

## The Agency ARM MBS Sector

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- ▶ Adjustable-rate mortgages (ARMs) are floating-rate mortgages with rates that reset periodically over the term of the mortgage depending upon where interest rates are. ARMs have become increasingly popular with U.S. homeowners over the last few years as the rapid increase in home prices over this period has forced U.S. homeowners to gravitate towards the initially lower payments offered by ARMs in order to qualify for their mortgages.
- ▶ As a result of the increasing popularity of ARMs and because of the close linkage between the primary and secondary markets in the U.S., the ARM MBS sector has become one of the most active and liquid sub-sectors of the overall Agency MBS market. The total amount of outstanding Agency ARM MBS as of Q1 2006 was \$450 billion compared to \$3.1 trillion for all Agency fixed-rate MBS.
- ▶ This primer provides a broad-based introduction to this important market. First, we define and discuss the terminology associated with ARMs. Next, we discuss the characteristics of the ARM MBSs that are created by pooling these mortgages together. The discussion then segues to the structure of the market for trading ARM MBS. The primer concludes with two appendices. The first appendix presents a brief history of ARM lending in the U.S. along with a high-level overview of some of the factors that have influenced ARM demand and supply over the years. The second appendix serves as a brief introduction to some web-based tools provided by the Agencies for accessing collateral information on ARM pools.
- ▶ In the near-term, ARMs will continue to remain a popular option with homeowners until affordability returns to more reasonable levels. Over a longer-term, it should be interesting to see whether some of the products introduced in the most recent years of the cycle such as Option ARMs and IO ARMs remain viable. There is still a fair amount of uncertainty as to how the borrower base underlying these products will react in an environment of stable to declining home prices.

## INTRODUCTION

Adjustable-rate mortgages (ARMs) are floating-rate mortgages with rates that reset periodically over the term of the mortgage. ARMs have become increasingly popular with U.S. homeowners over the past few years as the rapid increase in home prices over this period has forced borrowers to gravitate towards the initially lower monthly payments offered by ARMs in order to qualify for their mortgages.

ARM MBSs are pass-through pools collateralized by a collection of ARMs with similar characteristics.<sup>1</sup> As a result of the increasing popularity of ARMs and because of the close linkage between the primary and secondary mortgage markets in the U.S., the ARM MBS sector has become one of the most active and liquid sub-sectors of the overall Agency MBS market.<sup>2</sup> The total amount of outstanding Agency ARM MBS as of Q1 2006 was \$450 billion compared to \$3.1 trillion for all Agency fixed-rate MBS. Participants in the ARM MBS market now include a broad spectrum of institutional investors including mutual funds, commercial banks, REITs and hedge funds. However, because of the lack of uniformity in ARM pools, liquidity in the ARM MBS market is still short of that offered by the fixed-rate TBA market. Currently, ARM pools trade more like specified pools in the pass-through market or structured products.

The goal of this primer is to provide a broad-based introduction to this important market. First, we define and discuss the terminology associated with ARMs. We also examine homeowner note rate changes in ARMs and the common types of ARMs offered by originators in order to provide some context for this terminology. In the next section, we discuss the general characteristics of the ARM MBSs that are created by pooling these mortgages together along with a description of the various pooling constraints that originators work under. We also list some of the specific characteristics of FNMA, FHLMC and GNMA ARM MBS. The discussion then segues to the structure of the market for trading ARM MBS. Our primer concludes with two appendices. The first appendix presents a brief history of ARM lending in the U.S. along with a high-level overview of some of the factors that have influenced ARM demand and supply over the years. The second appendix provides a brief tutorial on some web-based tools provided by the Agencies for accessing collateral information on ARM pools.

## ADJUSTABLE-RATE MORTGAGES

As the name suggests, an adjustable-rate mortgage (ARM) has a note rate that periodically resets over the term of the mortgage depending upon where interest rates are. Once the note rate adjusts, the borrower's new principal and interest payments are determined by re-amortizing the mortgage based on the current principal balance, the original maturity date, and the new note rate. Initial rates on ARMs are usually lower than on fixed-rate mortgages (FRMs) because the ARM borrower is taking on interest-rate risk. More precisely, these borrowers are taking on the risk that their mortgage

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<sup>1</sup> The terms "ARM MBS" and "ARM pool" are used interchangeably in this primer since virtually all Agency ARM MBSs are pools – Very few CMOs are currently created off of ARM collateral.

<sup>2</sup> We use the word "Agency" to collectively refer to Fannie Mae (FNMA), Freddie Mac (FHLMC) and Ginnie Mae (GNMA).

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payments might increase in the future. While this simple description captures the essence of an ARM contract, there are many variations in the types of ARMs available to consumers and understanding these variations requires familiarity with a fair amount of terminology. Fundamentally, this terminology describes the “how” and the “when” of the homeowner’s note rate and payment change. We now provide a guided tour through this forest of jargon.

### ARM Terminology

The starting point of determining a borrower’s ARM rate is an **index**. The index is a financial market rate that reflects the prevailing cost of borrowing money. Changes in this cost will lead to movements in the index which will in turn lead to adjustments in the borrower’s note rate. The most common indices in use are 1-year LIBOR and the 1-year Constant Maturity Treasury (CMT) index. The 1-year CMT is the average yield of Treasury securities with 1-year remaining to maturity and is published each Monday in Federal Reserve Release H.15. Other popular indices include the COFI Index (Cost of Funds Index)<sup>3</sup> and the MTA Index.<sup>4</sup>

To capture the cost of originating a loan and to build in a profit margin, lenders add a **margin** to the index rate to determine the final loan rate:  $\text{Loan Rate} = \text{Margin} + \text{Index}$ . The margin is constant over the life of a mortgage loan and is typically 275 bps over 1-year CMT or 225 bps over 1-year LIBOR. For certain types of ARMs, lenders will frequently offer an initial discount on the **fully-indexed interest rate** (the sum of the index plus the margin) to attract borrowers – this introductory rate is called a **teaser rate** and can last from origination to when the borrower’s rate first adjusts.

The speed with which the borrower’s ARM note rate reacts to changes in the underlying index depends upon the length of the **reset period**. The reset period governs how often the loan rate on an ARM can change and is typically divided into two distinct intervals: the time to the first note rate change (the **first reset period**)<sup>5</sup> and the time interval between all subsequent note rate changes (the **periodic reset period**). As the distinction between the two periods suggests, the length of the first reset period can be different from that of the periodic reset period and typically ranges from 1 month to 10 years. The length of the periodic reset period is more constrained and ranges from 1 month to 12 months. For example, in a **5/1 Hybrid ARM**, the mortgage rate is initially fixed for five years and then resets annually after that. The newly reset rate on the 5/1 Hybrid ARM is equal to the index (1-year CMT or 1-year LIBOR) plus the margin (275 bps over 1-year CMT or 225 bps over 1-year LIBOR).

When the note rate on an ARM resets, a **lookback** period is used to determine the appropriate value of the index to use for setting the rate – this period is equal to the number

<sup>3</sup> The COFI Index is determined by the monthly weighted average cost of funds for the member institutions of the 11<sup>th</sup> District of the Federal Home Loan Bank (FHLB). The COFI for a given month is released on the last business day of the following month by the FHLB of San Francisco. For example, the COFI for February is released on the last business day of March.

<sup>4</sup> The MTA (Monthly Treasury Average) Index is the 12-month average of the monthly average yields of U.S. Treasury securities adjusted to a constant maturity of one year. It is calculated by averaging the previous twelve monthly values of the 1-year CMT. The MTA Index is calculated on a monthly basis. The value for a particular month is generally available on the first Monday of the following month when monthly values of 1-year CMT are published in the H.15 release.

<sup>5</sup> The first reset period is also known as the **initial period**.

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of calendar days that are counted back from the **interest rate change date** to determine the new index value. The lookback period is usually 30, 45, or 60 calendar days.<sup>6</sup> Later on, we will work through a detailed example of how the homeowner's note rate changes on the appropriate reset date. For most ARMs, the monthly payment usually adjusts a month after the note rate change.

To reduce the interest rate risk that the borrower is exposed to, ARMs come with **interest rate caps** that govern the maximum level to which the loan rate can reset. Typically, there are two types of rate caps: a **periodic cap** and a **lifetime cap**. Lifetime caps are required by law and limit rate changes over the life of the loan. Periodic caps limit rate changes between adjustment intervals. The periodic cap that applies to the first adjustment interval is often referred to as the **first reset cap** or the **initial reset cap**.

The market convention is to quote the cap structure in a specific format: **first reset cap/periodic cap/lifetime cap**. Thus, a 5/2/5 cap structure implies a first reset cap of 5%, a periodic cap of 2%, and a lifetime cap of 5%. A first reset cap of 5% implies that the borrower's mortgage rate cannot increase by more than 5% above the initial mortgage rate on the day of the first reset. Similarly, a periodic cap of 2% means that in any given year (or other specified periodic reset period), the borrower's mortgage rate cannot go up by more than 2% above the previous year's mortgage rate. Finally, a lifetime cap of 5% limits a borrower's rate from increasing by more than 5% above the initial mortgage rate over the entire term of the loan.

Typically, the ARM's cap structure also acts as a **floor** and restricts the maximum amount rates can fall from the pre-adjustment rate level. For example, for a 5/2/5 cap structure, the maximum that rates can fall at first reset is 5% from the initial mortgage rate. Similarly, for each subsequent reset, the borrower's rate cannot fall down by more than 2% from the previous period's rate. There is no lifetime floor on the mortgage rate.

Another contractual feature sometimes present in ARMs that helps decrease the borrower's exposure to interest rates is the presence of **payment caps** that specify the maximum amount that the monthly payment can increase by. These limits are set as a percentage of the previous monthly payment. The presence of payment caps can lead to a situation in which the borrower's note rate adjusts upward without a corresponding increase in the payment amount. The capitalization of any unpaid interest in the scheduled monthly payment into the borrower's principal balance is referred to as **negative amortization**. Negative amortization usually occurs due to upward interest rate adjustments without a corresponding increase in the payment amount. This might happen either because of a mismatch between payment and rate adjustment frequencies or the existence of payment caps. Only a few types of ARMs allow negative amortization with the most popular such mortgage being an **Option ARM**. Option ARMs are discussed in more detail below.

The total amount of negative amortization possible on an ARM is limited in order to protect the lender. In particular, the increase in the outstanding balance of the loan is capped at

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<sup>6</sup> The interest change date is not included in the calculation of the lookback period.

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110% to 125% of the original balance. When this limit is hit, the payment is immediately **recast** – the monthly payment is raised to amortize the loan completely over the remaining term of the loan. In other words, a **payment recast** defines the payment restructuring of a negatively amortizing ARM to force the eventual paydown of the principal balance to zero. Payment caps are not applicable in this situation.

A **convertible** ARM gives the borrower an option to convert their loan to a fixed-rate mortgage after an initial lock-out period. As one might expect, the borrower does have to pay for this option and all else being equal, rates tend to be higher on convertible ARMs. Sometimes, the lender will also charge the borrower a fee when the loan converts although many lenders offer free conversions. While different conversion windows are offered by lenders, the borrower usually has to exercise their conversion option between year one and year five of the mortgage loan. To illustrate, consider a convertible 3/1 hybrid ARM with a conversion window between years one and five. At any time between year one and three, the borrower has the option to convert from their initial fixed rate (which will convert to a floating rate at the first reset date) to a new 30-year fixed-rate mortgage for the remaining life of the loan. Also, after the end of year three and before the end of the conversion period, the borrower can convert the adjustable-rate loan to a fixed-rate loan at their discretion.

**Interest Only (IO) and Option ARMs** are “affordability” products that reflect relatively recent product innovations in the mortgage market. The IO mortgage allows borrowers to make only interest payments on their mortgage until the IO term (typically 3, 5 or 10 years) ends, after which the loan switches to being fully amortizing for the remainder of the mortgage term.<sup>7</sup> In an Option ARM, the interest rate adjusts on a monthly basis while the monthly payment adjusts annually. The borrower has one of four different payment options each month: They can make a minimum monthly payment that is determined by an initial teaser rate and the payment change cap, an interest only payment, a 30-year fully amortizing payment, or a 15-year fully amortizing payment. If the borrower makes the minimum payment then the loan can experience negative amortization. Every five years or when the loan amount hits the negative amortization limit (110%/115%/125% of the initial loan value), the loan is recast. Option ARMs can come with a prepayment penalty with 1-year and 3-year penalties being the most common.

Figure 1 collects some of the terminology discussed above.

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<sup>7</sup> Formally, the **IO term** or **IO period** is defined to be the interval between the first payment due date and the last IO payment date.

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Figure 1: Understanding Common ARM Terminology

Terminology	Description	Comments
<i>Index</i>	Financial market rate that is indexed to cost of borrowing; used by lender as basis for loan rate	Moves in tandem with the yield curve; volatility of different indices can be quite dissimilar
<i>Margin</i>	Set percentage that lender adds to index rate to calculate the final loan rate	Upto 3.5% on an individual loan; stays the same during life of the loan
<i>Teaser rate</i>	A discounted rate that is lower than the fully indexed rate	Introductory rate to attract borrowers; lasts from a month to a year
<i>Reset period</i>	Governs how often the loan's rate can change	Can range from one month to 10 years; the new rate equals index plus margin
<i>Lookback</i>	Number of calendar days that are counted back from the mortgage rate change date to determine the new index value	The lookback period is usually 30, 45, or 60 calendar days
<i>Interest rate caps</i>	The maximum level to which the loan rate can reset	Lifetime caps, required by law, limit rate changes over the life of the loan; periodic caps limit rate changes between adjustment levels; cap levels vary
<i>Payment caps</i>	Maximum amount that the monthly payment can increase	Limit set at a percentage of previous payment; can result in negative amortization
<i>Negative amortization</i>	The capitilization of any unpaid interest in the scheduled monthly payment into the borrower's principal balance.	Most mortgages include a cap on negative amortization; the cap typically limits the total amount you can owe from 110% to 125% of the original loan amount.
<i>Conversion option</i>	The option to convert to a fixed-rate mortgage after an initial lock-out period.	The borrower usually has to exercise their conversion option between year one and year five of the mortgage loan.

Source: Banc of America Securities

### Homeowner Note Rate Changes on ARMs

A useful way to contextualize some of the above terminology is to walk through the mechanics of a note rate and payment change on an ARM. This exercise also gives us a foundation for better understanding the cash flows on an ARM mortgage-backed security (MBS).

An ARM has specific dates when the mortgage rate to the borrower changes (**interest change dates**). Interest must be calculated at the new note rate beginning on the interest

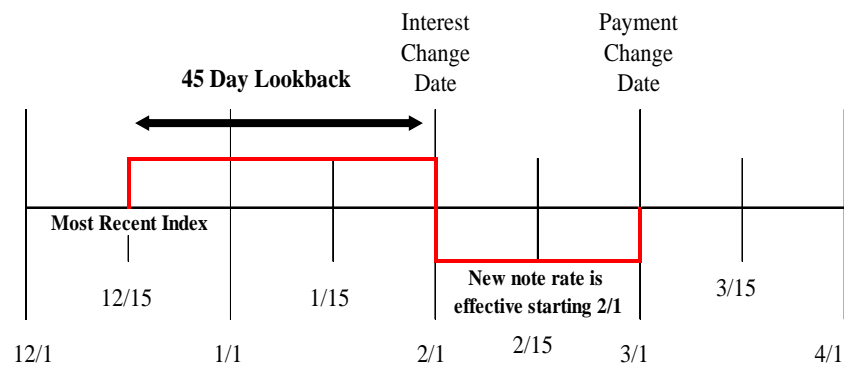
change date. The actual monthly payment change will typically occur a month after the interest rate change.<sup>8</sup> The basic calculation to determine the new mortgage rate is to:

1. Identify the new index level;
2. Add the index and margin;
3. Round off (typically to the nearest eighth of a percent); and,
4. Check for cap restrictions.

The **payment change date** is the first date that the monthly payment changes to reflect the note rate change. For example, suppose the interest change date specified in the borrower’s note is February 1 with the old note rate being 6% and the new rate being 7%. The situation is illustrated in Figure 2. Then, the January interest collected in the February 1 monthly payment is calculated at 6%, while amounts due after February 1 are based on the 7% interest date. The payment change date in this case is March 1.

As itemized above, to calculate the new note rate on February 1 we need to go through a four step process. The new index level in Step 1 is determined by “looking back” a pre-specified number of calendar days (30, 45, or 60). Figure 2 shows that with a 45 day lookback, we would use the most recently published value of our index as of December 15th in order to set the note rate on February 1. For example, if the calculation uses an index published once a month at the end of the month, the index value published at the end of November would be used.

**Figure 2: Timelines for ARM Note Rate Changes**



Source: Freddie Mac, Banc of America Securities

<sup>8</sup> As discussed previously, Option ARMs are a counterexample. The note rate on an Option ARM resets every month while the payment change frequency is annual.

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### Common ARM Products Offered in the U.S.

Now that we have a working knowledge of the various contractual features associated with an ARM, we are ready to survey the broad spectrum of ARMs currently available to U.S. homeowners. Our focus will be on ARMs that are eligible for securitization in GNMA, FNMA or FHLMC pools. Furthermore, these ARMs are fairly standardized because the housing GSEs (FNMA, FHLMC) and GNMA enforce uniform underwriting guidelines and will only securitize certain types of ARM products. Some of these guidelines and standards are listed in Figure 3. Here, it should be kept in mind that these assumptions are subject to change depending upon how comfortable the agencies feel about assuming the credit risk on certain types of mortgages. For instance, mortgages with negative amortization are currently only being securitized in FNMA pools.

### Figure 3: Standard Product Assumptions for GSE MBS Eligible ARMs

- ◆ 45 day lookback
- ◆ Round mortgage note rates to nearest 1/8<sup>th</sup>
- ◆ No lifetime floors
- ◆ Maximum Gross Mortgage Margin is 350bps
- ◆ No negative amortization (only Freddie Mac)
- ◆ All 30-year terms

Source: Banc of America Securities

In the secondary markets, the ARMs eligible for securitization in GNMA pools are called **government mortgages** since they are explicitly backed by the government under the Federal Housing Administration (FHA) or Veteran's Administration (VA) programmes. ARMs that are eligible for securitization by FNMA or FHLMC are known as **conforming mortgages**.

Within the category of conforming ARMs, the most popular type of ARM is a **Hybrid ARM**. A Hybrid ARM mortgage combines the characteristics of a fixed- and adjustable-rate mortgage by initially fixing the borrower's rate for a set time (typically three, five, seven, or ten years) and then floating it at a fixed spread off an index. Some of the typical features of a conforming Hybrid ARM can be conveniently summarized in terms of the ARM terminology we have discussed above:



- **Index.** Typically 1-year CMT, 1-year LIBOR, or 6-month LIBOR
- **First Reset Period.** 3, 5, 7, or 10 years; annual resets thereafter. The 6-month LIBOR ARM resets every six months.
- **Margin.** Typically 275 basis points over the 1-year CMT, 225 basis points over 1-year LIBOR, or 200 basis points over 6-month LIBOR
- **Interest Rate Caps.** 3/1s typically have a 2/2/6 cap structure, 5/1s have 2/2/5 or 5/2/5, 7/1s and 10/1s have 5/2/5. Recall that each of these cap structures consists of three distinct caps. For example, in a 2/2/6 cap structure we have the following caps:
  - **Initial cap:** 2% above the initial fixed-rate on the first adjustment
  - **Periodic cap:** 2% on subsequent adjustments
  - **Life cap:** All adjustments subject to a cap of 6% over the initial rate
- **Lookback.** 45 days

In the government ARM sector, the two most popular types of ARMs are 1-year ARMs and 3/1 Hybrid ARMs. The key characteristics of the 1-year ARM are:

- **Index.** 1-year CMT
- **First Reset Period.** 12 to 18 months after the first payment date, annual resets thereafter
- **Margin.** 275 basis points
- **Interest Rate Caps.** 1/1/5
- **Lookback.** 30 days

FHA offers 3-, 5-, 7-, and 10-year Hybrids and VA offers 3- and 5-year Hybrids with the following characteristics:

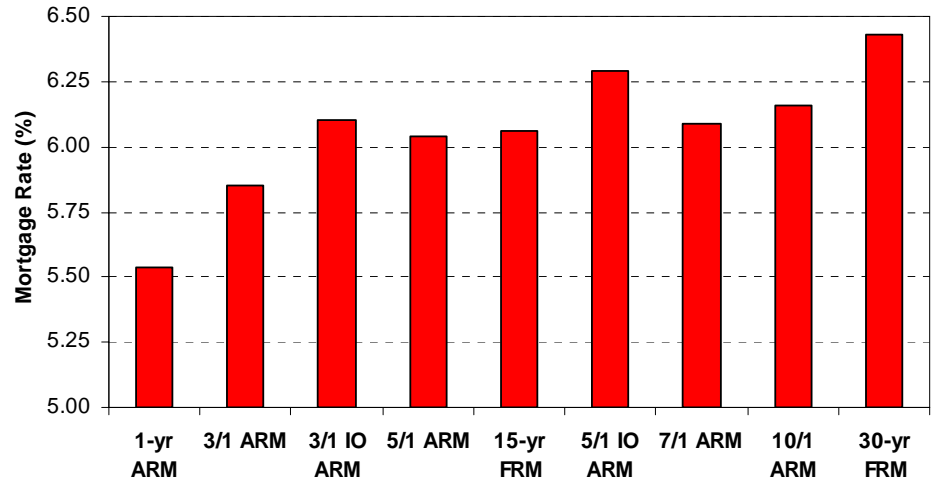
- **Index.** 1-year CMT
- **First Reset Period.** 3, 5, 7, or 10 years, annual resets thereafter
- **Margin.** 275 basis points
- **Interest Rate Caps.** 1/1/5 for 3- and 5-year Hybrid ARMs; 2/2/6 for 7- and 10-year Hybrid ARMs
- **Lookback.** 30 days

### **Mortgage Rates on ARM Products**

How do lenders come up with mortgage rates on this large number of ARM products? One simple principle to use is that the mortgage rates on different ARM products should be a function of how much interest-rate risk the borrower takes on: A shorter reset period will translate to a greater concession for the borrower. For example, as Figure 4 illustrates, 1/1 ARMs have the lowest rates followed by 3/1s, 5/1s etc. The lender's perception of credit risk will also play a role. All else being equal, loans that defer principal amortization will be charged a higher rate than fully amortizing loans. So, assuming the borrower's characteristics are the same, 10/1 IO ARM rates will be higher than 10/1 ARM rates. Finally, the relationship between the rates on ARMs with different reset periods will depend upon the slope of the yield curve: The relationships

in Figure 4 represent a very flat yield curve from a historical perspective. In a more positively sloped yield curve environment, the rate differentials between ARMs with different reset periods will increase.

**Figure 4: Rates for a Selection of Conforming Mortgage Loans, 17 Apr 2006**



Source: Banc of America Securities

**AGENCY ADJUSTABLE-RATE MBS**

ARM MBSs are created by pooling together ARM loans which share some common characteristics. The resulting MBS is in some respects very similar to the typical pass-through pool traded in the TBA market: Mortgage payments made by the underlying borrowers in the ARM pool are passed through to the end investor with a delay after deducting a servicing and guarantee fee. Timely payments of principal and interest to the end investor are guaranteed by the relevant Agency (Fannie Mae, Freddie Mac, or Ginnie Mae).<sup>9</sup>

Clearly, several of the concepts that are relevant to the ARM loan also make sense in the context of the ARM MBS: index, lookback, reset period etc. One new twist is the concept of a **net margin**: this is the margin of the loan (labelled **gross margin** in Figure 5) less an IO strip that consists of the servicing and guarantee fee. Just as the borrower’s rate is equal to the index value plus the gross margin, the MBS coupon rate is equal to the index value plus the net margin. Figure 5 provides a visual illustration of how the underlying borrower’s rate is related to the pass-through rate on the ARM MBS.

At a big picture level then, an ARM MBS pool is just a floating-rate security with pass-through cash flows. Thus, the key difference between an ARM MBS and a fixed-rate MBS comes from the fact that the pass-through coupon on the ARM MBS is not fixed and will

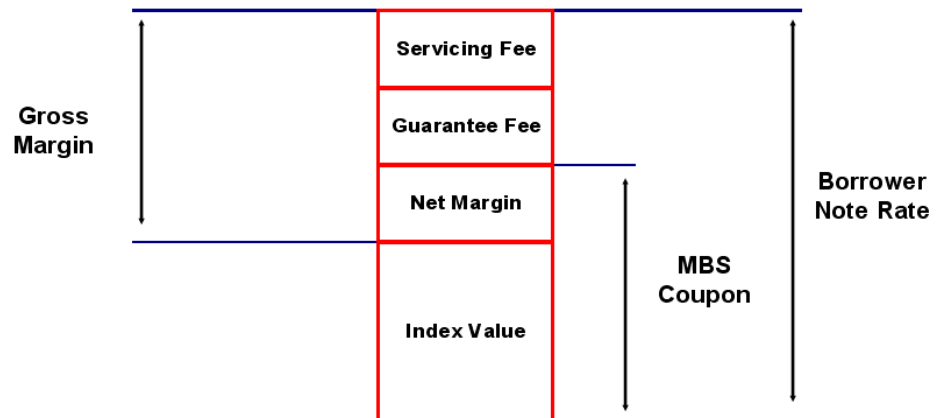
<sup>9</sup> This last statement is not completely accurate because Freddie Mac’s Offering Circular for its PCs states that Freddie Mac will only guarantee timely payment of interest and *ultimate* payment of principal on its ARM PCs. In other words, Freddie Mac does not guarantee timely payment of scheduled principal on its ARM PCs.

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change as the note rates on the underlying ARM loans reset. In general, there are no constraints on the coupon of the ARM MBS other than those inherited from the loans collateralizing the pool. For example, if each of these loans had the same life cap, the MBS would have a life cap equal to the cap rate for the loans less servicing and guarantee fees.

**Figure 5: Relating the Index, MBS Coupon and Borrower Note Rate on ARM Securities**



Source: Freddie Mac, Banc of America Securities

Originators have two options for pooling their ARM loans. In the first and more popular option, **WAC ARM MBSs** with a weighted-average coupon (and net margin) are created by subtracting a *fixed* servicing and guarantee fee from the borrower’s note rate.<sup>10</sup> As we had discussed above, the coupon received by an investor on this MBS will vary over time as the underlying loans reset. The coupon will also drift over time because of differential prepayment and amortization rates on the individual loans in a pool and because these loans have different interest rate adjustment dates.

In the second pooling option, ARM MBSs with a fixed net margin are created by using buyup and buydown multiples to adjust the amount of servicing and guarantee fee IO strip so that each loan in the pool has the same net margin. This type of MBS is commonly referred to as a **Margin ARM**. Here too, the coupon can vary over time as the underlying loans reset since these loans may have different interest rate adjustment dates.

One point we have glossed over so far is the requirement that ARM MBS pools consist of loans with “common characteristics.” One reason this uniformity is necessary is that it is difficult for investors to estimate their expected interest payments on an MBS if the underlying ARMs have substantial variation in their indexes, reset periods, lookback periods, caps etc. Another reason is that ARM borrowers with different contractual characteristics may well have different prepayment characteristics – some sort of homogeneity in the underlying borrowers is desirable from an investor’s perspective since it reduces prepayment risk. This type of uniformity is enforced to some extent by Agency

<sup>10</sup> WAC ARM MBSs are also referred to as **Flex ARMs**.

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restrictions on what types of ARMs can be pooled together. Some of the currently enforced pooling constraints for GSE WAC ARM pools are summarized in Figure 6.

**Figure 6: GSE WAC ARM MBS Pooling Criteria**

<b>ARM CHARACTERISTICS</b>	<b>POOLING CRITERIA</b>
<b><i>Adjustment date</i></b>	Mortgages pooled in the same securities may have different adjustment dates
<b><i>Convertibility</i></b>	Convertible ARMs must be pooled with convertible ARMs unless the conversion window has expired
<b><i>First Reset Period</i></b>	Same for all mortgages: e.g. 3/1s pooled only with 3/1s
<b><i>Index</i></b>	Same for all mortgages
<b><i>Interest Only Period</i></b>	For IO ARMs, IO period must equal first reset period
<b><i>Initial Cap</i></b>	All mortgages must have the same initial cap unless an ARM is past the first reset.
<b><i>Life Cap</i></b>	Mortgages may have different life caps
<b><i>Mortgage Rate and Margin</i></b>	Mortgages pooled in the same security may have different mortgage rates and margins
<b><i>Periodic cap</i></b>	Same for all mortgages

Source: Fannie Mae, Freddie Mac, Banc of America Securities

An effort to further standardize ARM pooling was made with the creation of a “uniform” pooling option for 5/1 Hybrid ARM pools by Fannie Mae.<sup>11</sup> The features introduced for this pooling option directly address some of the lack of uniformity associated with the typical WAC ARM pool. Specifically, some of the pooling characteristics enforced by this program include:

- The stated MBS coupon must be issued in 25 bps increments (4.00%, 4.25%, 4.50% etc) during the initial fixed period of the underlying Hybrid ARMs. After reset, the MBS will have a weighted-average coupon.
- Each loan in the pool must have the same margin.
- The pools do have a weighted reset date but the reset tolerance is narrower than in a WAC ARM: each of the underlying 5/1 Hybrids should have a reset date that is between 54 to 62 months.

<sup>11</sup> These pools are identified with an LA prefix.

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After this broad overview of ARM MBS, we will now briefly describe some of the idiosyncratic variations between the ARM MBS programs of the different Agencies. In the GSE MBS sector, we will simply focus on discussing the characteristics of Hybrid ARM MBS since Hybrid ARMs are the most popular conforming mortgage. In the GNMA sector, we will list the characteristics of 1-year CMT ARM MBS.

### GSE Hybrid ARM Pools

The key features of Hybrid ARM pools securitized by the GSEs are as follows:

- **WAC Coupon.** Have a weighted-average coupon for the initial fixed-period (3 years for 3/1s, 5 years for 5/1s etc) and then reset annually to 1-year CMT, 1-year LIBOR, or every six months to 6-month LIBOR.
- **Delay days.** FNMA's have 54 delay days, while FHLMC's have 74 delay days.
- **Interest rate caps.** 5/2/5 cap structures are the most common followed by 2/2/6 and 2/2/5 cap structures. A majority of 7/1s and 10/1s have a 5/2/5 cap structure.
- **Net margins.** Typically 220bps for 1-year CMT indexed pools, 160-170bps for 1-year LIBOR and 140bps for 6-month LIBOR.

### Ginnie Mae Treasury ARM Pools

The key features of Ginnie Mae 1-year CMT ARM pools are:

- **Coupon.** The coupon is fixed for one year and then resets annually thereafter. There is one pool created per coupon per month. Pools are multi-issuer, meaning that multiple originators deliver into the same pool number. Coupons are issued in 50bp increments: 3.0%, 3.5%, 4.0% etc. All underlying loans are indexed to 1-year CMT.
- **Delay days.** 49 days
- **Interest rate caps.** 1/1/5 cap structure
- **Net margins.** Most of the origination has a net margin of 150bps but occasionally pools with 200bps and 250bps margins are also issued.

### Markets for Agency Adjustable-Rate MBS

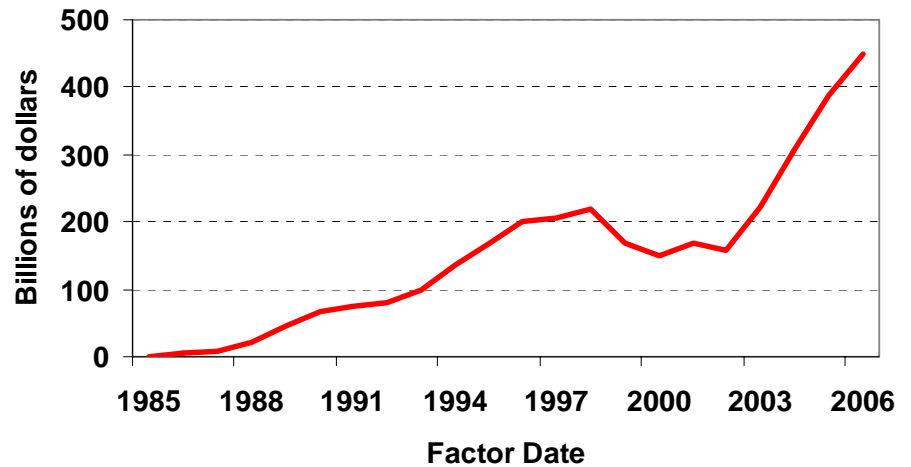
While the Agency ARM MBS market dates back to the 1980s, activity in the sector has really exploded since 2003 (Figure 7). The catalyst for the jump in activity in the sector is the increasing use of ARM financing by homeowners. The rise in the use of ARMs by homeowners has been fuelled by decreasing housing affordability which has forced borrowers to move towards the lower initial monthly payments offered by ARMs in order to qualify for mortgages on their homes.<sup>12</sup> Figure 8 shows the relative liquidity of the different sectors in the Agency ARM MBS market: FNMA (60% share) and FHLMC (32% share) MBSs are much more liquid than GNMA (8% share).

<sup>12</sup> Further details on the history of ARM lending in the U.S. can be found in the Appendix.

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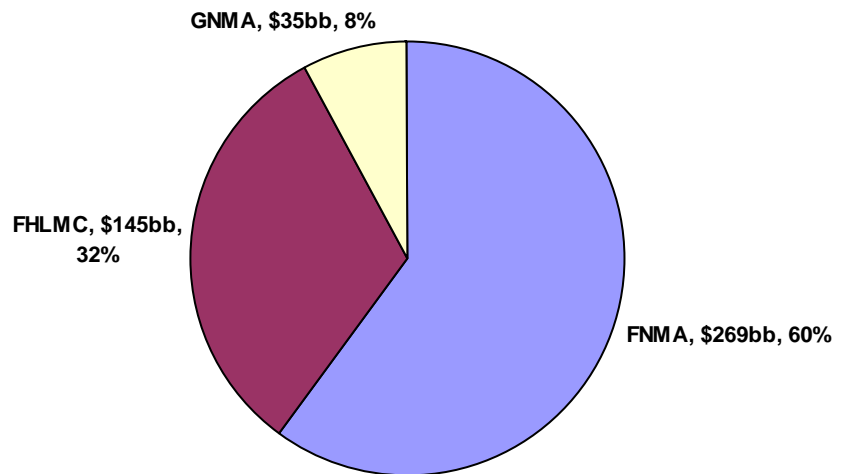
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Figure 7: Total Outstanding Agency ARM MBS: 1985-1Q 2006



Source: Fannie Mae, Freddie Mac, Ginnie Mae, Banc of America Securities

Figure 8: Total Outstanding ARM MBS by Agency: 1Q 2006



Source: Fannie Mae, Freddie Mac, Ginnie Mae, Banc of America Securities

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**Primary Market**

The ARMs collateralizing these MBSs are originated by the usual spectrum of originators: commercial banks, mortgage bankers and thrifts. While some lenders (thrifts) originate ARMs with the intention of holding them in their portfolios, most ARMs are originated by mortgage bankers for immediate sale in the secondary market to an end investor. The primary market for Agency ARMs is thus very similar to that for fixed-rate mortgages. The only difference is that a fixed guarantee and servicing fee is collected on most ARM pools instead of the variable fee on fixed-rate pools.

**Secondary Market**

As with the primary market, the secondary market for ARM MBS is very similar to the fixed-rate MBS market: It is an over-the-counter market with trading activity taking place between broker-dealers and their customers which include other broker-dealers, originators, and institutional holders of ARM MBS: commercial banks, pension funds, mutual funds, hedge funds and REITs.

Several dealers make markets in ARM MBS pools and facilitate transactions between customers while taking temporary positions and capturing the bid-offer spread. During times of heavy trading activity this spread averages 1-2 ticks per \$100 face value but can be wider during slower periods. Most of the trading centers around New York time and overseas markets are not really developed. In addition to transacting directly with customers, primary dealers frequently trade with each other through inter-dealer brokers.<sup>13</sup>

The central difference between the secondary markets for fixed-rate and ARM MBS is the absence of a roll market for ARM MBS pools.<sup>14</sup> Even though the agencies have made significant progress in standardizing the ARM products that can be pooled together, a lack of fungible pools in the ARM MBS sector has inhibited liquidity and stilted further development of the market. The core problem is that most ARM pools are WAC ARMs and, as we have previously discussed in detail, these MBS do not have a standardized coupon. Hence, instead of the half-coupons (5%, 5.5%, 6%) available in the fixed-rate sector, ARM coupons are more or less arbitrary (5.001%, 5.025%, 5.21% etc) and also drift over time. As a consequence of this lack of uniformity, there is no consensus on what would constitute “good delivery” which in turn means that market participants are reluctant to short ARMs and there is no roll market for these securities. In fact, ARM pools trade like specified pools in the pass-through market or structured products: each security is unique and needs to be individually negotiated. Currently, there are also no electronic screens or transactions through electronic networks like TradeWeb because of the lack of standard ARM MBS benchmark securities. While our earlier discussion had referenced the fact that the Agencies had attempted to work around these issues by initiating uniform pooling options for some of the most liquid ARM sectors, these programs have yet to establish themselves.

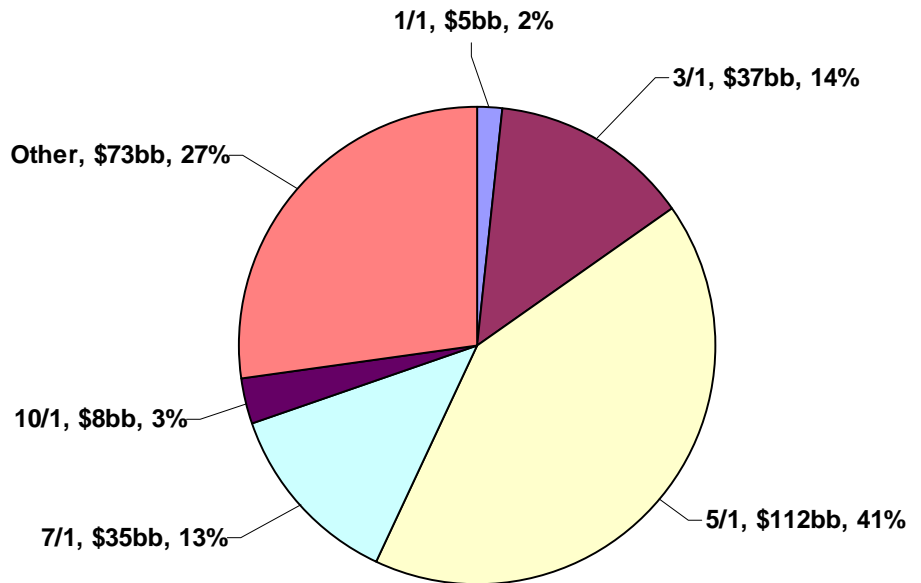
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<sup>13</sup> Currently, there are 3 active inter-dealer brokers in the ARM MBS market.

<sup>14</sup> When people talk about “TBAs” in the ARM MBS market they are referring to the pools that originators try to sell in advance of securitization by the agencies. The originators have a fairly good idea of the collateral characteristics of TBA pools and make this information available (subject to some small variance) at the time of the trade.

After this broad overview of the Agency ARM MBS sector, we will now focus on some of the institutional details associated with the subsectors devoted to trading GNMAs and FNMA/FHLMCs. Figure 8 had given us some perspective on the relative size of the GNMA, FNMA, and FHLMC sectors of the ARM MBS market. Figure 9 below shows us the relative popularity of the different ARM product types within the FNMA ARM MBS sector. As we can clearly see, 5/1 Hybrid ARM MBS are by far the most liquid, which is why they are the only sector for which “uniform” pooling options have been proposed. The figure shows that 41% of all outstanding FNMA ARM MBSs are 5/1s. The corresponding figure for FHLMC is 53%.

**Figure 9: Total Outstanding FNMA ARM MBS by Type: 1Q 2006**



Source: Fannie Mae, Banc of America Securities

The **Other** category for FNMA ARMs consists of Option ARMs and Hybrid ARMs with non-standard reset periods.

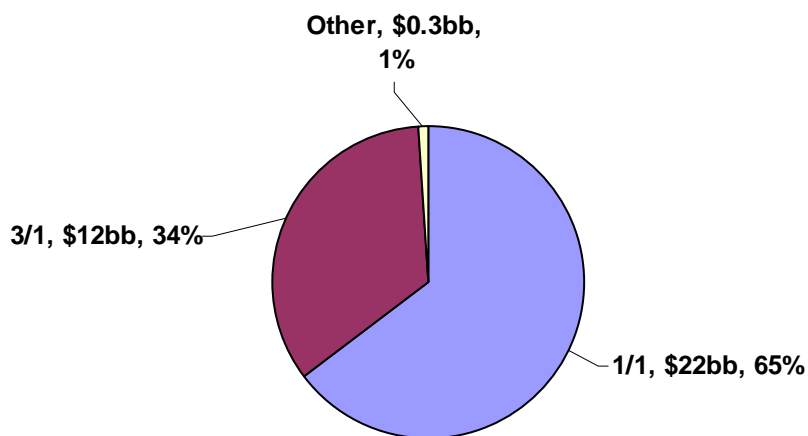
Within the GNMA ARM MBS sector, 1/1s and 3/1s dominate the sector (see Figure 10). The TBA market works as follows. Since the origination volume of GNMA ARMs is relatively small, there is only 1 pool per coupon per net margin created each month for 1/1s and 3/1s. All government ARM loans originated in the same quarter have the same reset date. For example, all 1/1 ARM loans originated over the third quarter of 2005 (July-August) would have a reset date of October 2006. Similarly, all 3/1 pools originated over this period would have a reset date of October 2008. Thus, in a GNMA ARM pool, the mortgages have identical interest rate change and payment adjustment dates. In a TBA trade, unless otherwise specified, any combination of that quarter’s production can be delivered. For example, for an August TBA trade, the July or August production’s pool or any combination of both can be delivered. Obviously, for a July TBA trade, only July’s pool can be delivered.

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Figure 10: Total Outstanding GNMA ARM MBS by Type: 1Q 2006



Source: Ginnie Mae, Banc of America Securities

## APPENDIX A: A BRIEF HISTORY OF ARM LENDING IN THE U.S.

A potted history of ARM lending is useful for divining what drives ARM demand and supply. Until the early 1980s, virtually the only mortgage offered in the U.S. was the 30-year fixed-rate self-amortizing mortgage. This is quite different from the finance systems in other parts of the world which offer several flavors of adjustable-rate mortgages.<sup>15</sup> The seed for the idiosyncratic evolution of the U.S. in this regard was the collapse of the housing finance system in the Great Depression. The structure of mortgage debt prior to this time consisted of mortgages with variable rates, large down payments, short one- to five-year terms, interest-only payments and large balloon payments at expiration. It was also fairly common for homeowners to have to use several mortgage loans to finance a home purchase.

One of the most significant institutions created as part of the federal response to the Great Depression was the Federal Housing Administration (FHA). The FHA introduced a new type of mortgage loan into the system: the 30-year amortizing, fixed-rate prepayable mortgage. The 30-year mortgage dominated the origination landscape until the high inflation environment of the 1970s and early 1980s led to lenders preferring to originate ARMs. As we saw previously (Figure 7), the first ARM MBS were originated in the early 1980s.<sup>16</sup>

From there on, the increase in the liquidity of ARMs has been slow but steady. Typically, as Figure 11 shows, the demand for ARMs is heavily dependent on the level of 30-year mortgage rates with homeowners preferring to lock in a low long-term mortgage rate when possible. As the figure also demonstrates, this trend has broken in recent years with a significant increase in ARM share despite low fixed-rate mortgage rates. The major contributing factor to this increase appears to be the decrease in affordability as borrower incomes have not kept pace with rising house prices. Low inflation and the low volatility of the short-term rates that most ARMs are indexed to have also been offered as explanations for the increasing popularity of ARMs. On the supply side, lenders appear to be increasingly comfortable underwriting mortgage credit risk because of improvements in information technology.<sup>17</sup>

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<sup>15</sup> See “The American Mortgage in Historical and International Context,” Richard K. Green and Susan M. Wachter, *Journal of Economic Perspectives*, Volume 19, Issue 4, Fall 2005, pp. 93-114.

<sup>16</sup> Fannie Mae, Freddie Mac and Ginnie Mae all started participating in the ARM MBS market within a couple of years of each other.

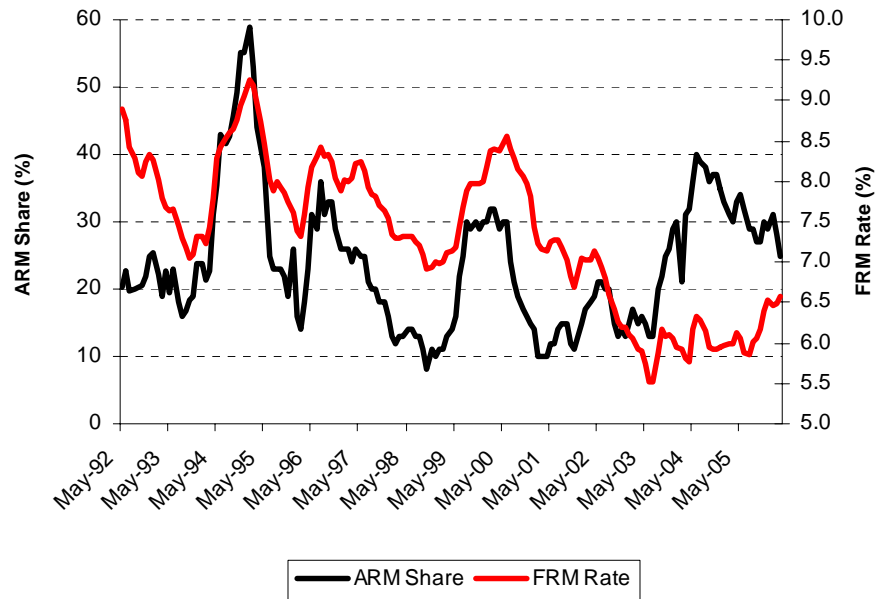
<sup>17</sup> The movement towards the increasing adoption of ARMs by U.S. homeowners is actually part of a larger global trend. Many of the factors we’ve discussed as promoting the use of ARMs (house price increases, decreases in affordability, decrease in the level and volatility of inflation, reduction of credit restrictions by lenders) are also visible in several international mortgage markets. See “Housing finance in the global financial market,” *Bank for International Settlements*, January 2006.

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Figure 11: Historical Trends in the ARM Share of Originations



Source: FHFB, Banc of America Securities

On the flip side, it appears to be widely thought that the increased popularity of ARMs with homeowners might have negative implications: homeowners might be stretching to make their payments, are burdened with debt, and don't necessarily understand all the risk associated with their mortgages, particularly on some of the newly introduced products like the Option ARM product. Time will tell.

## APPENDIX B: ACCESSING FNMA AND FHLMC ARM POOL DATA

Both FNMA and FHLMC provide useful web sites for accessing up-to-date information on their ARM MBSs. These web sites provide security lookup tools that can serve as useful resources for accessing detailed collateral characteristics on ARM pools. The FNMA lookup tool is called **PoolTalk** while the FHLMC tool just goes by **Security Lookup**. The information returned by these tools on an ARM pool includes:

- Current unpaid balance, pool factor, coupon.
- Weighted average statistics at the pool level like WAC, WAM, WALA, Weighted Average FICO etc.
- ARM-related information like index, margin, caps, months to roll, lookback, etc.
- Up-to-date quartile information for various pool characteristics like age, coupon etc.
- Distribution of loans by next rate change date.
- Geographical distribution of loans in the pool.

For example, Figures 12 and 13 display screen shots of the output returned when an ARM pool number (or CUSIP) is entered into the respective lookup tools. Even though the descriptive terminology for ARM pools is somewhat different across the two agencies, a similar level of detail is provided by both at the pool level. Freddie Mac has recently taken the lead in disclosure by also providing loan level information on newly issued pools.

Figure 12: Pool Data from Fannie Mae



[ Download Pool Statistics in Delimited Format ] [ Download Pool Statistics in XML Format ]

ARM Pool Information							
Security Information		Month	Current Factor	Pool Level PTR	Weighted Average (WA) Information		Percent Missing
Pool Number	879003	May	0.96138507	5.12500	WA Original Coupon	5.7620	Credit Score 0.000
Pool Prefix	LB	April	0.98914633	5.12800	WA Current Coupon	5.7630	Loan To Value Ratio 0.000
CUSIP	31409URY3	March	0.99884075	5.12800	WA Original Maturity	358	Percent UPB
Suppress Code	0 - Active	February	1.00000000	5.12800	WA Current Maturity	355	Without Credit Score 0.000
Pool Issue Date	02/01/2006				WA Credit Score	715	With First Payment Due -
Maturity Date	02/01/2036				WA Loan To Value	72	With Interest Only -
Original Balance	\$38,185,090.00				WA Loan Age	4	Current Month
Pool Loan Count	153				WA Original Loan Term	360	May 2006
					WA Months Remaining To Scheduled Amortization	-	

ARM Detail Information			
Rate Information		Weighted Average (WA) Information	
MBS Margin	1.6260	WA Loan Margin	2.2600
Accrual Rate	5.1290	WA Life Floor	0.0000
Issue Accrual Rate	5.1280	WA Life Cap	10.7627
Transfer Type	W - IS BOOK ENTRY	WA Months To Roll	58
Pool Subtype	P92W - WSJ 1-YEAR LIBOR	WA Max Pool Accrual Rate	10.128
Pass Through Method	W	WA Min Pool Accrual Rate	0.0
Net Life Floor		WA Net Coupon	5.128
Original	0.0000	Original	10.1280
Updated	0.0000	Updated	10.1290

Adjustment Information					
General		Adjustment Caps		Negative Amortization	
Months-to-Rate Change	55	Per-adjustment Rate Cap	999.9999	Deferred Interest Flag	N
Convertible Flag	N	Payment Cap	0.0000	Weighted Avg. Neg. Amortization Limit	0.0000
Note Rate Rounding Method	9	Lookbacks		Change Frequency	
Minimum Index Movement	0.0000	Standard	45	Rate Adjustment Frequency	12
First Rate Change Date	08/01/2009	Variable	0	Payment Change Frequency	12
First Payment Change Date	09/01/2009			Amortization Recast Frequency	0

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Change Date Information								
Next Change Date	% of Security Balance	MBS Margin High	MBS Margin Low	MBS Margin	Net Coupon High	Net Coupon Low	WA Net Coupon	Current WAC
08/01/2009	1.0950	1.6160	1.6160	1.6160	5.5000	5.5000	4.8660	5.5000
09/01/2009	2.1660	1.6160	1.6160	1.6160	5.5000	5.5000	4.8660	5.5000
12/01/2009	0.9930	1.6160	1.6160	1.6160	5.5000	5.5000	4.8660	5.5000
01/01/2010	1.0480	1.6160	1.6160	1.6160	5.5000	5.5000	4.8660	5.5000
02/01/2010	1.4130	1.6160	1.6160	1.6160	5.5000	5.5000	4.8660	5.5000
09/01/2010	4.1660	1.6160	1.6160	1.6160	6.2500	5.5000	5.0600	5.6940
10/01/2010	1.3760	1.6160	1.6160	1.6160	5.6250	4.8750	4.3940	5.0280
11/01/2010	0.6540	1.6160	1.6160	1.6160	5.3750	5.3750	4.7410	5.3750
12/01/2010	3.9640	1.6160	1.6160	1.6160	6.2500	5.2500	5.1460	5.7800
01/01/2011	34.9960	1.8660	1.6160	1.6180	6.7500	4.7500	5.1550	5.7890
02/01/2011	48.1290	1.8660	1.6160	1.6350	6.5000	4.8750	5.1770	5.8110

Loan Pass Through Information						
Next Change Date	LPT High	LPT Low	High Cap	Low Cap	High Floor	Low Floor
08/01/2009	4.8660	4.8660	9.8660	9.8660	0.0000	0.0000
09/01/2009	4.8660	4.8660	9.8660	9.8660	0.0000	0.0000
12/01/2009	4.8660	4.8660	9.8660	9.8660	0.0000	0.0000
01/01/2010	4.8660	4.8660	9.8660	9.8660	0.0000	0.0000
02/01/2010	4.8660	4.8660	9.8660	9.8660	0.0000	0.0000
09/01/2010	5.6160	4.8660	10.6160	9.8660	0.0000	0.0000
10/01/2010	4.9910	4.2410	9.9910	9.2410	0.0000	0.0000
11/01/2010	4.7410	4.7410	9.7410	9.7410	0.0000	0.0000
12/01/2010	5.6160	4.6160	10.6160	9.6160	0.0000	0.0000
01/01/2011	6.1160	4.1160	11.1160	9.1160	0.0000	0.0000
02/01/2011	5.8660	4.2410	10.8660	9.2410	0.0000	0.0000

**Geographic Distribution and Quartile Information**  
 Information at Issuance **OR** Current Information

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Source: Fannie Mae

Figure 13: Pool Data from Freddie Mac

### Basic Information, ARM Pool

**Pool Type:** 1-Year LIBOR, Hybrid Initial Interest WAC ARM PC  
 Visit the [Glossary of Terms](#) for descriptions of disclosure elements.

<b>Pool Number:</b>	1G0792	<b>Cusip Number:</b>	3128NC2Z6	<b>Original UPB:</b>	\$25,823,688.00
<b>As of Date:</b>	03/01/2006	<b>Maturity Date:</b>	03/01/2036	<b>Original Coupon:</b>	5.26800
<b>Original WARM:</b>	359	<b>Original WALA:</b>	1	<b>Original WAC:</b>	5.893
<b>Original WAOLT:</b>	360	<b>Original WAMTAM:</b>	85.04	<b>Original WAMTA:</b>	84.040
<b>Original AOLS:</b>	\$260,899.00	<b>Original WAOCS:</b>	740	<b>Original WAOLTV:</b>	70
<b>Original WAOLS:</b>	\$296,889.00	<b>Original Credit Score Unknown % UPB:</b>	0.000	<b>Original LTV Unknown % UPB:</b>	0.000
<b>Index:</b>	1 YR LIBOR - WSJ	<b>Lookback:</b>	45	<b>Adjustment Period:</b>	12
<b>Next Adjustment Date:</b>	08/01/2012	<b>Payment Adjustment Cap:</b>	0.000	<b>Periodic Rate Cap:</b>	2.000
<b>Initial Period:</b>	7	<b>Initial Cap Up %:</b>	5.000	<b>Initial Cap Down %:</b>	5.000
<b>Convertible:</b>	N	<b>First Conversion Date:</b>		<b>Last Conversion Date:</b>	
<b>Original Wgtd Avg Mort Margin:</b>	2.250	<b>Original Wgtd Avg Mort Life Ceiling (Gross):</b>	10.894	<b>Original Wgtd Avg Mort Life Floor (Gross):</b>	0.000
<b>Original PC Margin:</b>	1.625	<b>Original Wgtd Avg Mort Life Ceiling (Net):</b>	10.268	<b>Original Wgtd Avg Mort Life Floor (Net):</b>	0.000
<b>Min 10/Max 24.9 Basis Points Flag (Y/N):</b>	N	<b>Prepayment Protection Mortgage Flag (Y/N):</b>	N		
<b>Payment Date:</b>	06/15/2006	<b>Current Factor Date:</b>	05/01/2006	<b>Current UPB:</b>	\$25,401,701.67
<b>Payoff Date:</b>		<b>Current Factor:</b>	0.98365894	<b>Current Coupon:</b>	5.26500
<b>Current WARM:</b>	358	<b>Current WALA:</b>	2		
<b>Current WAOLT:</b>	360	<b>Current WAMTAM:</b>	83.04	<b>Current WAMTA:</b>	82.040
<b>Current AOLS:</b>	\$259,306.00	<b>Current WAOCS:</b>	739	<b>Current WAOLTV:</b>	70
<b>Current WAOLS:</b>	\$294,918.00	<b>Current Credit Score Unknown % UPB:</b>	0.000	<b>Current LTV Unknown % UPB:</b>	0.000
<b>Current PC Margin:</b>	1.625	<b>Current Wgtd Avg Mort Life Ceiling (Net):</b>	10.265	<b>Current Wgtd Avg Mort Life Floor (Net):</b>	0.000
<b>Current Neg Am Factor:</b>	0.0000000				
<b>Seller Name:</b> CITIMORTGAGE, INC.					
<b>Seller Address:</b> 1000 TECHNOLOGY DRIVE MAIL STATION 822					
<b>Seller Address:</b> OFALLON, MO 63368-2240					

**Legend 1:**  
**Legend 2:**

**Record Date:**  
*'Last Business Day of the month for payment on the 15th two months following'*  
**Accrual Period:**  
*'1st through the 30th, payable on the 15th two months following.'*

Source: Freddie Mac

FNMA encodes some characteristics of the underlying ARM loans backing an MBS in a field called **Pool Subtype**. These pool subtypes are represented by alphanumeric character strings and are unique to ARM pools. For FNMA ARM pools, the subtype encodes information such as the pool index, initial fixed-rate period, rate and payment adjustment

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frequency, cap structure, convertibility etc. While most of the information encoded in the subtype is directly available on the PoolTalk screen, some details can only be obtained by unpacking the definition of the subtype itself. This can be done on the PoolTalk page by following the hyperlink next to the Pool Subtype row (see Row 5 in the **ARM Detail Information** section of Figure 12). For example, Figure 14 displays the description of the P9C subtype obtained by following the above procedure.

**Figure 14: Sample FNMA PoolTalk Subtype Description from Fannie Mae**

NOTE: THIS INFORMATION IS PROVIDED FOR COMPARATIVE PURPOSES ONLY.  
PLEASE REFER TO RELEVANT FANNIE MAE PROSPECTUS AND PROSPECTUS  
SUPPLEMENT TO CONFIRM THIS INFORMATION AND FOR A MORE DETAILED PRODUCT  
DESCRIPTION.

1LRR2002.SINGLE FANNIE MAE PAGE: 174  
RUN DATE: 05/31/2006 LASER ARM MATRIX SYSTEM  
RUN TIME: 20:02:34 SINGLE FAMILY MBS ARM MATRIX  
-SUBTYPE: P9C  
INDEX : WSJ 1-YEAR LIBOR  
  
INITIAL PERIOD : 43 - 66 MONTHS  
  
RATE ADJ FREQUENCY : ANNUALLY  
  
PYMT ADJ FREQUENCY : ANNUALLY  
  
INTERVAL RATE CAP : +2%/-2%@1ST ADJ; +2%/-2% THEREAFTER  
  
INTERVAL PYMT CAP : N/A  
  
CONVERTIBLE FEATURE: NO  
  
OTHER FEATURES : INTEREST ONLY - NO  
  
: PREPAYMENT PENALTY - NO

Source: Fannie Mae



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