

Fin 5413 CHAPTER FIVE

ADJUSTABLE RATE AND VARIABLE PAYMENT MORTGAGES

Chapter Objectives: ARMs

- Calculate loan payments, loan balance, and interest charges on adjustable rate mortgages
- Effective cost of borrowing or lenders effective yield
- Calculate FTLAPR of an ARM
- Understanding the risks of both lender and borrower under an ARM

ARMs and Lender Considerations

- Who should bear the interest rate risk on a mortgage?
- Market interest rates change daily, but 30 year FRM's are common
- Fixed rate over life of the loan (FRMs): Lender bears the risk (presumably borrower pays a premium to escape this risk)
- ARMs – borrower bears some interest rate risk
- Unanticipated inflation – primary source of interest rate risk
- Uncertainty about all risk premiums (prepayment)

ARMs: An Overview

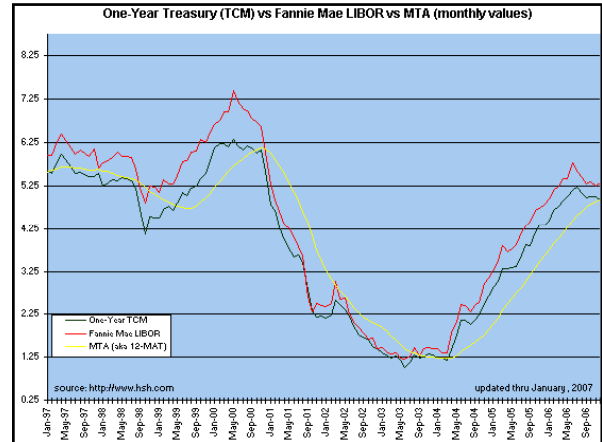
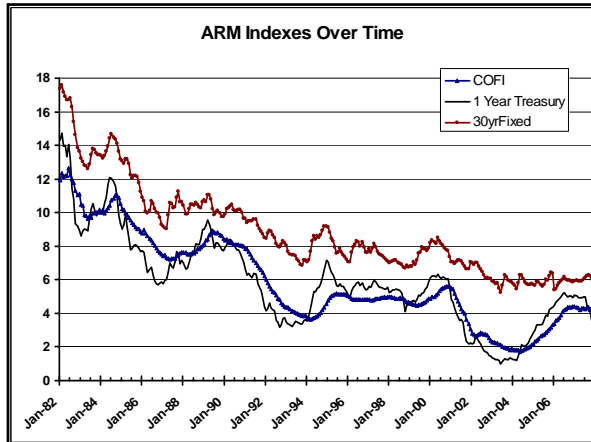
- The interest rate charged on the note is indexed to other market interest rates
- The loan payment is adjusted at specified periods. The interest rate may vary with a shorter periodicity than the payments (e.g. COFI type loans)
- ARMs do not eliminate all interest rate risks
- The longer the adjustment period the greater the interest rate risk to the lender

ARMs: Mechanics

- The borrower is charged an index based interest rate plus a spread – e.g. LIBOR plus 2.25%
- May be rounded to the nearest 1/8%
- Often limits on the amount the interest rate may adjust
- Often limits on the amount the payment may change

Some ARM Indexes

- Interest rates on six month treasury bills
- Interest rates on one year treasury bills
- Interest rates on three year treasury bills
- Interest rates on five year treasury bills
- Weighted average cost of funds
- National average of existing loans (fixed rate)
- LIBOR



Latest ARM Indexes

1 year Treasury (TCM):	2.31%
3 year Treasury (TCM):	2.21%
5 year Treasury (TCM):	2.74%
11th District COFI:	4.172%
6-Month LIBOR (HSH):	4.825%

from HSH Associates
<http://www.armindexes.com>

ARM Characteristics

- Initial interest rate - sometimes called the start rate or the contract rate or interest.
 - If lower than index value plus margin, it is typically referred to as a "teaser rate"
- Index - stated in mortgage
- Adjustment interval - usually tied to the index
 - COFI – varies monthly and rate changes each month (though payment does not)
 - 1 Year Treasury based – changes each year
 - 3 Year Treasury based – changes every 3 years

ARM Characteristics Continued

- Margin - a constant spread, or premium added to the index
- Composite rate - the index plus the margin, sometimes called the market rate
- Margin typically depends on Index (see hsh.com)
 - LIBOR plus 225 basis points (a basis point is 1/100 percent)
 - 1 Year Treasury plus 275 bp
 - 1 Year MTA (12 month moving Treasury Average) plus 250 bp
 - COFI plus xx bp
 - Average composite rate within 10 bp for past 3 years for the three indexes (hsh)

ARM Characteristics Continued

- Common Limitations (Caps and ceilings)
 - Maximum increases allowed in interest rate at adjustment
 - Maximum interest rate allowed on loan
 - Maximum increase allowed in payment – though this maximum may reset say every 5 years to deal with excess negative amortization, of if the principal hits some trigger amount such as 110-125% of the original principal amount
 - May be minimum interest rates, but less important if the loan is pre-payable as the borrower may prepay to get a better rate.

ARM Characteristics Continued

- Negative Amortization (also called positive accrual) occurs when payments are limited but interest rates rise so that the payment is below the interest amount due
- Floors - maximum reductions in payments or interest rates
- Assumability, Discount points, Prepayment Privilege, etc. are like any other mortgage

ARMs- Other Considerations

- Both lenders and borrowers face uncertainty when choosing ARMs
- Risk premium – ARMs typically have higher default rates, why?
- Interest rate risk – is now shared by the borrower and lender – amount depends on ARM terms
- Ceteris paribus, at time of origination the expected yield on an ARM should be less than on a FRM because the borrower is accepting some (or all) of the interest rate risk.

ARMs- Other Considerations Continued

- Short term indexes are riskier to borrowers than long term indexes
- Shorter adjustment periods are riskier to borrowers
- Maximum caps on interest rate adjustments favor the borrower
- Borrowers should be careful of negative amortization

ARM Variations

- 3/1, 5/1, etc. Hybrid ARMS
 - The rate is fixed for the first period, and then is a 1 year adjustable ARM after that period
- (Interest Only) Option ARMS
 - There is no required loan amortization though the payment adjusts as interest rates changes. The borrower has the option to pay down the principal. Four payment options may be specified:
 - Minimum payment (may have negative amortization)
 - Interest only payment
 - Amortize over 30 year lifetime
 - Amortize over 15 year lifetime

Teaser Rates

- Initial rates for ARMs are stated, and are typically lower than the sum of the index plus margin
- For loans with a strong teaser, that is an initial rate much lower than the composite rate would be the day the loan was originated, there will be a large expected payment increase on the adjustment date (payment shock)
- If the borrower was “qualified” on the teaser rate he or she may not be able to make the new, higher payments
- Many subprime mortgages were of a 2/1 structure with a teaser and so borrowers can not afford the higher payment, leading to high default rates

Ex. 5.1: ARM example #1

- You are seeking a loan for your \$250,000 house and have determined that you would like to choose an ARM because you expect to keep the house for just 3 years. Assume you make a 20% down payment and pay 3 points. What are your CF's and the yield to lender? What do you pay each year in interest?
 - Initial rate 3.25%
 - Annual adjustments – Tbill + 2.25% (rounded to 1/8%)
 - No payment or interest rate caps
 - Index, now at 4.21, then changes annually to: 3.67, 6.23, 8.33

Ex. 5.2: ARM example #2

- You are seeking a loan for your \$250,000 house and have determined that you would like to choose an ARM because you expect to keep the house for just 3 years. Assume you make a 20% down payment and pay 2 points. What are your CF's and the yield to lender? What do you pay each year in interest?
 - Initial rate 3.5%
 - Annual adjustments – Tbill + 2.75% (rounded to 1/8%)
 - Max change of 2% per year interest rate
 - Max interest of 5% above initial rate
 - Index, now at 4.21, then changes annually to: 3.67, 6.23, 8.33

Ex 5.3: ARM example #3

- You are seeking a loan for your \$250,000 house and have determined that you would like to choose an ARM because you expect to keep the house for just 3 years. Assume you make a 20% down payment and pay 1 points. What are your CF's and the yield to lender? What do you pay each year in interest?
 - Initial rate 3.75%
 - Annual adjustments – Tbill + 2.75% (rounded to 1/8%)
 - Max payment change of 7.5% per year (negative amortization allowed)
 - Max interest of rate 6% above initial rate
 - Index, now at 4.21, then changes annually to: 3.67, 6.23, 8.33

Dealing with Accrued Interest

- Interest Amount is the total amount paid, less what reduces the loan principal
- When a loan has negative amortization, the negative amortization portion is accrued interest
- For those on a “cash basis” accounting system, interest is tax deductible in the year it is paid, not necessarily the year it is accrued
- Any accrued interest remaining at the time of loan payoff will be paid at that time, and considered an interest payment

Accrued interest

- To determine the amount paid to interest in the final year of a loan one do the following:
- Total Interest Paid = Total amount paid – amount paid to principal.
- Interest paid in last period (say year) = Total interest paid – interest paid in previous periods.

Interest paid each year

- When a loan amortizes in every period, then the amount of interest paid, is as shown by the amortization function of the calculator.
- When a loan is experiencing negative amortization, the total payment is the interest payment that period.
- When a loan has accrued interest, and the payment in the current period is above the amount of interest due in the current period, part of the current period payment will be use to pay down accrued interest; thus, will be part of the interest paid this period.

Interest paid each year

- The more complicated cases are when negative amortization has arisen in the past, so your current payment, if large enough to cover the current period's interest, will also cover some or all of the previously accrued interest.
 1. If it covers some of the previously accrued interest, then your total payments that period are all interest – consisting of interest for the current period, plus recovery of some previously accrued interest

Interest paid each year

- If your current payment is large enough to cover this periods interest, plus all previously accrued interest, then the total amount paid to interest is the amount accrued this year, plus the amount remaining from previous years.
- The amount of accrued interest on a loans is:
Current Balance – minimum loan balance

Example: Interest Paid

- You started with a \$100,000 loan. The current balance is 96,000, of which \$2000 is accrued interest (i.e. your minimum balance since the start of the loan was 94,000). Note rate is 6%. What will you pay in interest over the next 12 months if:
 - a) Payment is \$450 per month
 - b) Payment is \$550 per month
 - c) Payment is \$750 per month

FTLAPR for ARM's

- The FTLAPR is computed assuming the index does not change, and may be rounded to the closest ¼%
- Example 5.4: A 15-year ARM with 3 points (\$100,000 note amount) is offered with an initial interest rate of 3% based on the 1 year Treasury Index that is currently at 5.82. The margin is 275 bp. Annual interest rate cap is 2%, with a 6% lifetime ceiling (increase). What is the FTLAPR?

Price Level Adjusted Mortgage

- When inflation is high, interest rates on either FRM's or ARM's will be high to compensate the lenders
- In real terms, the borrowers payment starts out very high, and then declines over time (payment tilt). This makes it hard to afford a very large loan.
- An alternative is to have a loan with a real interest rate, with a payment that is increased with inflation. The loan balance is also increase with inflation. This is much like TIPS

Example 5.5: PLAM example

- Consider a \$100,000 loan offered at a 3% real rate of interest over 20 years. Payments and loan balance will be adjusted annually. Assuming inflation over then next three years is 18%, 11%, and 15% respectively, what are the loan payments, and final payoff required at the end of year 3?

Shared Appreciation Mortgage (SAM)

- Rather than charging a high interest rate to recover the effect of inflation, lender accepts compensation for inflation via the increasing value of the property. This allows the lender to charge a lower interest rate
- If the lender needs to pay depositors a high interest rate to attract deposits, it may not be able to offer SAM type mortgages. Lenders may wait years before receiving compensation
- Lenders need to be concerned about how well property will be maintained

Shared Appreciation Mortgage (SAM) Continued

- Appreciation in value of real estate depends on action of borrowers, such as maintenance
- Appreciation paid to a lender ruled a contingent interest

Example 5.6: SAM example

- You have a building currently valued at \$1,200,000 for which you seek a \$1,000,000 mortgage (30-year with 5 year balloon). You are offered a SAM at 5%, where you must also give the lender 45% of the appreciation after 5 years. For an 8% annual inflation rate for the building, and assuming you hold the building for 5 years, what are your cash flows on the loan. What is the yield to the lender?

