = \frac{0.7855}{0.08} = 9.818$$

The Present Value (capital value / value now) of the investment that has an income of £50,000 per annum for the next 20 years is £50,000 x 9.818 = £490,940.

4. Discounting

The Years Purchase of a reversion to perpetuity deferred

Sometimes an income stream to be received will not start now but will start sometime in the future. To deal with this we can combine (multiply) two formula.

Example

The YP in reversion to perpetuity will capitalise a future income stream of say, £10,000 per annum in perp at 5%.

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

The answer would be

$$= 10{,}000 \times \frac{1}{0.05 \times (1+0.05)^4} = 10{,}000 \times \frac{1}{0.05 \times 1.215506} = 10{,}000 \times \frac{1}{0.0607753}$$

$$= 10{,}000 \times 16.454053 = £164{,}540.$$

Next Lecture

Section 10 – Methods of Valuation - Residual Method