Interest-only loans

Sunday, 24 March 2019   12:45 pm

By the end of the lesson I would hope that you have an understanding and be able to apply to questions the following concepts:

- Know how to use the Financial Solver on your CAS to answer questions relating to interest-only loans
- Understand what it means to be an interest only loan
- Understand the language used for interest only loans
    - V_0 as the principal
    - r as the rate of interest
    - D as the regular payment per compounding period

RECAP:

In previous lessons we have been looking at the financial component of this course.
We have been using a CAS to help us find future values, payments, interest charged and more!
In the previous video the payments we have been making have been calculated to include interest and some form of the principal.
This lesson looks at loans where we only pay back the interest!

Growing up and owning a home

When we all grow up we believe that the dream is to own a home.
Strange really that most European countries think the idea of owning a home is stupid! They rent for life.
Anyways …

In Australia, the UK and USA we believe that owning a home is great!

We go to the bank. We ask them for a LOT of money and, if you're lucky they say yes!
You then spend 25 years (or longer) paying off that loan.

The amount you pay each month back to the bank will include an **interest component** and a small payment back of the principal.

For example:

At this time, I am paying $1612 per month to the bank for my house.

Interest: $916
Repayment of principal: $696

OUCH!

Hopefully, at the end of the 25 years I will owe the bank nothing.

Interestingly, over this time, on a $450,000 mortgage I will be paying back over $900,000 to the bank!

HOUSES ARE EXPENSIVE!

The median house price in some areas of Melbourne is about $750,000.
Not all people can afford this!
So, they take out what they call an interest only mortgage.

This is where they only pay back the interest.

Example:
If I only paid back the interest part to the bank, rather than pay $1612, I'd be paying $916.
Nice!

BUT … this means at the end of the mortgage, I will still owe the bank $450,000.

My principal will never reduce.

THIS IS A LOT OF MONEY TO FIND AT THE END OF THE LOAN!

How does this work with my CAS? Can I work things out without my CAS?

Firstly, the most important thing to remember is:

For interest only loans the Present Value and Future Value always stay the same

Language, language, language

There are two ways of doing these calculations:
- Using the CAS using the Financial Solver
- Pencil and Paper (and CAS)

Let's look at the language first:

For an interest only loan we can use the following formula to find the repayment per month.
To do this, we need to know:
- Rate of Interest, r
- Principal amount, V_0

$$r =$$

$$V_0 =$$

The formula then becomes:

$$D = \frac{r}{100} \times V_0$$

Example:
This example is extracted from the *Cambridge Further Mathematics Units 3 and 4 Textbook:*

Jane borrows $50000 to buy some shares. Jane negotiates an interest-only loan for this amount, at an interest rate of 9% per annum, compounding monthly. What is the monthly amount Jane will be required to pay?

$$D = \frac{0.75}{100} \times 50\,000$$

$$= \$375$$

$9\%\ p/a$

$$\frac{9}{12} = 0.75\%$$

Now, let's try it with the Financial Solver

Things to note:
- It doesn't matter how many months you pay it over, the PMT is always going to be the same
- Payments per year should be set to 12 **unless otherwise stated in the question**
- Compounding periods should be set to 12 **unless otherwise stated in the question**
- Don't forget the minus sign!

We still use the same letters as before, but we need to make sure the Present and Future value stay the

same!

N: 1

I: 9

PV: 50 000

PMT: —

FV: − 50 000

P/Y: (12)

C/Y: 12

Example 2:

Stuart borrows $180000 to buy a house. He negotiates an interest-only loan for this amount, at an interest rate of 7.6% per annum, compounding fortnightly. What is the fortnightly payment, correct to the nearest cent?

DID YOU SEE THE TRICK?

N: 1

I: 7.6

PV: 180 000

PMT: —

FV: − 180 000

P/Y: 26

C/Y: 26

$526.16