Management of Fixed Income Securities
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Lecture - 51
Mortgage-Backed Securities - I

Welcome back, so in the previous session we discussed about the different type of bond portfolio of strategies and then we can move towards another type of security which are also part of the fixed income securities that is called the mortgage-backed securities.

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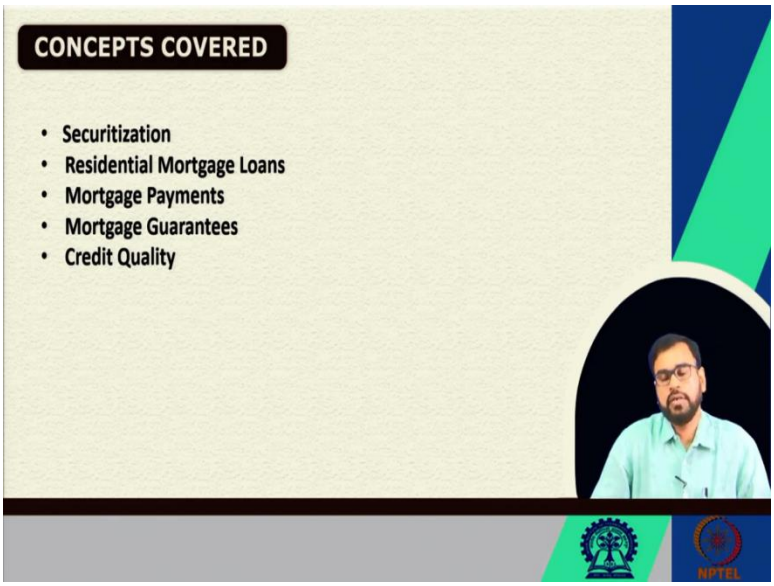

So, whenever you talk about the mortgage-backed securities, there are different concepts then they always we come across. The first and foremost important concept is the securitization. Then we have the other concepts like residential mortgage loans, mortgage payments, mortgage guarantees and credit quality. So, these are the different concepts which are very much involved or very much linked to the instrument called the mortgage-backed security which has a lot of significance in today's financial markets scenario.

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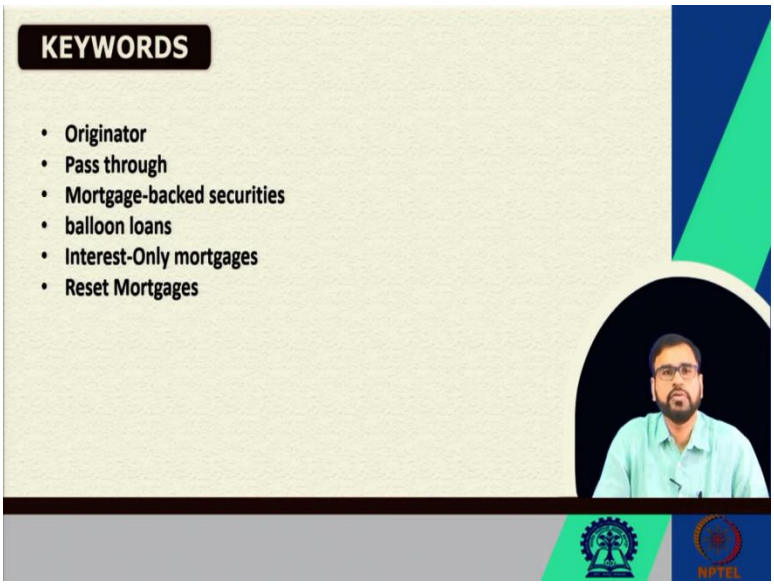

So, while discussing this particular issue, you will come across the different keywords like originator, passed through, mortgage-backed securities, balloon loans, interest only mortgages, reset mortgages and other type of other mortgages also. So, you will come across these keywords while discussing about the mortgage-backed securities.

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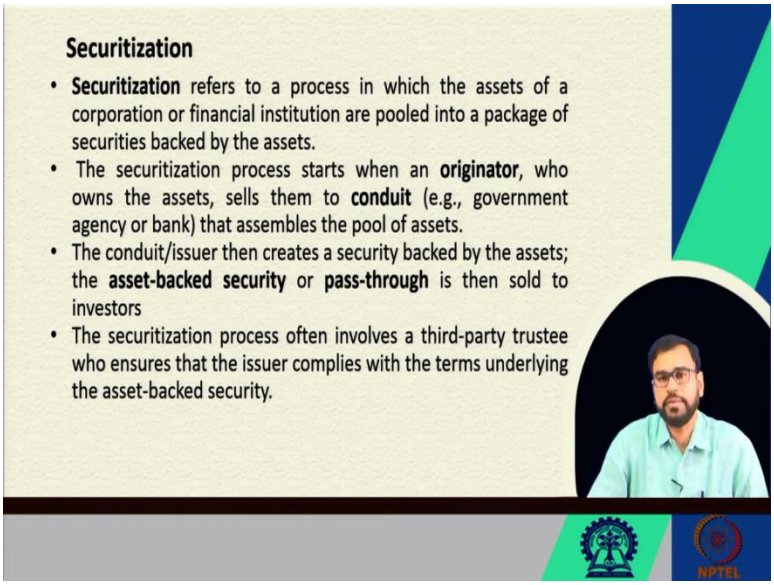

So, here if let us first discuss about what is the process of securitization. What exactly it means? Securitization is basically a process in which the assets of a corporation or a company or a financial institution are pulled into a package of securities backed by certain assets. Let the bank has certain loans and that particular mortgage loans can be converted or can be pulled and that

can be basically sold to another agency who can convert that particular asset into another financial asset.

That is basically we call it the mortgage-backed security and that can be sold to the investors. And the cash flow and other kind of valuation of that particular asset will depend upon the underlying asset on which that particular kind of security has been constructed or has been based. So, therefore the securitization process basically starts with an originator. Here in this case, we have taken the example of a commercial bank rate.

So, the commercial bank can be the originator who basically owns to asset. And sales that asset to the conduit, the conduit can be government agency or a bank or any anybody else which basically assemble the pool of the assets. That particular conduit basically has the responsibility of the pulling of the assets. And then, that particular kind of process or the conduit basically then creates another security, which is basically backed by that asset.

That is called the asset-backed security or pass-through. And then they sell it to the investors. So, the process of securitization generally involves a third-party trustee generally who ensures that the issuers are basically complies with the terms underlying the asset-backed security.

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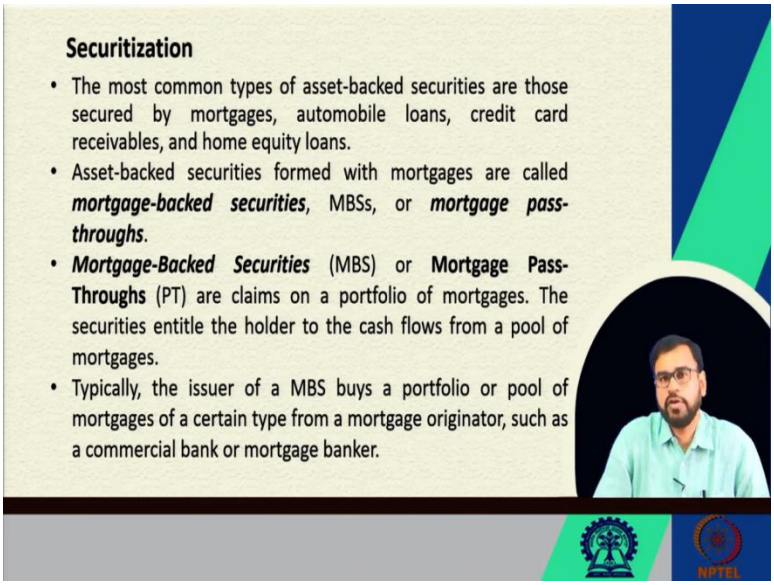

So, the most common type of asset-backed securities, which are generally secured by the mortgages are the automobile loans, credit card receivables, home equity loans. And the asset-

backed securities generally formed with mortgages similarly called the mortgage-backed security or mortgage pass-through. So, the mortgage-backed security or mortgage pass-through are claims are basically the claims on a portfolio of the mortgages.

And the securities basically entitle the holder to the cash flows from the pool of the mortgages. So, generally the issuer of the mortgage-backed security buys the portfolio or a pool of mortgages of a certain type from a mortgage originator like a commercial bank or the mortgage banker. And they try to issue that particular security to the other investors who general invest in that particular type of asset, relatively risky asset in general.

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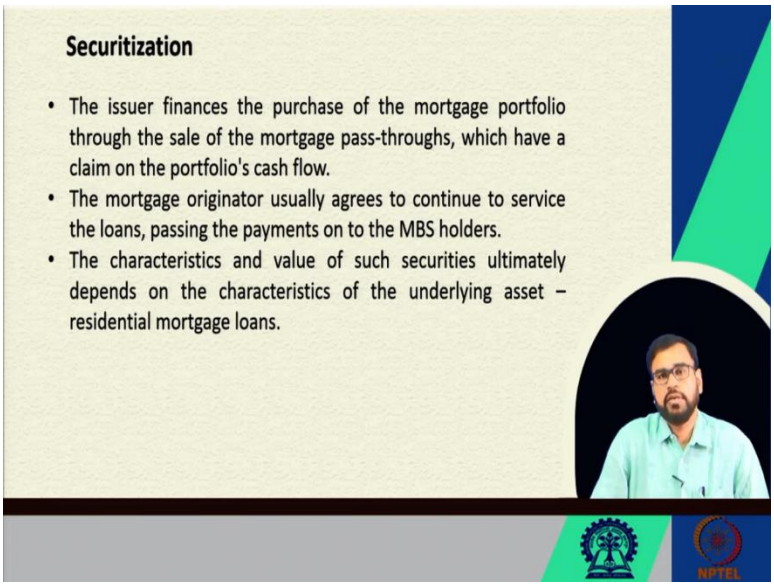

So, the issue or basically finances the purchase of the mortgage portfolio, through the sale of the mortgage pass-through, which have a claim on the portfolio of cash flow. And the mortgage originator usually agrees to continue to service the loans, passing the payments to the mortgage-backed security holders. So, that's why the characteristics and the value of such mortgage-backed securities ultimately depend on the characteristics of the underlying asset.

Let in the first case we have taken the example of a residential mortgage loan. So, here the underlying asset is residential mortgage loans. Whatever, cash flow will be linked to that residential mortgage loan that will decide the value of that particular mortgage-backed security. So, securitization process overall basically to this precise is a process through which a full of the

underlying assets can be converted into another asset, which is called to mortgage-backed security.

And there are many parties involved in that from originator to the conduit to even there are some mortgage-backed securities are also ensured, so then will finally investors.

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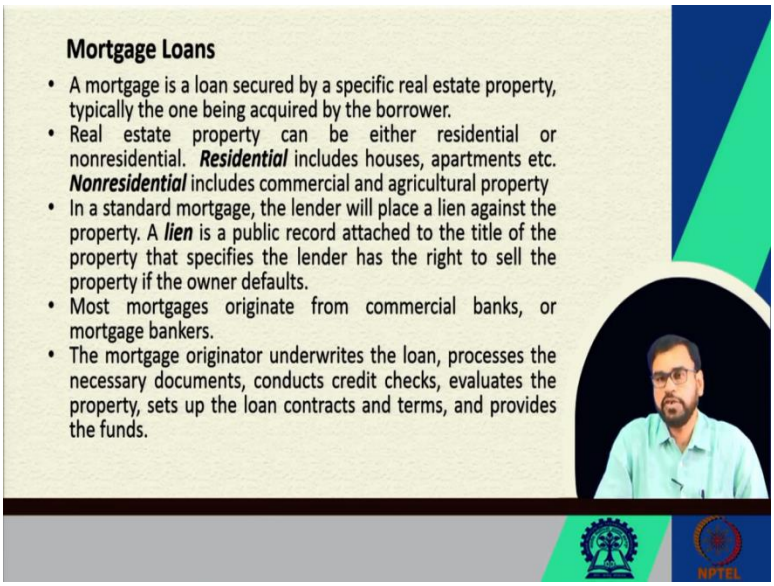

Let us first discuss about the mortgage loans then we can go ahead with the mortgage-backed securities. So, what do mean by a mortgage loan? So, mortgage is basically a kind of loan which is secured by a specific realistic property, typically the one being acquired by the borrower. If there is any default, then the particular borrower or the lender has to basically liquidate that asset and get back the money.

But generally, borrower takes the loan to buy that particular house or by that particular property. So, the real estate property if you consider that can be either residential or it can be non-residential. And why we are talking about that because the cash flows and objective of this kind of properties will be different accordingly your cash flow and other type of risk also will be different.

So, the residential part includes the houses, apartments etc. and non-residential means it includes the commercial and agricultural properties, is it the cash flow whenever we are talking about this in case of non-residential it is not that property is basically a kind of mortgage. There basically it

is ensured that the cash flow which will be generated from that particular business that will be basically utilized for payment of that particular loans.

So, in a standard mortgage the lender will place a lien against the property, and what is this lien? It is basically a kind of public record which attached to the title of the property which specifies the lender has the right to sell the property if the owner defaults. So, most of the residential mortgages what we are talking about these are originate from the commercial banks or the mortgage bankers.

And the mortgage originator underwrites the loan, processes the necessary documents, conducts the credit checks, evaluates the property, sets up the loan contraction terms and provides the funds. All type of things generally will be done by the commercial bank, which is in our case we call it the originator.

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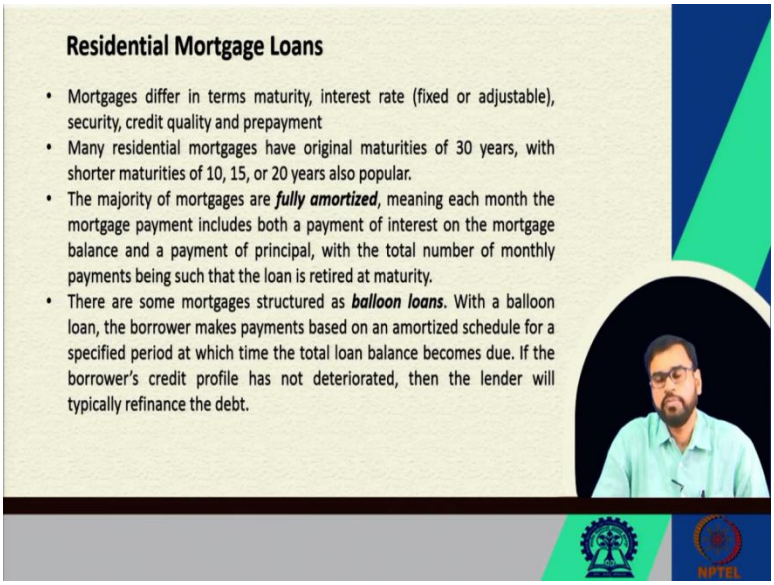

So, then what will happen? The mortgages basically differ in terms of maturity, in terms of interest rate (some of the mortgages are based upon the fixed rate some of our adjustable or the variable rate), security, credits quality and the prepayment. You know the prepayment risk is a very important risk whenever we are talking about the values of the mortgage-backed securities. So, the residential mortgages generally have long termination.

It can go up to 30 years, 20 years. So, short term maturity loans also are there 10 years, 15 years like that. The majority of the residence mortgages are fully amortized. What do you mean by the fully amortized? It means that each month the mortgage payment includes both payment of interest on the mortgage balance and payment of the principal, with the total number of monthly payments being such that the loan is retired at the maturity. The loan will be retired at the maturity and every month there will be payment one part is interest other part is principal.

And there are some mortgages their structured as balloon loans. What is a balloon loan? With the balloon loans the borrower makes payment based on the amortized schedule for the specified period at which time the total loan balance becomes due. So, if the borrower's credit profile has not deteriorated then the lender will typically refinance the debt.

So, there is a schedule, instead of giving the money or giving the loan at a time, so there is a schedule on the scheduled basis these particular loans will be given. So, if everything goes well, then that refinancing facility will be created or the particular lender will basically go for the refinancing debt. So, that is basically we call the balloon loans that is the way this particular mortgage can be structured.

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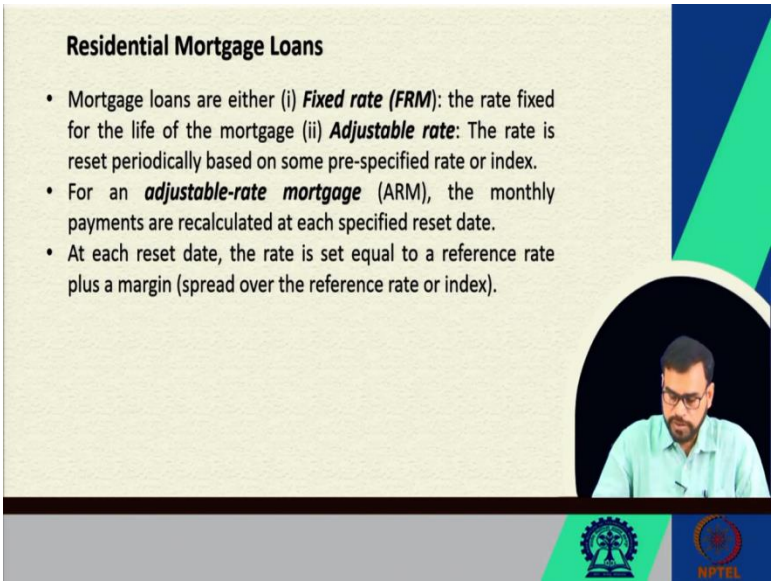

And the mortgage loans are either fixed rate the rate fixed for the life of the mortgage or it can be adjustable rate. What is the adjustable rate? Here the rate is basically reset periodically based on some pre specified rate for the index. In India let you are using the prime lending rate or you are

using marginal cost of lending rates (MCLR). So, these particular rates can be used to reset the rates against this mortgage loan.

So, for the adjustable-rate mortgage, the monthly payments are recalculated at each specified reset date. So, at each reset this rate is set equal to the reference rate plus a margin. So, reference rate can be anything any bank can utilize this any one of the reference rates and some margin will be added to that and accordingly the particular interest rate can be always imposed against that particular mortgage loans. So, this is the way the residential mortgage loans can be categorized.

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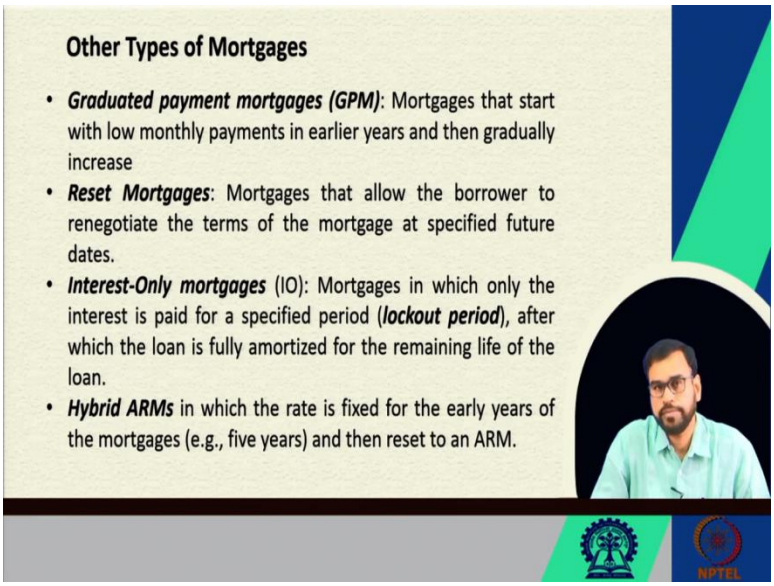

There is some other type of mortgages also, what is the other type of mortgages? One type of mortgage is called the graduated payment mortgages. What does it mean? Here the mortgages start with low monthly payments in earlier years and it will gradually increase. So, the monthly payments are not equal. In the early period the payments are less and gradually this particular payment should be increasing. So, that is called the graduated payment mortgages.

Then another type of mortgage we have the reset mortgages. These mortgages allow the borrower to renegotiate the terms of the mortgage are specified future. It can be reset some terms and condition can be changed, the interest rate can be changed, the base rate can be changed. So, all those kinds of characteristics can be possible, there is a scope for that this is called the reset mortgages.

Then another type of mod case we call it interest only mortgages. Here the mortgages basically in which only the interest is paid for a specific period, that is called the lockout period. And after which the loan is fully amortized for the remaining life of the loan, first you pay the interest then you pay the principal. And that principal amount will be equally divided on a particular schedule and in the beginning all the interest payments basically the organization will take away from you.

And there is a hybrid adjustable-rate mortgage will have, here the rate is fixed for the early years of the mortgage let for five years. Then it can become an adjustable loan or adjustable mortgage. In the beginning, it was fixed and after that a certain period of time it becomes adjustable or the variable, that is called the hybrid ARMs.

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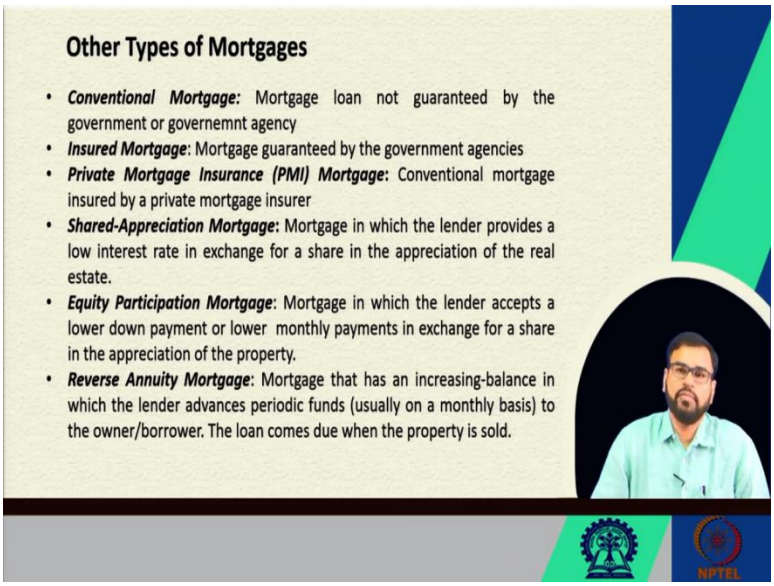

We can also have some conventional mortgages like here the loan not guaranteed by the government or the government agency. And there are some mortgages which are insured, some loans are insured and these particular mortgages are guaranteed by the government agencies and there are some private mortgage insurances also. Private mortgage insurance which are available, there the insurance is basically provided by the private mortgage insurer.

There are some private mortgages or they can also give insurance to that particular type of mortgages. Then we have another mortgage called the shared appreciation mortgage. Here the lender provides the low interest rate in exchange for a share in the appreciation of the real estate.

Then we have the equity participation mortgage. Here the lender accepts a lower down payment or lower monthly payments in exchange for a share in the appreciation of the property. And we have another mortgage also generally we observe in the market that is called the reverse annuity mortgage. This mortgage has an increasing balance in which the lender basically advances the periodic funds to the owner or the borrower and the loan comes due when the property is sold. So, that is called the reverse annuity mortgage.

So, there are different types of for residential mortgages are available and on that basis the mortgage-backed securities can be constructed or can be created.

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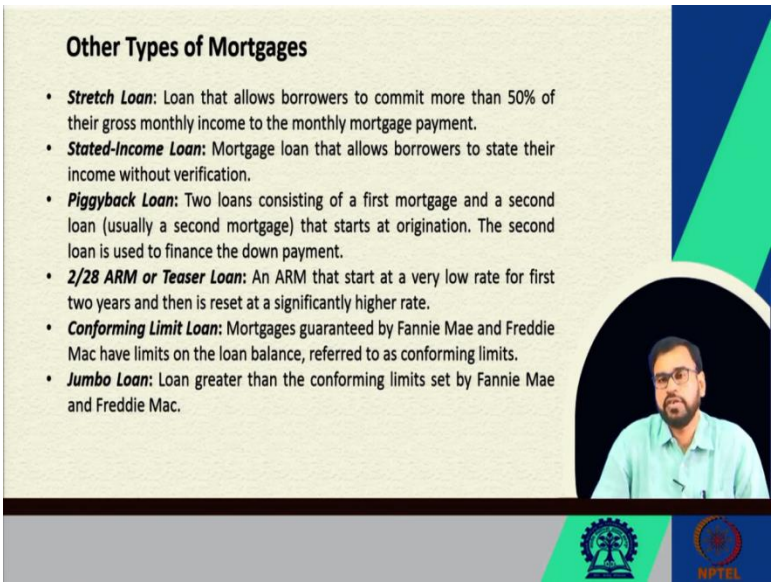

We have another loan call the stretch loan. What is that particular loan or particular mortgage? Here it allows the borrower to commit more than 50% of their gross monthly income to the monthly mortgage payment that is called stretch loan. Then we have stated income loan, this particular loan generally allows the borrower to state that income without verification.

Then piggyback loan, here the loans consisting of a first mortgage and a second loan (usually the second mortgage what we call it) that starts also at origination. The second loan is used to finance the down payment for the first loan so that is called basically the piggyback loan. Then that kind of mortgages large available in the US market and they have a kind of mortgage called 2/28 ARM or the teaser loan. So, that means this is an adjustable mortgage that starts at a very low rate for the first two years, then it is reset at significantly higher rate after two years.

Then we have conforming limit loan here the mortgages are guaranteed by the two major agencies. That Fannie Mae and Freddie Mac which are popularly involved in the mortgage back business in US have limits on the loan balance but these are guaranteed by these two agencies again, these are government agencies or government sponsored agencies.

Then we have a concept called jumbo loan, this loan is a very high amount loan greater than the confirming limits set by these two agencies that Freddie Mac and the Fannie Mac. So, these are the two agencies who have given certain limits. And if the loans that are giving more than this then we can consider them the jumbo loan.

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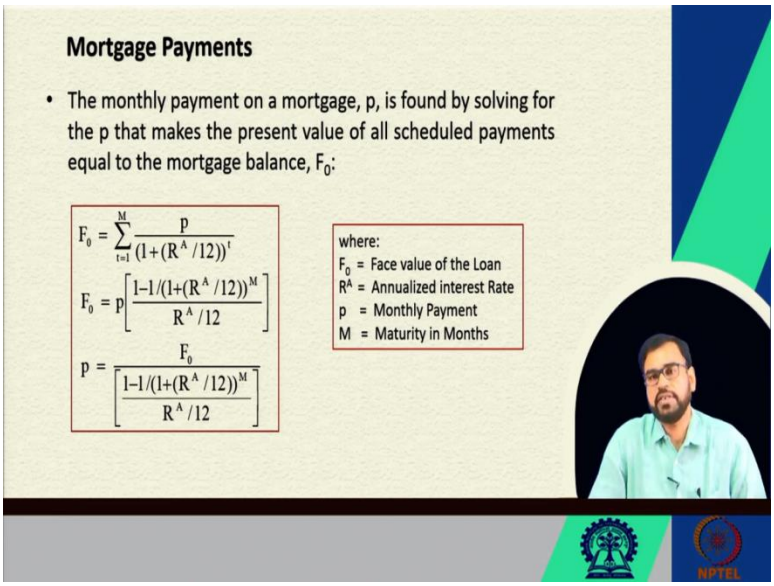

Then the other concept is that the mortgage payments, how these mortgage payments are done and you know that the cash flow of the word gets back securities which will be based upon these loans whatever we are talking about. These loans can be pulled and from that we can create another asset that is basically called the mortgage-backed assets. So, the basic features of that loan generally will decide that what will be the cash flow or the valuation of that mortgage back security.

So, if you are trying to calculate the mortgage payment or the loan payments, then the monthly payment on a mortgage generally found by solving for that particular amount which led to in this case we have assumed that is p which makes the present value of all scheduled payments equal

to the mortgage balance let that is F_0. So, that means to find out this p, how we can find out these monthly payments how much this payment these particular persons should make.

Then this condition has to be satisfied; that means F_0 = summation t = 1 to M p by your $1 + R^A$ divided by 12 to the power t. So, in this case, if you see that then automatically this will be you are already you know this if you take in this side then you will be p into 1 - 1 by $1 + R^A$ by 12 to the power M divided by R^A by 12 because we are calculating the monthly payment. This is basically the monthly payment.

So, that's why we are dividing it with respect to the 12 because all the other information are available annually. So, then from here if you want to calculate the p is equal to your F_0 divided by this notation. So, your F_0 is the face value of the loan, R^A is the annualized interest rate, p is equal to a monthly payment, and M is equal to your maturity in once.

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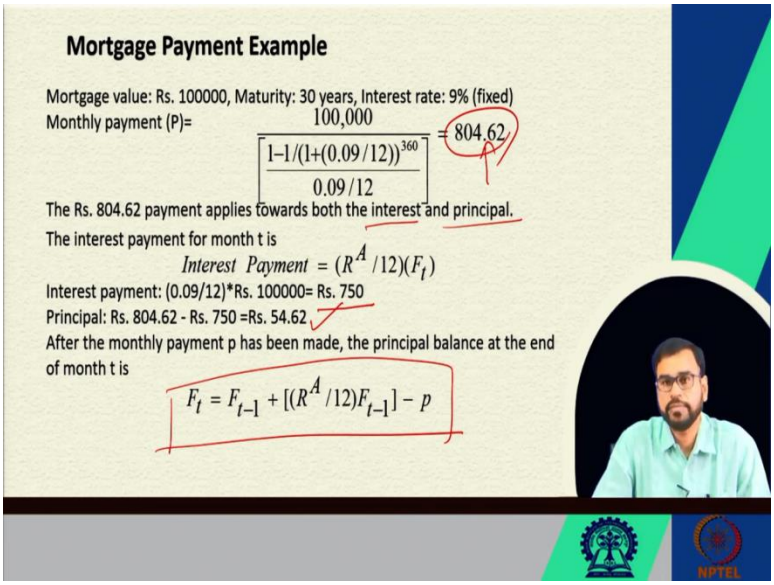

So, let us take one example. Let the mortgage value is let 1 lakh maturity is 30 years. Interest rate is 9% let we have assumed it is fixed. Then what will be the monthly payment using that particular formula we can get it is 100000 divided by 1 -1 by 1 plus in bracket 0.09 divided by 12 to the power 360 because the maturity period is 30 years. So, 30 into 12 that is 360, so then we got 804.62.

So, this 804.62 applies towards both interest and as principal.Both interest component and as well as the principal component is linked to this 804.62. So, what is the interest payment? How do you find out? The interest payment is basically what your R^A by 12 into F_t. So, your R^A = 0.09 divided by 12 into 100000 that will give you 750. So, your interest payment component will be 750 in the first case.

And the principal becomes 804.62 - 750, that is 54.65. So, after the monthly payment p has been made, and then the principal payment in the end of the month will go down. The obviously this equation has to be satisfied in this case.

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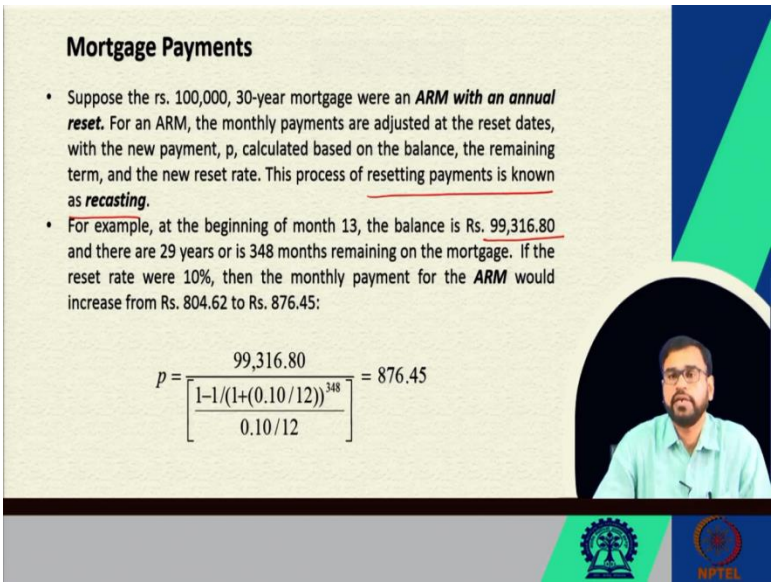

So, let us see suppose the loan amount is 100000, 30 years mortgage and here we are talking about the ARM, that is variable in nature the interest is basically variable nature with annual reset if there is a reset then it is fixed from the beginning the reset can be done in the annual reset. So, for an ARM the monthly payments are adjusted at the reset rates with the new payment generally p which can be calculated based on the balance the remaining term and the new reset rate.

So, the process of the resetting the payment is known as the recasting. So, let in the beginning of the month 13 in our previous example, whatever we have taken later at the beginning of the month 13, the balance was this much 99,368.80 and there are 29 years that went 348 months remaining on that particular market.

So, if the reset rate were 10% then the monthly payment basically will change into 804 before it was 804.62. Now whenever the reset rate was changed to 10% then the monthly payment also will be changed, it will increase from 804.62 to 876.45 because this was the balance amount divided by that 1-1 /(1 + 0.10 / 12) to the power 348 divided by 0.10 divided by 12 that will give you 876.45.

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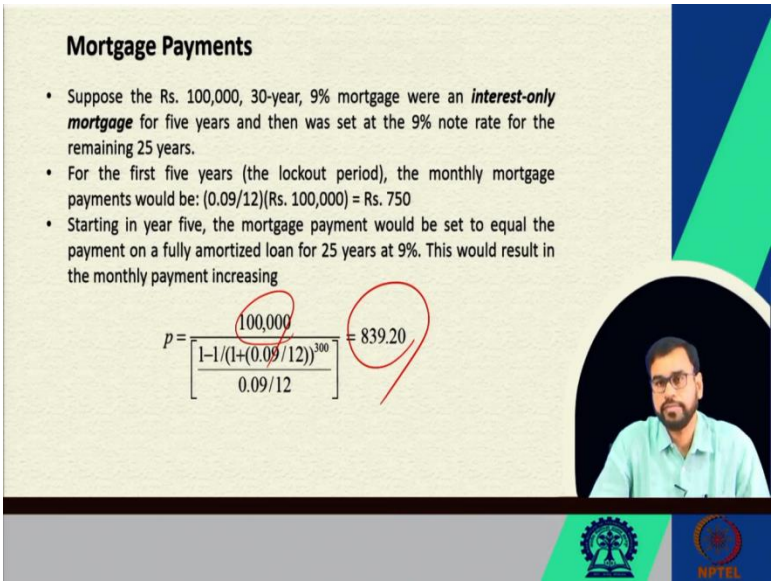

Suppose this 100000, 30 years 9% mortgage were an interest only mortgage for 5 years and then was set at 9% note rate for the remaining 25 years. Then what will happen? Then for the first 5 years, which is called the lockout period. The monthly mortgage payment would be 750 and starting in the year 5 the mortgage payment would be set which will be equal to the payment on a fully amortized loan for 25 years at 9%.

So, that means your total loan was 100000, then now within these 25 years you have to repay that with a fixed amount of payments in the monthly basis then that basically will be getting 839.20. So, this is basically happening if it is an interest only mortgage. So that means depending upon the character of that particular loan or character of the mortgage your monthly payment values are changing.

And that will have the impact on the valuation of that particular mortgage back security, which is based upon this particular asset. So, this is what about the monthly payments whatever we get.

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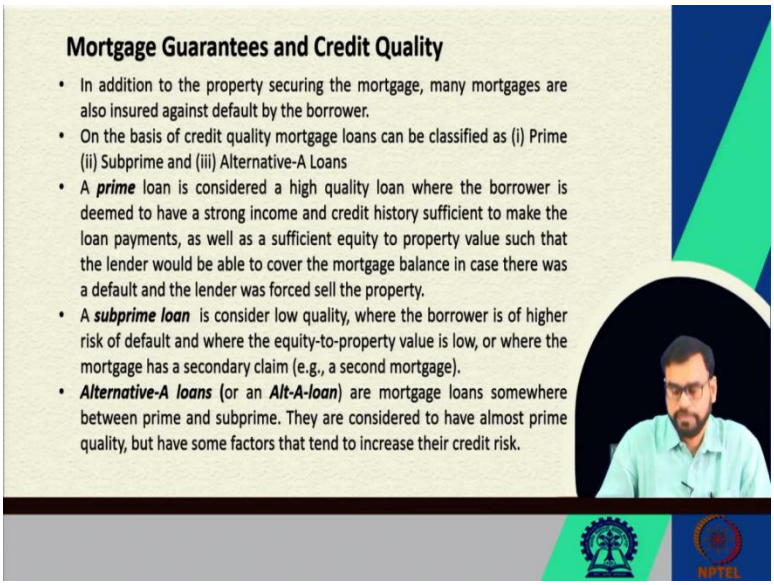

Then the mortgages also can have some guarantees and some credit quality. So, in addition to the property which is securing the market many mortgages are also insured against the default by the borrower. So, on the basis of the credit quality mortgages loans also can be classified as primes, subprime or alternative-A loan like that.So, prime loan is basically considered as the high-quality loan where the borrower is deemed to have strong income and credit history and sufficient to make the loan payments as well as sufficient equity to the property value such that the lender would be able to cover the mortgage balance in case there is any default.

But the subprime loan is considered as a low quality where the borrower is of higher risk of default and where the equity to property value is low and the mortgage has a secondary claim and all these things. And the alternative-A loan is generally what gets loans were somewhere between prime and subprime. They are considered to have almost prime quality but have some factors that tend to increase their credit risk in that particular case. So, this is the way the particular mortgage loans are classified.

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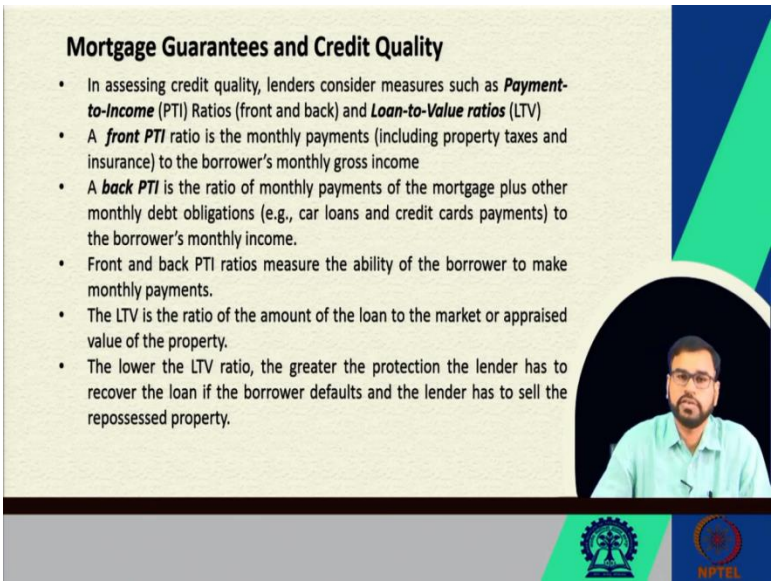

So, whenever you are assessing the credit quality, the lenders basically consider the different measures like payment to income ratio and loan to value ratio. So, there are two types of payment to income ratio that has front and back. And the front payment to income ratio is the monthly payments including the property tax and insurance to the borrower's monthly gross income and the back payment income is the monthly payments of the mortgage plus other monthly debt obligations (like car loans, credit card payments) to the borrower's monthly income. So, this front and back PTI basically measure the ability of the borrower to make the monthly payments.

And LTV that loan to value ratio is the amount of loan to the market or appraised value of the property. So, lower the LTV value greater is the protection on the lender has to recover the loan if the borrower defaults and the lender have to sell the repossessed property.

So, these are the two variables what they considered while assessing this credit risk of that particular mortgage.

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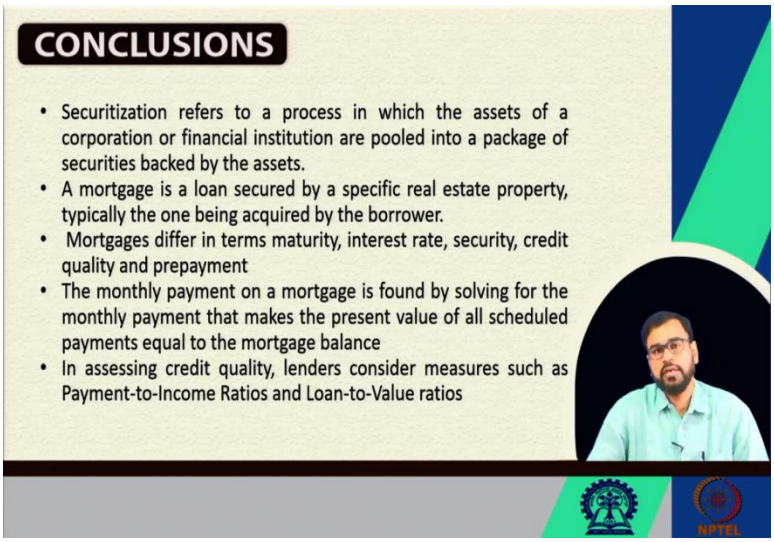

So, what basically you have discussed process of securitization where the assets of the different institutions are hold and converted into different asset which is called the asset back securities. The mortgage of a loan is generally secured by the specific real estate property typically one being acquired by the borrower. Mortgages differ in terms of maturity, interest rates, security, credit quality and prepayment that we will discuss in further.

And the monthly payment on the mortgage is found by solving the monthly payment which makes the present value of all schedule payments equal to the mortgage balance and assessing the credit quality the lenders basically consider the majors like payment to income ratio and the loans to value ratio.

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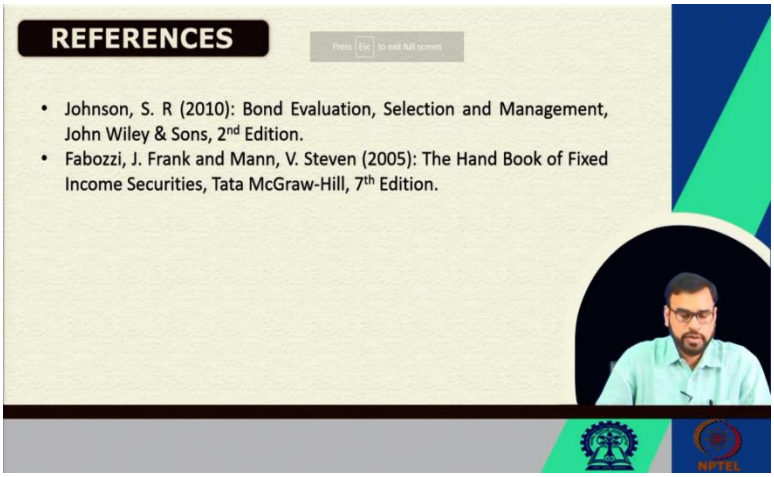

So, these are the references you can go through for the detailed discussion.

Thank you.