LOAN

A **loan** is a type of debt. Like all debt instruments, a loan entails the redistribution of financial assets over time, between the lender and the borrower.

In a loan, the borrower initially receives or *borrows* an amount of money, called the *principal*, from the lender, and is obligated to *pay back* or *repay* an equal amount of money to the lender at a later time. Typically, the money is paid back in regular *installments*, or partial repayments; in an annuity, each installment is the same amount.

The loan is generally provided at a cost, referred to as interest on the debt, which provides an incentive for the lender to engage in the loan. In a legal loan, each of these obligations and restrictions is enforced by contract, which can also place the borrower under additional restrictions known as loan covenants. Although this article focuses on monetary loans, in practice any material object might be lent.

Acting as a provider of loans is one of the principal tasks for financial institutions. For other institutions, issuing of debt contracts such as bonds is a typical source of funding.

Types of loans

Secured

A secured loan is a loan in which the borrower pledges some asset (e.g. a car or property) as **collateral**

A mortgage loan is a very common type of debt instrument, used by many individuals to purchase housing. In this arrangement, the money is used to purchase the property. The financial institution, however, is given security — a **lien** on the title to the house — until the mortgage is paid off in full. If the borrower defaults on the loan, the bank would have the legal right to repossess the house and sell it, to recover sums owing to it.

In some instances, a loan taken out to purchase a new or used car may be secured by the car, in much the same way as a mortgage is secured by housing. The duration of the loan period is considerably shorter — often corresponding to the useful life of the car. There are two types of auto loans, direct and indirect. A direct auto loan is where a bank gives the loan directly to a consumer. An indirect auto loan is where a car dealership acts as an intermediary between the bank or financial institution and the consumer.

Unsecured

Unsecured loans are monetary loans that are not secured against the borrower's assets. These may be available from financial institutions under many different guises or marketing packages:

- credit card debt
- personal loans
- bank overdrafts
- credit facilities or lines of credit

The interest rates applicable to these different forms may vary depending on the lender and the borrower. These may or may not be regulated by law.

Interest rates on unsecured loans are nearly always higher than for secured loans, because an unsecured lender's options for recourse against the borrower in the event of default are severely limited. An unsecured lender must sue the borrower, obtain a money judgment for breach of contract, and then pursue execution of the judgment against the borrower's unencumbered assets (that is, the ones not already pledged to secured lenders). In insolvency proceedings, secured lenders traditionally have priority over unsecured lenders when a court divides up the borrower's assets. Thus, a higher interest rate reflects the additional risk that in the event of insolvency, the debt may be uncollectible.

Demand

Demand loans are short term loans (typically no more than 180 days) that are atypical in that they do not have fixed dates for repayment and carry a floating interest rate which varies according to the prime rate. They can be "called" for repayment by the lending institution at any time. Demand loans may be unsecured or secured.

Subsidized (Subvention)

A subsidized loan is a loan on which the interest is reduced by an explicit or hidden subsidy. A common example in car loans is when a manufacturer gets into a arrangement with the financer and offers the **Lender** a discount on the car. The Lender in turns offers a lower interest rate to the customer. The lender books a loan for $10,000 but pays the manufacturer only $ 9,000 (10% discount). So the Lender makes money from the lower interest rate as well as the differnec ein the loan amount and the disbursed amount.

Otherwise, it may refer to a loan on which an artificially low rate of interest (or none at all) is charged to the borrower.

An unsubsidized loan is a loan that gains interest at a market rate from the date of disbursement.

Target markets

Personal or commercial

Loans can also be subcategorized according to whether the debtor is an individual person (consumer) or a business. Common personal loans include mortgage loans, car loans, home equity lines of credit, credit cards, installment loans and payday loans. The credit score of the borrower is a major component in and underwriting and interest rates (APR) of these loans. The

monthly payments of personal loans can be decreased by selecting longer payment terms, but overall interest paid increases as well. Typical car loan tenures are for 3 to 5 years.

Loans to businesses are similar to the above, but also include commercial mortgages and corporate bonds. Underwriting is not based upon credit score but rather credit rating.

Loan payment

The most typical loan payment type is the fully amortizing payment in which each monthly rate has the same value overtime.

The fixed monthly payment **P** for a loan of **L** for **n** months and a monthly interest rate **c** is.

$$P = L \cdot \frac{c\,(1+c)^n}{(1+c)^n - 1}$$

Abuses in lending

Predatory lending is one form of abuse in the granting of loans. It usually involves granting a loan in order to put the borrower in a position that one can gain advantage over him or her. Where the moneylender is not authorized, they could be considered a loan shark.

Usury is a different form of abuse, where the lender charges excessive interest. In different time periods and cultures the acceptable interest rate has varied, from no interest at all to unlimited interest rates. Credit card companies in some countries have been accused by consumer organisations of lending at usurious interest rates and making money out of frivolous "extra charges".

Abuses can also take place in the form of the customer abusing the lender by not repaying the loan or with an intent to defraud the lender.

Fixed and Floating Interest Rates

A **fixed interest rate loan** is a loan where the interest rate doesn't fluctuate during the fixed rate period of the loan. This allows the borrower to accurately predict their future payments.

A fixed interest rate is based on the lender's assumptions about the average market interest rate over the relevant period. For example, when the discount rate is historically low, fixed rates are normally higher than variable rates because interest rates are more likely to rise during the fixed rate period. The risk of market interest rate fluctuations is borne by the Lender.

Some fixed interest loans - particularly mortgages intended for the use of people with previous adverse credit - have an 'extended overhang', that is to say that once the initial fixed rate period is over, the person taking out the loan is tied into it for a further extended period at a higher interest rate before they are able to redeem it.

A **floating interest rate**, also known as a **variable rate** or **adjustable rate**, refers to any type of loan that does not have a fixed rate of interest over the life of the loan.

Such a loan typically uses an index or other base rate (anchor rate) for establishing the interest rate for each relevant period. This base rate defined by the Lender is commonly referred to as Prime Lending Rate (PLR). This would normally by influenced by the prevailing inter-bank lending rates (Repo & Reverse-Repo Rates, London Inter-bank Offered Rate – LIBOR etc.).

The rate for such loan will usually be referred to as a markup or margin (offset) over the base rate: for example, a five-year loan may be priced at six-month PLR + 2.50%. At the end of each six-month period, the rate for the following period will be based on PLR at that point (the reset date), plus the markup. The basis will be agreed between the borrower and lender, but 1, 3, 6 or 12 month money market rates are commonly used for commercial loans.

Banks may prefer to lend to their customers with floating rates, since they are raising funds (through deposits, bond issues, and by borrowing from other banks or the money market). Pricing loans to their customers in the same currency and basis allows banks to manage the balance between their assets and liabilities.

Typically, floating rate loans will cost less than fixed rate loans, depending in part on the yield curve. In return for paying a lower loan rate, the borrower takes the interest rate risk: the risk that rates will go up in future. In cases where the yield curve is inverted yield curve, the cost of borrowing at floating rates may actually be higher; in most cases, however, lenders require higher rates for longer-term fixed-rate loans, because they are bearing the interest rate risk (risking that the rate will go up, and they will get lower interest income than they would otherwise have had).

Certain types of floating rate loans, particularly mortgages, may have other special features such as interest rate caps, or limits on the maximum interest rate or maximum change in the interest rate that is allowable.

Floating rate loan

In business and finance, a floating rate loan (or a variable or adjustable rate loan) refers to a loan with a floating interest rate. The total rate paid by the customer "floats" in relation to some base rate, to which a markup or margin is added (or more rarely, subtracted). The term of the loan

may be substantially longer than the basis from which the floating rate loan is priced; for example, a 25-year mortgage may be priced off the 6-month prime lending rate.

Floating rate loans are common in the banking industry and for large corporate customers. A floating rate mortgage is a mortgage with a floating rate, as opposed to a fixed rate loan.

In many countries, floating rate loans and mortgages predominate. They may be referred to by different names, such as an adjustable rate mortgage in the United States. In some countries, there may be no special name for this type of loan or mortgage, as floating rate lending may be the norm. For example, in Canada substantially all mortgages are floating rate mortgages; borrowers may choose to "fix" the interest rate for any period between six months and ten years, although the actual term of the loan may be 25 years or more.

Floating rate loans are sometimes referred to as bullet loans, although they are distinct concepts. In a bullet loan, a large payment (the "bullet" or "balloon") is payable at the end of the loan. A floating rate loan may or may not incorporate a bullet payment.

Example

A customer borrows $50,000 from a bank; the terms of the loan are (six-month) PLR + 3.5%. At the time of issuing the loan, the PLR rate is 15.5%. For the first six months, the borrower pays the bank 19% annual interest. At the end of the first six months, the PLR rate has risen to 4%; the client will pay 19.5% for the second half of the year. At the beginning of the second year, the PLR rate has now fallen to 1.5%, and the borrowing costs 17% for the **following six months.**

Flat rate (finance)

Flat interest rate loans are often used by traditional moneylenders in the informal economy of developing countries. They are also used by many microfinance institutions. One reason for their popularity is their ease of use. For example, a loan of $1,200 can be structured with 12 monthly repayments of $100, plus interest, due on the same dates, of 1% ($12) a month, resulting in a total monthly payment of $112.

Flat rate calculations, which are based on the amount of money the borrower receives at the beginning of the loan rather the average amount the borrower has access to during the loan, have been outlawed in developed countries. The flat rate basis of calculation assumes the original loan amount is outstanding throughout the tenure of the loan. In fact, with every installment payment some part of the original principal is also paid. So effectively the assumption is not correct. However, they persist in many developing countries, and have frequently been adopted by microcredit institutions.

For a variety of reasons (see below), flat rates can be useful in lending to poor people, and often disappear very slowly as financial systems develop.

Flat rate calculations

Flat interest APR

To use the example above, the borrower only has access to $1,200 at the very beginning of the loan. Since $100 in principal is being paid each month, the average amount the borrower has access to during the loan term is actually slightly more than half of $1,200. This means that the effective interest on such a loan, if recalculated using the declining balance method, is nearly double the flat rate. "A general rule known by financial managers is that when flat interest is used, the APR is almost twice as much as the quoted interest rate."[2]

In the first 3 examples on the right the borrower will be quoted 1% a month. These are loans of $1,200 each, amortized with level payments over 4, 12 and 24 months. In the 4-month example, the borrower will make 4 equal payments of $300 in principal and 4 equal payments of $12 (1% of $1,200) in interest. This yields an annualized flat rate of 12%, and an annualized effective APR of 19.05%.

Examples of Loans Quoted at 1% a Month, Flat

Principal	No. of months	Repayment per month		Origination fee	Flat rate (annualized)	Effective APR
		Principal	*Interest*			
$1,200	4	$300	$12	none	12.0%	19.05%
$1,200	12	$100	$12	none	12.0%	21.46%
$1,200	24	$50	$12	none	12.0%	21.57%
$1,200	4	$300	$12	4.0%	12.0%	37.81%
$1,200	12	$100	$12	4.0%	12.0%	28.33%
$1,200	24	$50	$12	4.0%	12.0%	24.92%

Source: Mathwood Consulting Co.

Calculating the APR of a Flat Rate Loan

Principal -$1,200	Flat Rate Calculation			Declining Balance Calculation		
	Total payment	Interest	Outstanding (month end)	Total payment	Interest	Outstanding (month end)
Month 1	$312.00	$12.00	-$900.00	$312.00	$19.05	-$907.05
Month 2	$312.00	$12.00	-$600.00	$312.00	$14.40	-$609.45
Month 3	$312.00	$12.00	-$300.00	$312.00	$9.68	-$307.12
Month 4	$312.00	$12.00	$0.00	$312.00	$4.88	$0.00
Total	$1,248.00	$48.00	$0.00	$1,248.00	$48.00	$0.00

Principal, amortization schedule and total payments for declining balance are set to equal those for the flat rate loan.

19.05%

The interest rate that yields equal total interest paid in the flat and declining systems is the effective APR.

Source: Mathwood Consulting Co.

To keep the quoted interest rate as low as possible, microcredit institutions often recover some of their lending costs by charging one-time origination or administration fees before disbursing loans. Because these fees are deemed an inherent cost of borrowing, developed countries generally require lenders to include them in APR calculations. Even an origination fee as low as 4% of the total loan can have a large impact on the borrower's total costs. This is especially true for short-term loans, as the last 3 examples in the table show. Microcredit loans are usually for 12 months or less.

In order to recalculate a flat rate as an effective APR, it is necessary to model a comparable loan using a declining balance amortization schedule, resulting in the same total cost to the borrower (see table on the left). The loan is for $1,200 repayable in level monthly payments over 4 months. The total cost of this loan includes the principal plus $48.00 in interest. The effective

APR is calculated by iteration from the amortization schedule, using the compound interest formula.

Benefits of flat rate lending

Flat interest rates persist in emerging and informal financial systems due to the following advantages:

- *They are easy to calculate and track*: Flat interest rates require no calculations to blend principal and interest into a level payment, and require no compounding calculations (see the example to the right). Traditional moneylenders often do not have either computers or calculators, and neither do their borrowers, who are often illiterate and/or innumerate. Flat rates keep loan commitments clear, transparent and easily tracked by both parties. Many microfinance institutions do not have computers either, and the complexity of declining balance calculations may confuse their borrowers and even their staff. Semi-formal institutions like self-help groups, village banks and ASCAs also usually prefer this calculation method.

- *They meet vital cash flow needs of farmers*: Many borrowers in developing countries are farmers who demand loans with balloon payments, repayable after they harvest their crops. Because the borrower is using the entire amount of principal borrowed throughout the entire loan term, flat rate calculations are accurate when applied to balloon loans.

- *They support 'in-kind' loan transactions*: Flat rate loans originated before currency was invented, and are commonly used to repay loans in regular instalments of chickens, eggs, kilos of rice, and so on. For farmers accustomed to these types of transactions, flat rate cash loans are familiar and easy to understand.

Problems with flat rate lending

Flat interest rates represent a significant problem for financial sector development for the following reasons:

- *They deter pre-payments by borrowers*: Borrowers have an incentive to avoid pre-paying flat-rate loans, as they will lose the use of the borrowed money with no compensating discount in interest payments. Lenders are therefore ensured maximum interest income, which encourages them to continue the practice. Writing of the practices of microfinance institutions in Bangladesh, S.M. Rahman points out that "[i]f one client takes a loan today and offers to repay the entire loan the next day, the client has to repay the total loan along with the whole year's interest, reckoned on a flat rate system."

- *They offer convenient level of disclosure for the lender (but not for the borrower)*: Flat interest rates generally prevail only where declining balance calculations are not familiar to most borrowers, or are not required by law. In such places loans quoted using declining balance rates may be rejected by borrowers, who mistakenly believe that flat rates are cheaper. "Not only the clients but even educated people sometimes have trouble

understanding this system. The problem is that the flat rate gives an impression of a lower rate than it actually is."

In addition, microfinance institutions (MFIs) that use flat rates calculations are slightly understating the size of their outstanding loan portfolios, which results in the appearance of a higher portfolio yield and lower average loan sizes. Both of these characteristics appeal to donors and external financiers.[5]

Towards consumer protection in borrowing

Flat interest rates are controversial in microfinance. Chuck Waterfield, designer of *Microfin*, a widely used financial modeling tool for MFIs, asks "Why did such a system appear in microfinance lending? The answer is obvious and cannot be debated: it allows the institution to charge nearly twice as much interest for the quoted interest rate as with the declining balance method."

As early as 1889, F.W. Raiffeisen used both ethical and practical grounds to dissuade the credit unions then emerging in Germany from adopting flat rate loan pricing. "It is immoral to charge interest in advance, and also objectionable as a business method. Every member shall have the right at any time to pay back his loan. If interest has been charged for a full year in advance, the members who have made repayments ahead of time, pay too much interest, unless the Credit Union makes a refund. The first arrangement is unjust, the latter involves complicated bookkeeping."[7]

The less developed an economy, the more active informal moneylenders usually are, and the less capacity the government may have to regulate them effectively. As a result, Brigit Helms argues for an evolutionary approach to interest rates, in which they can be expected to gradually drop as competition increases and the government gains greater capacity to effectively enforce comparable interest rate disclosures on financial sector actors.[8] At the same time, interest rate ceilings, and popular conflation of flat rates with declining balance ones, has led many microfinance institutions to replace interest rate points with transaction fees and other charges, circumventing disclosure norms consistent with APR.

Effective Rate

The **effective interest rate**, **effective annual interest rate**, **reducing principal rate** or simply **effective rate** is the interest rate on a loan or financial product restated from the nominal interest rate as an interest rate with annual compound interest payable in arrears.

It is used to compare the annual interest between loans with different compounding terms (daily, monthly, annually, or other). The effective interest rate differs in two important respects from the annual percentage rate (APR):

1. the effective interest rate generally does not incorporate one-time charges such as front-end fees;

2. the effective interest rate is (generally) not defined by legal or regulatory authorities (as APR is in many jurisdictions)

By contrast, the effective APR is used as a legal term, where front-fees and other costs can be included, as defined by local law.

Annual percentage yield or effective annual yield is the analogous concept used for savings or investment products, such as a certificate of deposit. Since any loan is an investment product for the lender, the terms may be used to apply to the same transaction, depending on the point of view.

Effective annual interest or yield may be calculated or applied differently depending on the circumstances, and the definition should be studied carefully. For example, a bank may refer to the yield on a loan portfolio after expected losses as its effective yield and include income from other fees, meaning that the interest paid by each borrower may differ substantially from the bank's effective yield.

Calculation

The effective interest rate is calculated as if compounded annually. The effective rate is calculated in the following way, where r is the effective annual rate, i the nominal rate, and n the number of compounding periods per year (for example, 12 for monthly compounding):

$$r = (1 + i/n)^n - 1$$

For example, a nominal interest rate of 6% compounded monthly is equivalent to an effective interest rate of 6.17%. 6% compounded monthly is credited as 6%/12 = 0.005 every month. After one year, the initial capital is increased by the factor $(1 + 0.005)^{12} \approx 1.0617$.

When the frequency of compounding is increased up to infinity the calculation will be:

$$r = e^i - 1$$

The yield depends on the frequency of compounding:

Effective Annual Rate Based on Frequency of Compounding					
Nominal Rate	**Semi-Annual**	**Quarterly**	**Monthly**	**Daily**	**Continuous**
1%	1.002%	1.004%	1.005%	1.005%	1.005%
5%	5.062%	5.095%	5.116%	5.127%	5.127%
10%	10.250%	10.381%	10.471%	10.516%	10.517%
15%	15.563%	15.865%	16.075%	16.180%	16.183%
20%	21.000%	21.551%	21.939%	22.134%	22.140%

30%	32.250%	33.547%	34.489%	34.969%	34.986%
40%	44.000%	46.410%	48.213%	49.150%	49.182%
50%	56.250%	60.181%	63.209%	64.816%	64.872%

The effective interest rate is a special case of the internal rate of return.

If the monthly interest rate j is known and remains constant throughout the year, the effective annual rate can be calculated as follows:

$$r = ((1+j)^{12} - 1)$$

Repayment Schedule (Amortization schedule)

An **amortization schedule** is a table detailing each periodic payment on an amortizing loan (typically a mortgage or car loan), as generated by an amortization calculator. Amortization refers to the process of paying off a debt (often from a loan or mortgage) over time through regular payments. A portion of each payment is for interest while the remaining amount is applied towards the principal balance. The percentage of interest versus principal in each payment is determined in an amortization schedule.

While a portion of every payment is applied towards both the interest and the principal balance of the loan, the exact amount applied to principal each time varies (with the remainder going to interest). An amortization schedule reveals the specific monetary amount put towards interest, as well as the specific amount put towards the principal balance, with each payment. Initially, a large portion of each payment is devoted to interest. As the loan matures, larger portions go towards paying down the principal.

Methods of amortization

There are different methods in which to arrive at an amortization schedule. These include:

- Straight line (linear)
- Declining balance
- Annuity
- Bullet (all at once)
- Increasing balance (negative amortization)

Amortization schedules run in chronological order. The first payment is assumed to take place one full payment period after the loan was taken out, not on the first day (the amortization date) of the loan. The last payment completely pays off the remainder of the loan. Often, the last payment will be a slightly different amount than all earlier payments.

In addition to breaking down each payment into interest and principal portions, an amortization schedule also reveals interest-paid-to-date, principal-paid-to-date, and the remaining principal balance on each payment date.

Example amortization schedule

This amortization schedule is based on the following assumptions:

First, it should be known that rounding errors occur and depending how the lender accumulates these errors, the blended payment (principal + interest) may vary slightly some months to keep these errors from accumulating; or, the accumulated errors are adjusted for at the end of each year, or at the final loan payment.

There are a few crucial points worth noting when mortgaging a home with an amortized loan. First, there is substantial disparate allocation of the monthly payments toward the interest, especially during the first 18 years of the mortgage. In the example above, payment 1 allocates about 80-90% of the total payment towards interest and only $67.09 (or 10-20%) toward the Principal balance. The exact percentage allocated towards payment of the principal depends on the interest rate. Not until payment 257 or 21 years into the loan does the payment allocation towards principal and interest even out and subsequently tip the majority of the monthly payment toward Principal balance pay down.

Second, understanding the above statement, the repetitive refinancing of an amortized mortgage loan, even with decreasing interest rates and decreasing Principal balance, can cause the borrower to pay over 500% of the value of the original loan amount. 'Re-amortization' or restarting the amortization schedule via a refinance causes the entire schedule to restart: the new loan will be 30 years from the refinance date, and initial payments on this loan will again be largely interest, not principal. If the rate is the same, say 8%, then the interest/principal allocation will be the same as at the start of the original loan (say, 90/10). This economically unfavorable situation is often mitigated by the apparent decrease in monthly payment and interest rate of a refinance, when in fact the borrower is increasing the total cost of the property. This fact is often (understandably) overlooked by borrowers.

Third, the payment on an amortized mortgage loan remains the same for the entire loan term, regardless of Principal balance owed. For example, the payment on the above scenario will remain $733.76 regardless if the Principal balance is $100,000 or $50,000. Paying down large chunks of the Principal balance in no way affects the monthly payment, it simply reduces the term of the loan and reduces the amount of interest that can be charged by the lender resulting in a quicker payoff. To avoid these caveats of an amortizing mortgage loan many borrowers are choosing an interest-only loan to satisfy their mortgage financing needs. Interest-only loans have their caveats as well which must be understood before choosing the mortgage payment term that is right for the individual borrower.

Outstanding loan balance calculation

The outstanding loan balance at any given time during the term of a loan can be calculated by finding the present value of the remaining payments at the given interest rate. This amount will consist of principal only.

Example of O/S loan balance calculation:

- Loan Amount= $100,000
- Term= 20 years
- Interest Rate = 7%
- Amortization is monthly

Question: What is the loan balance at the end of year seven?

First, calculate the monthly payments by using the loan amount ($100,000) as present value, term as 240 (20 years x 12 months/year), Interest as .583333% (7%/12 months). This will give you a monthly payment of $775.30. The Present Value of an Annuity formula should be used here to solve for monthly payment.

Next, in order to find the outstanding loan balance you will need to find the present value of the remaining payments. Use the monthly payment of $775.30 as the payment function, the term will be 156 ((20-7)x12), and .583333% as the rate. This will give you an outstanding loan balance of $79,268.02. Again, the Present Value of an Annuity formula should be used.

This means that at the end of year seven the loan can be paid off in full for the amount of $79,268.02. Typically mortgage lenders will have a balloon payment clause in the contract that will charge a fee for early payment. This is because the lender will not get the same yield if loan balance is not held to maturity.

Similarly here is a table that shows both the interest and principle portions paid for the first two years.

Period	EMI	Interest	Principal	Balance
1	775.30	583.33	191.97	99,808.03
2	775.30	582.21	193.09	99,614.95
3	775.30	581.09	194.21	99,420.74
4	775.30	579.95	195.34	99,225.39
5	775.30	578.81	196.48	99,028.91
6	775.30	577.67	197.63	98,831.28
7	775.30	576.52	198.78	98,632.50
8	775.30	575.36	199.94	98,432.55
9	775.30	574.19	201.11	98,231.44
10	775.30	573.02	202.28	98,029.16
11	775.30	571.84	203.46	97,825.70
12	775.30	570.65	204.65	97,621.05
13	775.30	569.46	205.84	97,415.21
14	775.30	568.26	207.04	97,208.16
15	775.30	567.05	208.25	96,999.91
16	775.30	565.83	209.47	96,790.45
17	775.30	564.61	210.69	96,579.76
18	775.30	563.38	211.92	96,367.84
19	775.30	562.15	213.15	96,154.69
20	775.30	560.90	214.40	95,940.29
21	775.30	559.65	215.65	95,724.64
22	775.30	558.39	216.91	95,507.74
23	775.30	557.13	218.17	95,289.57
24	775.30	555.86	219.44	95,070.13

Internal rate of return

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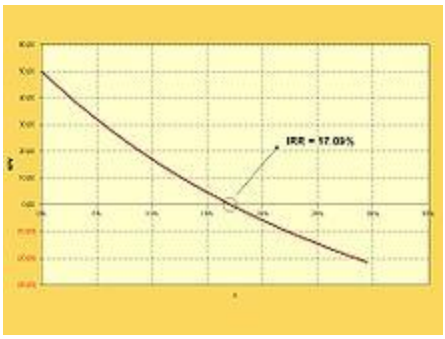
The **internal rate of return** (**IRR**) is a rate of return used in capital budgeting to measure and compare the profitability of investments. It is also called the discounted cash flow rate of return (DCFROR) or the rate of return (ROR).[1] In the context of savings and loans the IRR is also called the effective interest rate. The term *internal* refers to the fact that its calculation does not incorporate environmental factors (e.g., the interest rate or inflation).

Contents

[hide]

[edit] Definition



Showing the position of the IRR on the graph of $NPV(r)$ (r is labelled 'i' in the graph)

The internal rate of return on an investment or project is the "annualized effective compounded return rate" or "rate of return" that makes the net present value (NPV as NET*1/(1+IRR)^year) of all cash flows (both positive and negative) from a particular investment equal to zero.

In more specific terms, the IRR of an investment is the discount rate at which the net present value of costs (negative cash flows) of the investment equals the net present value of the benefits (positive cash flows) of the investment.

Internal rates of return are commonly used to evaluate the desirability of investments or projects. The higher a project's internal rate of return, the more desirable it is to undertake the project. Assuming all projects require the same amount of up-front investment, the project with the highest IRR would be considered the best and undertaken first.

A firm (or individual) should, in theory, undertake all projects or investments available with IRRs that exceed the cost of capital. Investment may be limited by availability of funds to the firm and/or by the firm's capacity or ability to manage numerous projects.

[edit] Uses

Because the internal rate of return is a rate quantity, it is an indicator of the efficiency, quality, or yield of an investment. This is in contrast with the net present value, which is an indicator of the value or magnitude of an investment.

An investment is considered acceptable if its internal rate of return is greater than an established minimum acceptable rate of return or cost of capital. In a scenario where an investment is considered by a firm that has equity holders, this minimum rate is the cost of capital of the investment (which may be determined by the risk-adjusted cost of capital of alternative investments). This ensures that the investment is supported by equity holders since, in general, an investment whose IRR exceeds its cost of capital adds value for the company (i.e., it is economically profitable).

[edit] Calculation

Given a collection of pairs (time, cash flow) involved in a project, the internal rate of return follows from the net present value as a function of the rate of return. A rate of return for which this function is zero is an internal rate of return.

Given the (period, cash flow) pairs (n, C_n) where n is a positive integer, the total number of periods N, and the net present value NPV, the internal rate of return is given by r in:

$$\mathrm{NPV} = \sum_{n=0}^{N} \frac{C_n}{(1+r)^n} = 0$$

The period is usually given in years, but the calculation may be made simpler if r is calculated using the period in which the majority of the problem is defined (e.g., using months if most of the cash flows occur at monthly intervals) and converted to a yearly period thereafter.

Any fixed time can be used in place of the present (e.g., the end of one interval of an annuity); the value obtained is zero if and only if the NPV is zero.

In the case that the cash flows are random variables, such as in the case of a life annuity, the expected values are put into the above formula.

Often, the value of r cannot be found analytically. In this case, numerical methods or graphical methods must be used.

[edit] Example

If an investment may be given by the sequence of cash flows

Year (n)	Cash Flow (C_n)
0	-4000
1	1200
2	1410
3	1875
4	1050

then the IRR r is given by

$$NPV = -4000 + \frac{1200}{(1+r)^1} + \frac{1410}{(1+r)^2} + \frac{1875}{(1+r)^3} + \frac{1050}{(1+r)^4} = 0.$$

In this case, the answer is 14.3%.

[edit] Numerical solution

Since the above is a manifestation of the general problem of finding the roots of the equation $\mathrm{NPV}(r)$, there are many numerical methods that can be used to estimate r. For example, using the secant method, r is given by

$$r_{n+1} = r_n - \mathrm{NPV}_n \left(\frac{(r_n - r_{n-1})}{\mathrm{NPV}_n - \mathrm{NPV}_{n-1}} \right).$$

where r_n is considered the n^{th} approximation of the IRR.

This r can be found to an arbitrary degree of accuracy.

The convergence behaviour of the sequence is governed by the following:

- If the function $\mathrm{NPV}(i)$ has a single real root r, then the sequence will converge reproducibly towards r.
- If the function $\mathrm{NPV}(i)$ has n real roots $r_1, r_2, \ldots, r_n$, then the sequence will converge to one of the roots and changing the values of the initial pairs may change the root to which it converges.
- If function $\mathrm{NPV}(i)$ has no real roots, then the sequence will tend towards $\pm\infty$.

Having $r_1 > r_0$ when $\mathrm{NPV}_0 > 0$ or $r_1 < r_0$ when $\mathrm{NPV}_0 < 0$ may speed up convergence of r_n to r.

[edit] Numerical Solution for Single Outflow and Multiple Inflows

Of particular interest is the case where the stream of payments consists of a single outflow, followed by multiple inflows occurring at equal periods. In the above notation, this corresponds to: $C_0 < 0$, $C_n \geq 0$ for $n \geq 1$. In this case the NPV of the payment stream is a convex, strictly decreasing function of interest rate. There is always a single unique solution for IRR.

Given two estimates r_1 and r_2 for IRR, the secant method equation (see above) with $n = 2$ will always produce an improved estimate r_3. This is sometimes referred to as the Hit and Trial (or Trial and Error) method. There is however a much more accurate estimation formula, given by:

$$r_{n+1} = (1 + r_n)\left(\frac{1 + r_{n-1}}{1 + r_n}\right)^p - 1$$

where

$$p = \frac{\log(\mathrm{NPV}_{n,in}/|C_0|)}{\log(\mathrm{NPV}_{n,in}/\mathrm{NPV}_{n-1,in})}.$$

In this equation, $\mathrm{NPV}_{n,in}$ and $\mathrm{NPV}_{n-1,in}$ refer to the NPV's of the *inflows only* (that is, set $C_0 = 0$ and compute NPV). For example, using the stream of payments {-4000, 1200, 1410, 1875, 1050} and initial guesses $r_1 = 0.1$ and $r_2 = 0.2$ gives $\mathrm{NPV}_{1,in} = 4382.1$ and $\mathrm{NPV}_{2,in} = 3570.6$. The accurate formula estimates IRR as 14.35% (0.3% error) as compared to IRR = 14.7% (3% error) from the secant method.

If applied iteratively, either the secant method or the improved formula will always converge to the correct solution.

Both the secant method and the improved formula rely on initial guesses for IRR. The following initial guesses may be used:

$$r_1 = (A/|C_0|)^{2/(N+1)} - 1$$

$r_2 = (1 + r_1)^p - 1$

where

A = *sum of inflows* = $C_1 + \ldots + C_N$

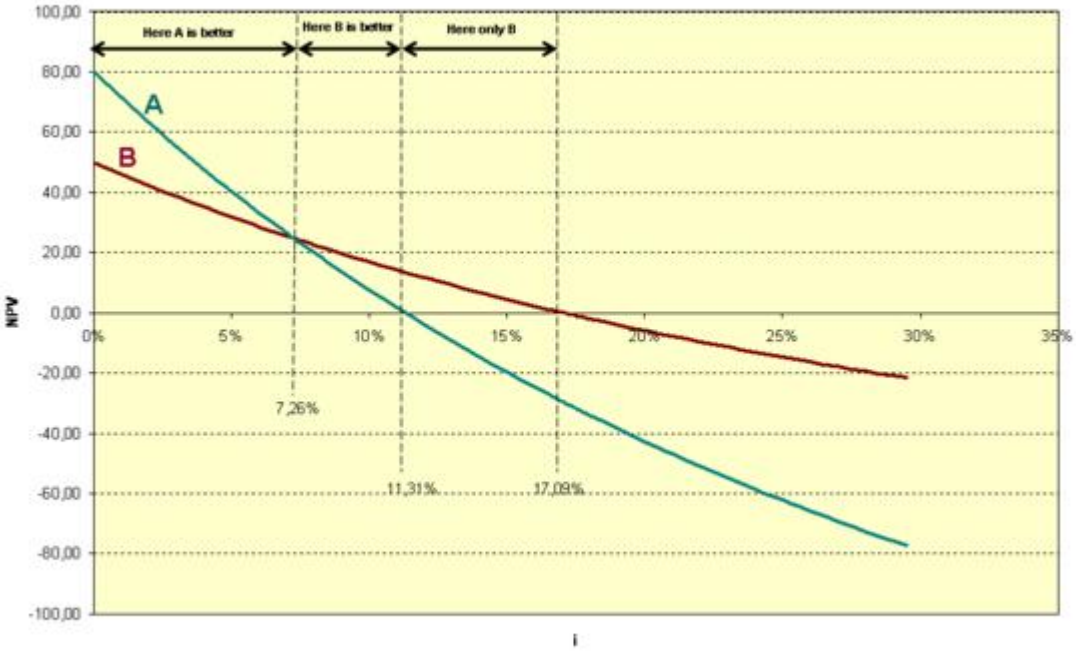
$$p = \frac{\log(A/|C_0|)}{\log(A/\mathrm{NPV}_{1,in})}.$$

[edit] Decision Criterion

If the IRR is greater than the cost of capital, accept the project. If the IRR is less than the cost of capital, reject the project.

[edit] Problems with using internal rate of return

As an investment decision tool, the calculated IRR should *not* be used to rate mutually exclusive projects, but only to decide whether a single project is worth investing in.



NPV vs discount rate comparison for two mutually exclusive projects. Project 'A' has a higher NPV (for certain discount rates), even though its IRR (=x-axis intercept) is lower than for project 'B' (click to enlarge)

In cases where one project has a higher initial investment than a second mutually exclusive project, the first project may have a lower IRR (expected return), but a higher NPV (increase in shareholders' wealth) and should thus be accepted over the second project (assuming no capital constraints).

IRR assumes reinvestment of interim cash flows in projects with equal rates of return (the reinvestment can be the same project or a different project). Therefore, IRR overstates the annual equivalent rate of return for a project whose interim cash flows are reinvested at a rate lower than the calculated IRR. This presents a problem, especially for high IRR projects, since there is frequently not another project available in the interim that can earn the same rate of return as the first project.

When the calculated IRR is higher than the true reinvestment rate for interim cash flows, the measure will overestimate — sometimes very significantly — the annual equivalent return from the project. The formula assumes that the company has additional projects, with equally attractive prospects, in which to invest the interim cash flows.[2]

This makes IRR a suitable (and popular) choice for analyzing venture capital and other private equity investments, as these strategies usually require several cash investments throughout the project, but only see one cash outflow at the end of the project (e.g., via IPO or M&A).

Since IRR does not consider cost of capital, it should not be used to compare projects of different duration. Modified Internal Rate of Return (MIRR) does consider cost of capital and provides a better indication of a project's efficiency in contributing to the firm's discounted cash flow.

In the case of positive cash flows followed by negative ones and then by positive ones (for example, + + - - - +) the IRR may have multiple values. In this case a discount rate may be used for the borrowing cash flow and the IRR calculated for the investment cash flow. This applies for example when a customer makes a deposit before a specific machine is built.

In a series of cash flows like (-10, 21, -11), one initially invests money, so a high rate of return is best, but then receives more than one possesses, so then one owes money, so now a low rate of return is best. In this case it is not even clear whether a high or a low IRR is better. There may even be multiple IRRs for a single project, like in the example 0% as well as 10%. Examples of this type of project are strip mines and nuclear power plants, where there is usually a large cash outflow at the end of the project.

In general, the IRR can be calculated by solving a polynomial equation. Sturm's theorem can be used to determine if that equation has a unique real solution. In general the IRR equation cannot be solved analytically but only iteratively.

When a project has multiple IRRs it may be more convenient to compute the IRR of the project with the benefits reinvested.[2] Accordingly, MIRR is used, which has an assumed reinvestment rate, usually equal to the project's cost of capital.

It has been shown[3] that with multiple internal rates of return, the IRR approach can still be interpreted in a way that is consistent with the present value approach provided that the underlying investment stream is correctly identified as net investment or net borrowing.

See also [4] for a way of identifying the relevant value of the IRR from a set of multiple IRR solutions.

Despite a strong academic preference for NPV, surveys indicate that executives prefer IRR over NPV.[5] Apparently, managers find it easier to compare investments of different sizes in terms of percentage rates of return than by dollars of NPV. However, NPV remains the "more accurate" reflection of value to the business. IRR, as a measure of investment efficiency may give better insights in capital constrained situations. However, when comparing mutually exclusive projects, NPV is the appropriate measure.

[edit] Mathematics

Mathematically, the value of the investment is assumed to undergo exponential growth or decay according to some rate of return (any value greater than -100%), with discontinuities for cash flows, and the IRR of a series of cash flows is defined as any rate of return that results in a net present value of zero (or equivalently, a rate of return that results in the correct value of zero after the last cash flow).

Thus, internal rate(s) of return follow from the net present value as a function of the rate of return. This function is continuous. Towards a rate of return of -100% the net present value approaches infinity with the sign of the last cash flow, and towards a rate of return of positive infinity the net present value approaches the first cash flow (the one at the present). Therefore, if the first and last cash flow have a different sign there exists an internal rate of return. Examples of time series without an IRR:

- Only negative cash flows — the NPV is negative for every rate of return.
- (-1, 1, -1), rather small positive cash flow between two negative cash flows; the NPV is a quadratic function of $1/(1+r)$, where r is the rate of return, or put differently, a quadratic function of the discount rate $r/(1+r)$; the highest NPV is -0.75, for $r = 100\%$.

In the case of a series of exclusively negative cash flows followed by a series of exclusively positive ones, consider the total value of the cash flows converted to a time between the negative and the positive ones. The resulting function of the rate of return is continuous and monotonically decreasing from positive infinity to negative infinity, so there is a unique rate of return for which it is zero. Hence, the IRR is also unique (and equal). Although the NPV-function itself is not necessarily monotonically decreasing on its whole domain, it *is* at the IRR.

Similarly, in the case of a series of exclusively positive cash flows followed by a series of exclusively negative ones the IRR is also unique.

Loan-to-value ratio

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

Loan to value is one of the key risk factors that lenders assess when qualifying borrowers for a loan. 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 loan 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/loan.

The valuation of a property or asset is typically determined by an appraiser, but there is no greater measure of the actual real value of one property/asset 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 of the total appraised value of real property (CLTV).

In Australia, the term Loan to Value Ratio is abbreviated to LVR instead of LTV. An LVR of 80% or below is considered to be a low risk for standard conforming loans, and below 60% for a no doc loan or low doc loan. Higher LVRs are available if the loan is mortgage insured.

In the UK, mortgages with an LTV of up to 125% were quite common in the run-up to the national / global economic problems, but today (November 2011) there are very few mortgages available with an LTV of over 90% - and 75% LTV mortgages are the most common.

Debt-to-income 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 a convenient, well-understood shorthand.) There are two main kinds of DTI, as discussed below.

Two main kinds of DTI

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

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

Example

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.

What DTI limits are used in qualifying borrowers?

Current limits

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.)
- USDA 29/41

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 remains to be seen.

Standard or conforming mortgages

Many countries have a notion of standard or conforming mortgages that define a perceived acceptable level of risk, which may be formal or informal, and may be reinforced by laws, government intervention, or market practice. For example, a standard mortgage may be considered to be one with no more than 70-80% LTV and no more than one-third of gross income going to mortgage debt.

A standard or conforming mortgage is a key concept as it often defines whether or not the mortgage can be easily sold or securitized, or, if non-standard, may affect the price at which it may be sold. In the United States, a conforming mortgage is one which meets the established rules and procedures of the two major government-sponsored entities in the housing finance market (including some legal requirements). In contrast, lenders who decide to make nonconforming loans are exercising a higher risk tolerance and do so knowing that they face more challenge in reselling the loan. Many countries have similar concepts or agencies that define what are "standard" mortgages. Regulated lenders (such as banks) may be subject to limits or higher risk weightings for non-standard mortgages. For example, banks and mortgage brokerages in Canada face restrictions on lending more than 80% of the property value; beyond this level, mortgage insurance is generally required.

Loan origination

Loan origination is the process by which a borrower applies for a new loan, and a lender processes that application. Origination generally includes all the steps from taking a loan application through disbursal of funds (or declining the application). Loan servicing generally covers everything after disbursing the funds until the loan is fully paid off. Loan origination is a specialized version of new account opening for financial services organizations. Certain people and organizations specialize in loan origination, with mortgage brokers and other mortgage originator companies serving as a prominent example. A Loan Origination Fee Is Often required and this is one of the legal / approved fee required of borrowers mostly by UK lenders. No other fee is expected from the borrower a Borrower has paid for this fee because it covers the originating and conclusion of the loan application.

There are many different types of loans. For more information on loan types, see the loan and consumer lending articles. Steps involved in originating a loan vary by loan type, various kinds of loan risk, regulator, lender policy, and other factors.

Application Process

Applications for loans may be made through several different channels and the length of the application process, from initial application to funding, means that different organizations may use various channels for customer interactions over time. In general, loan applications may be split into three distinct types:

- Agent assisted (branch-based)
- Agent assisted (telephone-based)
- Broker sale (third-party sales agent)
- Self-service

Retail loans and mortgages are typically highly competitive products that may not offer a large margin to their providers, but through high volume sales can be highly profitable. The business model of the individual financial institution and the products they offer therefore affects on which application model they will offer

Agent Assisted (Branch-Based) Loan Application

The typical types of financial services organizations offering loans through the face to face channel have a long-term investment in 'brick and mortar' branches. Typically these are:

- Banks
- Credit Unions
- Building Societies

The appeal to customers of the loan offered directly in branches is the often long-standing relationship that a customer may have with the institution, the appearance of trustworthiness this type of institution has, and the perception that holding a larger portfolio of products with a single organization may lead to better terms. From a bank's standpoint, cross-selling products to current customers offers an effective marketing opportunity, and agents in branches may be trained to handle the sale of many different types of financial products.

In a branch, customers typically sit with a sales agent who will assist the customer in completing the application form, selecting appropriate product options (such as payment terms and rates), collecting required documentation (new account opening compliance requirements must be met at this stage), selecting add-on products (such as Payment protection insurance), and eventually signing a completed application.

Dependent on the institution and product being offered, the application may be completed on a paper application form, or directly into an online application through the agent's desktop system. In either case, this phase of application is mostly concerned with the accurate capture of

customer's details, and does not incorporate any of the background decisioning work required to assess the suitability of the customer and the risk of default, or the due diligence that must be performed to mitigate risk of fraud and money laundering activities.

A major complexity for the branch origination channel is making the process simple enough that sales agents can be easily trained to handle many different products, while ensuring that the many due diligence and disclosure requirements of the financial and banking regulators regionally are met.

Many back-office functions of loan origination continue from this point and are described in the Processing section below.

Agent Assisted (Telephone-Based) Loan Application

Broker-Sourced (Third Party Sales Agent) Loan Application

Self-service Loan Application

- Self-service web applications are taken in a variety of ways, and the state of this business has evolved over time
- Print and fax applications or pre-qualification forms. Some financial institutions still use these.
  - Print, write or type data into the form, send it to the financial institution
  - Form fill on the web, print, and send to the financial institution (not much better)
- Web forms filled out and saved by the applicant on the web site, that are then sent to or retrieved by (ostensibly securely) the financial institution
- True web applications with interfaces to a loan origination system on the back end
  - Many of the early solutions had a lot of the same problems as general forms (bad work flows, trying to handle all manner of loan types in one form)
- Wizard-style applications that are very intuitive and don't ask superfluous questions

Jobs the online application should perform:

1. Present required disclosures, comply with various lending regulations)
2. Be compliant with security requirements (such as Multi-Factor Authentication) where applicable.
3. Collect the necessary applicant data
    1. Exactly what is needed varies by loan type. The application should not ask for data the applicant doesn't absolutely have to provide to get to a prequalification decision for the loan type(s) they seek.
    2. The application should pre-fill demographic data if the applicant is an existing client and has logged in.
4. Make it easy, quick, and friendly for the applicant (so they actually complete the application and don't abandon)
5. Get a current credit report

6. Prequalify (auto-decision) the application and return a quick response to the applicant. Typically this would be approved subject to stipulations, referred to the financial institution, declined (many FIs shy away from this preferring to refer any application that can't be automatically pre-approved.)

Processing

Decisioning & credit risk

The mortgage business consists of a few people: the borrower, the lender, and sometimes the mortgage broker. The people that originate the loans are usually the mortgage broker or the lender. Depending if the borrower has credit worthiness, then he/she can be qualified for a loan. The norm qualifying FICO score is not a static number. Lender guidelines and mitigating factors determine this number. Recent changes in the market and industry have made stated income and stated asset loans a thing of the past and full income and asset documentation is now required from the majority of Fannie Mae and Freddie Mac back mortgage securities. Not only does one's credit score affect their qualification, the fact of the matter also lies in the question, "Can I (the borrower) afford this mortgage?" In most cases the borrower can afford their mortgage. However, some borrowers seek to incorporate their unsecured debt in to their mortgage (secured debt.) They seek to pay off the debt that is outstanding in amount. These debts are called "liabilities," these liabilities are calculated into a ratio that lenders use to calculate risk. This ratio is called the "Debt-to-income ratio" (DTI). If the borrower has excessive debt that he/she wishes to pay off, and that ratio from those debts exceeds a limit of DTI, then the borrower has to either pay off a few debts in a later time and pay off just the outstanding debt. When the borrower refinances his/her loan, they can pay off the remainder of the debt.

Example: if the borrower owes $1,500 in credit cards and makes $3,000 in a month: his DTI ratio would be - 50%. But if the borrower owes $1,500 and makes $2,000 in a month, his DTI ratio would be - 75%. This ratio is seen by many lenders as high and too risky a person to lend to and may or may not be able to afford the mortgage. So that covers qualification, now on to appraising collateral.

Pricing, including Risk-based pricing & Relationship based pricing

Pricing policy varies a great deal. While you probably can't influence the pricing policy of a given financial institution, you can:

- Shop around
- Ask for a better rate - some financial institutions will respond to this, some won't
- Price match - many financial institutions will match a rate for a current customer[1]

Pricing is often done in one of these ways. Follow the internal links for more details:

- **Everyone pays the same rate.** This is an older approach, and most financial institutions no longer use this approach because it causes low risk customers to pay a higher than market

rate, while high risk customers get a better rate than they might otherwise get, causing the financial institution to get a lower rate of return on the loan than the risk might imply.
- **Risk-based pricing.** With this approach, pricing is based on various risk factors including loan to value, credit score, loan term (expected length, usually in months)[1]
- **Relationship based pricing** is often used to offer a slightly better rate to customers that have a substantial business relationship with the financial institution. This is often a price improvement offered on top of the otherwise computed rate.

Appraising Collateral

The next step is to have a Real Estate appraiser appraise the borrower's property that he wishes to have the loan against. This is done to prevent fraud of any kind by either the borrower or the mortgage broker. This prevents frauds like "equity striping" and money embezelment. The amount that the appraiser from either the borrower's side or the lender's side is the amount that the borrower can loan up to. This amount is divided by the debt that the borrower wants to pay off plus other disbursments (i.e. cash-out, 1st mortgage, 2nd mortgage, etc) and the appraised value (if a refinance) or purchase price (if a purchase) {which ever amount is lower} and converted into yet another ratio called the Loan to value (LTV) ratio. This ratio determines the type of loan and risk the lender is put up against. For example: if the borrower's house appraises for $415,000 and they wish to refinance for the amount of $373,500 - the LTV ratio would be 90%. The lender also may put a limit to how much the LTV can be - for example, if the borrower's credit is bad, the lender may limit the LTV that the borrower can loan. However, if the borrower's credit is in Good condition, then the lender most likely not put a restriction on the borrower's LTV. LTV for loans may or may not exceed 100% depending on many factors.

The appraisal would take place on location of the borrower's property. The appraiser may take pictures of the house from many angles and will take notes on how the property looks. He/she will type up an appraisal and submit it to the lender or broker (depending on who ordered the appraisal.) The Appraisal is written in the format compliant to FNMA Form 1004. The 1004 is the standard appraisal form used by appraisers nationwide.

Processing Documents/Loan Underwriting

Document Preparation

Electronic Signature

Digital Signature

Mortgage Underwriting

An underwriter is a person who evaluates the loan documentation and determines whether or not the loan complies with the guidelines of the particular mortgage program. It is the underwriter's responsibility to assess the risk of the loan and decide to approve or decline the loan. A processor is the one who gathers and submits the loan documents to the underwriter. Underwriters take at least 48 hours to underwrite the loan and after the borrower signs the package it takes 24 hours for a processor to process the documents.

Funding of Loan

- Booking
- Disbursal of funds

Collateralization & Recording lien

- Recording the debt onto the property's title

Credit bureau

A **credit bureau** is a company that collects information from various sources and provides consumer credit information on individual consumers for a variety of uses. It is an organization providing information on individuals' borrowing and bill paying habits. This helps lenders assess credit worthiness, the ability to pay back a loan, and can affect the interest rate and other terms of a loan. Interest rates are not the same for everyone, but instead can be based on risk-based pricing, a form of price discrimination based on the different expected risks of different borrowers, as set out in their credit rating. Consumers with poor credit repayment histories or court adjudicated debt obligations like tax liens or bankruptcies will pay a higher annual interest rate than consumers who don't have these factors.

In the U.S., credit bureaus collect and collate personal information, financial data, and alternative data on individuals from a variety of sources called data furnishers with which the bureaus have a relationship. Data furnishers are typically creditors, lenders, utilities, debt collection agencies and the courts (i.e. public records) that a consumer has had a relationship or experience with. Data furnishers report their payment experience with the consumer to the credit bureaus. The data provided by the furnishers as well as collected by the bureaus are then aggregated into the credit bureau's data repository or files. The resulting information is made available on request to customers of the credit bureau for the purposes of credit risk assessment, credit scoring or for other purposes such as employment consideration or leasing an apartment. Given the large number of consumer borrowers, these credit scores tend to be mechanistic. To simplify the analytical process for their customers, the different credit bureaus can apply a mathematical algorithm to provide a score the customer can use to more rapidly assess the likelihood that an individual will repay a given debt given the frequency that other individuals in similar situations have defaulted. Most consumer welfare advocates advise individuals to review their credit reports at least once per year, in order to ensure that the reports are accurate.

Commercial credit reports and scoring also exist, which can be used to evaluate the likelihood of a business paying creditors. Examples of these are the Paydex score from Dun & Bradstreet, the Experian Intelliscore the CPR Score from Cortera, the National Trade Credit Report from the National Association of Credit Management (NACM), the CIC Score from SACM (Southeastern Association of Credit Management, an NACM affiliate), and the PayNet MasterScore(SM) from PayNet.

India

The establishment of Credit Information Bureau (India) Limited (CIBIL), India's first Credit Information Bureau, is an effort made by the Government of India and the Reserve Bank of India to improve the functionality and stability of the Indian financial system by containing NPAs while improving credit grantors' portfolio quality.

CIBIL was promoted by State Bank of India (SBI), Housing Development Finance Corporation (HDFC), Dun & Bradstreet Information Services India Private Limited (D&B) and TransUnion International Inc. (TransUnion) to provide comprehensive credit information by collecting, collating and disseminating credit information pertaining to both commercial and consumer borrowers, to a closed user group of Members.

Accrued interest

In finance, **accrued Interest** is the interest that has accumulated since the principal investment, or since the previous interest payment if there has been one already. For a financial instrument such as a bond, interest is calculated and paid in set intervals. Accrued income is an income which has been accumulated or accrued irrespective to actual Receipt, which means event occurred but cash not yet received.

Formula

The primary formula for calculating the interest accrued in a given period is:

$$I_A = T \times P \times R$$

where I_A is the accrued interest, T is the fraction of the year, P is the principal, and R is the annualized interest rate.

T is calculated as follows:

$$T = \frac{D_P}{D_Y}$$

where D_P is the number of days in the period, and D_Y is the number of days in the year.

The main variables that affect the calculation are the period between interest payments and the day count convention used to determine the fraction of year, and the date rolling convention in use.

A compounding instrument adds the previously accrued interest to the principal each period, applying compound interest.