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Hybrid ARMs

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Executive Summary

- Hybrid ARMs combine features of ARMs and fixed-rate mortgages, with a coupon that is fixed for a specified period of time (for example, five years), after which it resets annually.
- The hybrid ARM sector has seen substantial growth in recent years, and it has become the most active part of the ARM market.
- We analyze historical prepayment data on hybrids. This analysis indicates that hybrid speeds are faster than those on fixed-rate loans but slower than those on traditional one-year ARMs — the longer the initial reset period, the closer the hybrid speeds to those on fixed-rate loans.
- There has been concern about hybrid speeds around the first reset date. Our analysis indicates that hybrid speeds tend to spike near the first reset, although the spike is not as high as some investors expect.
- We describe the Salomon Smith Barney prepayment model for hybrids, which has been developed using available data for the past eight years. While actual speeds tend to be noisy, because of the small balances in many classes, the model does a reasonable job on average in tracking speeds.
- The market convention has been to assume a balloon payment at the first reset date, with an assumed exit or terminal price. Our analysis suggests that this approach tends to understate the value of hybrids, because of overly conservative exit price assumptions. More realistic valuations will emerge as investors gain more confidence in prepayment models and OAS analysis becomes widely used for hybrids.

I. Introduction

As the name suggests, hybrid ARMs combine features of fixed-rate loans and adjustable rate mortgages (ARMs). The coupon on a hybrid is fixed for a specified period (typically three, five, seven, or ten years), after which, like the coupon on an ARM, it resets annually at a specified spread to an index. The product appeals to borrowers who want an initial coupon lower than that on a 30-year fixed rate loan, but who are not completely comfortable with a standard ARM and the attendant risk of a sharp upward reset in the coupon after one year. Noticeable issuance of hybrids first occurred in the early 1990s, and hybrid ARMs have continued to grow as a percentage of the ARMs market since then; a recent report from FHLB indicates almost 50% of new conventional ARMs originated are hybrids. Roughly $24 billion in agency hybrid ARMs is outstanding at present.

This paper provides a primer on hybrid ARMs. The rest of this section describes key features of hybrid ARMs and profiles the market. In Section II, we review historical hybrid ARM prepayment behavior, describing how hybrid speeds vary with the first reset period and how they compare with speeds on other MBS products, such as one-year ARMs, balloons, and fixed-rate MBSs. Section III describes how the historical patterns have been used to construct the Salomon Smith Barney Prepayment Model for hybrids, and Section IV discusses investment characteristics of hybrid ARMs.

Key Structural Features of Hybrid ARMs

Hybrid ARMs are generally categorized by the length of the first reset period, typically three, five, seven, or ten years. The term **5x1 hybrid**, for example, is used to denote a loan with a first reset after five years, with subsequent annual resets. Some other key features include the following:

- **Index**. Most hybrids are indexed to the one-year constant-maturity Treasury (CMT), but some hybrids are indexed to the three-year and five-year CMT. For example, a 3x3 hybrid will be indexed to the three-year CMT and will reset every three years. All CMT rates are obtained from the Federal Reserve Board's weekly *H.15 Statistical Release.*
- **Caps**. A hybrid pool can be characterized by three types of coupon caps: a **life** cap, a **periodic** cap, and an **initial reset** cap. For example, a 5-2-5 structure would indicate a life cap of 5% (i.e. 500bp) above the initial coupon, a periodic cap of 2%, and an initial reset cap of 5%. Most periodic caps are 2%, most life caps are 5% (except for 3x1s, which have 6%), and most initial reset caps are 2% (except for 7x1s and 10x1s, which have 5%). However, it is not uncommon to see pools with a variety of mixed cap characteristics.
- **Convertibility**. A convertibility option allows the borrower to convert into a fixed-rate mortgage during a specified period, called the **conversion window**. The conversion window is typically 60 months long and usually starts at month 1 or month 12. However, various other types of conversion periods are available (e.g. windows starting at month 60 or conversions allowed at the first three reset

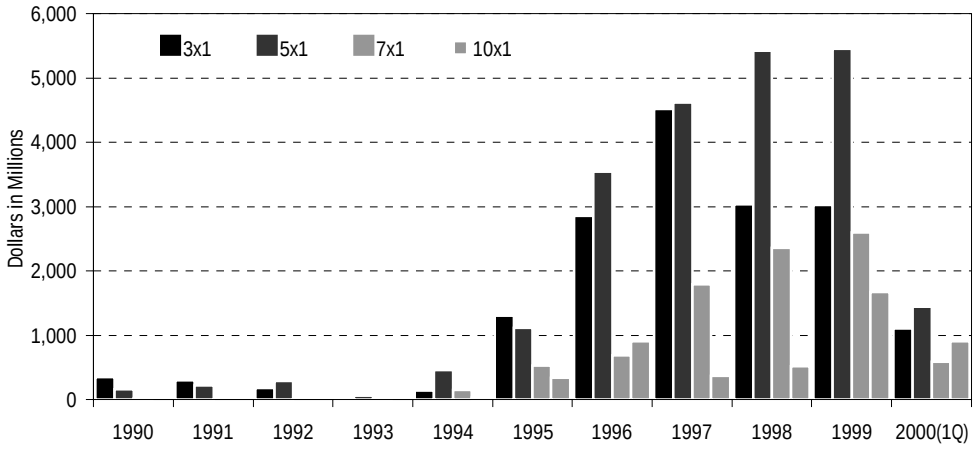
dates). The rate for the new loan is typically set between 3/8% and 5/8% above prevailing fixed 30-year mortgage rates. Convertible pools form about 13% of the current outstanding agency hybrids.

- **Margins**. Typical **gross margins** (the amount added to the index to set the loan coupon) on the loans are around 275bp–300bp and **net margins** (the difference between the MBS coupon and the index) are typically roughly 225bp. Minimum servicing spreads are set at 37.5bp for 3x1s and 5x1s, and 25bp for 7x1s and 10x1s. As with any other feature, margins and spreads can vary considerably among pools. The **lookback period** (the number of days between the coupon adjustment and the date the index level is determined) is typically 45 days.

Development of the Market

Figure 1 shows yearly issuance of hybrid ARMs. Issuance has grown steadily in recent years.

Figure 1. Issuance of Hybrid ARMs (Fannie Mae and Freddie Mac), 1990–2000



Source: Salomon Smith Barney.

Figure 2 describes major coupon vintages outstanding in the Fannie Mae hybrid ARM market and provides a snapshot of typical margins. Recent trends in the lending market suggest continuing growth in the hybrid sector. A recent Freddie Mac study finds 60% or more of the lenders now offer all the hybrid products and the initial discount stands at a high of almost 80bp–100bp for most hybrid products.

A Hybrid TBA Market

Recently, the Bond Market Association proposed creating a TBA market for hybrid ARMs. The association recognizes that the security side of the market is rather static in contrast to the popularity of the product and the development of the origination market. TBAs are expected to create a liquid and active hybrid market. Consistent pricing, trading in forward months, creation of a roll market — typical features of a TBA market — would provide investors with a deeper market in which to transact hybrid securities. Details of securities to be specified for TBA delivery, such as index, net margin, months-to-roll, caps, etc., are still being considered.

Figure 2. Profile of the FNMA Hybrid ARM Market, as of Mar 00

Orig Year	Orig Coupon (%)	Current Outstanding ($ Millions)	WAM (Mos.)	Net Margin	Gross Margin (bp)	Current Coupon (%)	Current WAC (%)
3x1 NON-CONV							
1997	6.0	408	333	2.194	2.835	6.06	6.70
1997	6.5	564	331	2.203	2.848	6.38	7.02
1997	7.0	44	329	2.296	2.935	6.86	7.50
1998	6.0	632	341	2.232	2.841	6.03	6.64
1998	6.5	58	340	2.341	2.956	6.30	6.91
1999	5.5	202.9	349	2.167	2.879	5.61	6.32
1999	6.0	395.6	350	2.175	2.885	5.99	6.69
1999	6.5	383.1	353	2.170	2.795	6.46	7.09
3x1 CONV							
1997	6.5	107	329	2.154	2.811	6.36	7.01
1998	6.0	65	340	2.275	2.900	5.96	6.59
5x1 NON-CONV							
1994	7.0	155	295	2.228	2.825	7.10	7.70
1995	6.5	105	308	2.196	2.820	6.52	7.15
1995	7.0	125	306	2.256	2.852	7.00	7.59
1996	6.5	139	318	2.283	2.883	6.54	7.14
1996	7.0	149	321	2.214	2.812	6.86	7.46
1997	6.0	162	332	2.150	2.777	6.05	6.68
1997	6.5	1335	331	2.260	2.838	6.46	7.04
1997	7.0	232	328	2.283	2.899	6.88	7.49
1998	6.0	808	342	2.202	2.791	6.04	6.62
1998	6.5	426	341	2.320	2.873	6.37	6.92
1999	6.0	433.2	349	2.154	2.805	5.98	6.63
1999	6.5	619.1	352	2.165	2.791	6.54	7.16
1999	7.0	313.9	353	2.231	2.800	6.93	7.50
5x1 CONV							
1998	6.5	120	340	2.256	2.758	6.27	6.78
7x1							
1997	6.5	249	333	2.220	2.835	6.51	7.12
1997	7.0	448	329	2.287	2.831	6.92	7.47
1998	6.0	417	344	2.189	2.777	6.05	6.63
1998	6.5	416	341	2.314	2.844	6.44	6.97
1999	6.0	476.2	348	2.145	2.772	5.97	6.59
1999	6.5	321.8	352	2.154	2.765	6.54	7.15
1999	7.0	189.4	354	2.184	2.768	6.89	7.47
10x1 NON-CONV							
1994	7.5	126	297	2.261	2.799	7.45	7.99
1997	6.5	143	327	2.366	2.880	6.91	7.43
1998	6.5	71	342	2.339	2.861	6.49	7.01
1999	6.0	121.7	348	2.131	2.774	6.02	6.66
1999	6.5	143.7	351	2.224	2.806	6.52	7.10
1999	7.0	204.4	354	2.126	2.780	6.98	7.63

Source: Salomon Smith Barney.

II. Prepayment Behavior of Hybrids

With seven to eight years of prepayment history and data on speeds around resets for 3x1s and 5x1s now available, it is possible to develop a good understanding of the prepayment characteristics of hybrids.

Traditionally, borrowers have chosen ARMs either to minimize initial monthly mortgage payments or because they do not expect to hold the mortgage for very long. The need for lower monthly payments may arise because of the borrower's income situation or the size of the loan. A short horizon may be due to a planned move within a few years or because the borrower plans to refinance into a fixed-rate mortgage at the earliest opportunity. In recent years, ARMs have also become popular with opportunistic "teaser junkies," who refinance into a new, teasered ARM as soon as the coupon starts to reset upward.

A standard ARM exposes the borrower to the risk of a payment shock at coupon resets, the first of which is only 12 months away. A hybrid ARM diminishes this risk, because the first coupon reset is further away, while still providing a lower initial coupon rate than a 30-year fixed-rate loan. Thus, it seems likely that a hybrid borrower shares some of the characteristics of an ARM borrower and some of the more risk-averse traits of a fixed-rate borrower — the longer the first reset, the closer the hybrid borrower should be to a fixed-rate borrower. As we will show, empirical speeds support this conjecture. An analysis of hybrid speeds leads to several conclusions.

Hybrid ARMs Are Slower Than One-Year Conventional ARMs

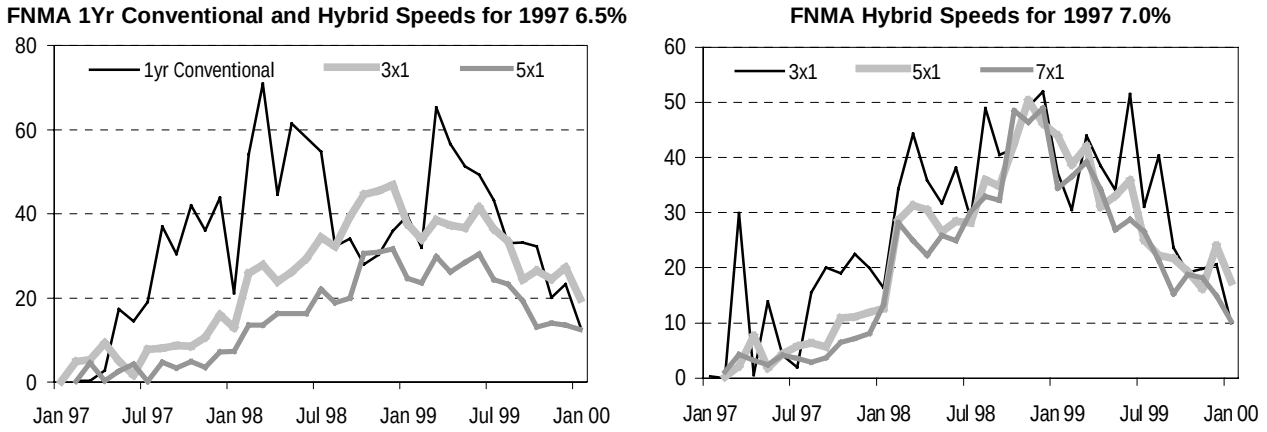
Figure 3 shows that standard one-year ARMs are significantly faster than hybrids, even in the first year, before the one-year ARM resets. This is presumably because one-year ARMs have higher proportions of opportunistic ARM-to-ARM borrowers as these borrowers would be most likely select a product with the lowest rate. In addition, hybrid ARM borrowers likely have a longer horizon for holding on to the mortgage, implying slower speeds in the first few years. In fact, Figure 3 indicates that speeds on the one-year ARMs and 3x1 hybrids converge somewhat after two to three years (in the absence of rate shocks).

The Longer the Initial Reset Period, the Slower the Speed

The left frame of Figure 3 shows that, although 5x1 borrowers have marginally higher WACs (10bp–15bp), they prepay at a slower rate. Presumably, they have forgone the lower rates (or lower points) on 3x1s to protect themselves against rising payments for two more years. Hence, with the extra protection against reset and a longer horizon, they demonstrate a lower propensity to refinance or move.

The right frame of Figure 3 depicts similar differences in speeds between higher coupon hybrids (all have WACs around 7.5%). However, in this example we see a temporary convergence in speeds during the 1998 refinancing waves. Hence, hybrid pools that are comfortably in-the-money during a period of exceptionally low rates are exposed to a significant amount of solicitation from lenders and show high speeds (irrespective of initial resets).

Figure 3. FNMA Hybrid Speeds — One-Year Conventional and Hybrid Speeds for 1997 6.5% and Hybrid Speeds for 1997 7.0%



Source Salomon Smith Barney.

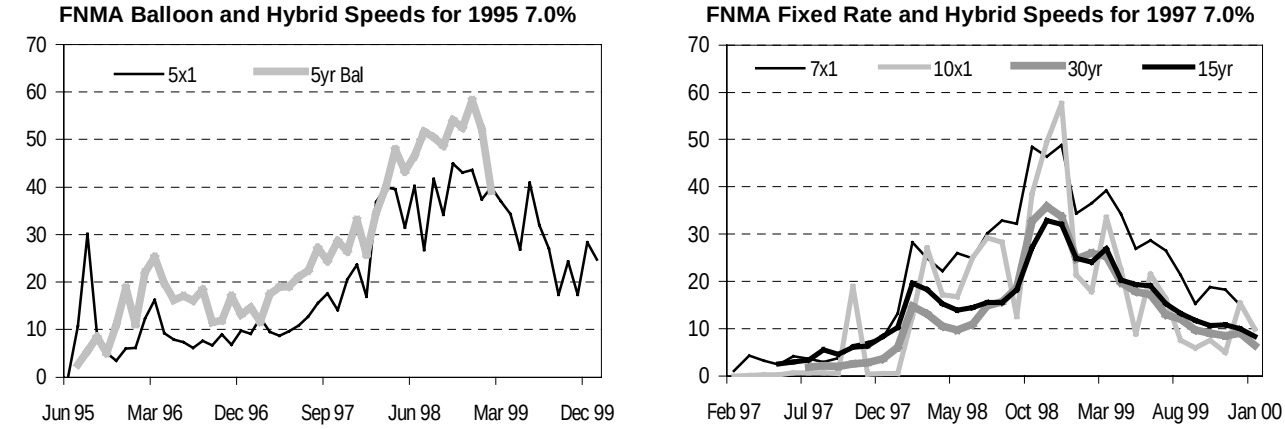
Balloons Are Typically Faster than Comparable Hybrids

The left panel of Figure 4 shows that hybrid speeds tend to be slower than those of balloon MBSs. This is probably because balloons have a higher concentration of fast movers and refinancers, the type of borrowers least worried about a balloon payment.

Longer Hybrids Are Faster than Fixed-Rate MBSs

The right panel of Figure 4 compares speeds for 7x1 and 10x1 hybrids with those of fixed-rate MBSs. Speeds for 7x1s are consistently faster than those of 30-year fixed-rate MBSs. Likewise, speeds of 10x1s tend to be faster — but not as fast as 7x1 speeds — than those on 30-year fixed rate MBSs. Among hybrids, a 10x1 borrower is likely most similar to a fixed-rate borrower, being someone who has some aversion to variable coupons but, at the same time, is willing to take a bit of risk in return for a lower coupon rate. However, hybrids do exhibit a sharper response to low mortgage rates, as indicated by the sharp jumps in speeds on the 7x1s and 10x1s during the 1998 refinancing waves.

Figure 4. FNMA Hybrid Speeds –— Balloon and Hybrid Speeds for 1995 7.0% and Fixed-Rate and Hybrid Speeds for 1997 7.0%



Source: Salomon Smith Barney.

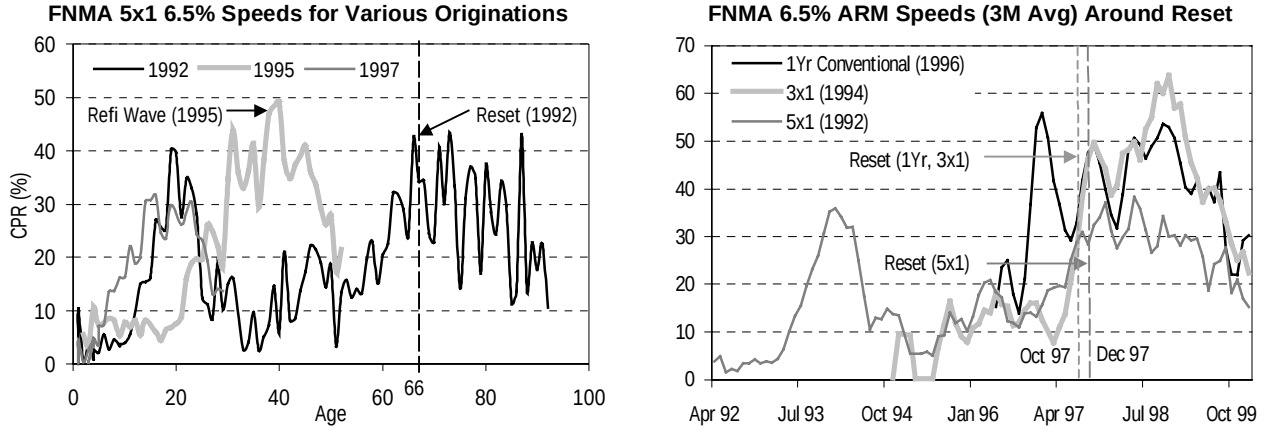
The responsiveness of hybrids to opportunities to lock in a low, long-term, fixed-rate mortgage rate is further illustrated in Figure 5, which shows a sharp rise in speeds for 1992 and 1997 origination 5x1s within the first two years, during the refinancing waves of 1993 and 1998, respectively. The 1995 origination 5x1s, on the other hand, seasoned less aggressively and peaked during the 1998 refinancing wave.

Prepayment Behavior Near the First Coupon Reset

With more data becoming available on resetting hybrids, it is easier to make inferences on prepayment speeds around resets. As the left panel of Figure 5 depicts, the 1992 origination 5x1s jumped from 20% CPR to about 40% CPR as the coupon reset from 7.25% to 8.5% in mid-1997, when 30-year mortgage rates were close to 7.5% (by comparison, 1992 FNMA 8s, with WACs around 8.50%, were prepaying at about 14% CPR during this time). The speeds trended down thereafter even though mortgage rates continued to fall, indicating that a coupon reset by itself can have a significant impact on hybrid speeds.

What about after the first reset? Will 3x1s and 5x1s behave like one-year ARMs after the first reset? As the right panel of Figure 5 indicates, speeds did converge somewhat after the reset between the 3x1 and the one-year ARM, but 5x1s remained distinctly lower. While the speeds of 3x1 and 1-year ARMs in 1998 may have been driven by the refinancing waves, recent data suggest there is some convergence in their speeds.

Figure 5. FNMA Hybrid Speeds: 5x1 6.5% Speeds for Various Originations and 6.5% ARM Speeds Around Reset



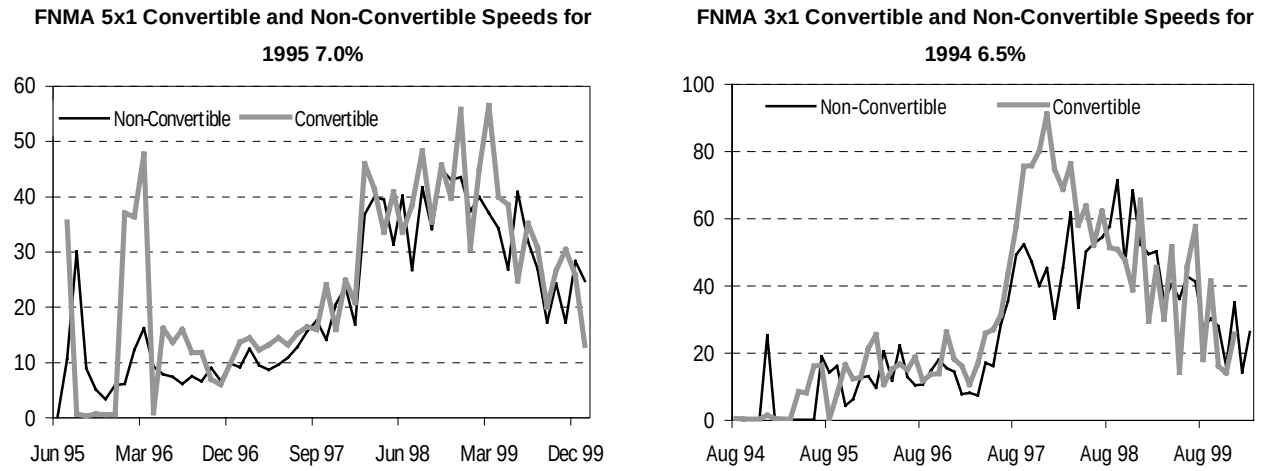
Source: Salomon Smith Barney.

Convertibility Makes a Difference

Figure 6 shows that convertible speeds in general are a little faster within the convertibility window. Moreover, the convertibility effect can be accentuated close to a reset or during a refinancing wave, as shown in the right panel for the 3x1.

These observations describe general patterns in hybrid ARM speeds. Investors should keep in mind that specific pools can depart from the average based on the geographical distribution of the loans, issuer profiles, WAC and margin dispersion, and so on.

Figure 6. FNMA Hybrid Speeds: 5x1 Convertible and Noncovertible Speeds for 1995 7.0% and 3X1 Convertible and Nonconvertible Speeds for 1994 6.5%



Source: Salomon Smith Barney.

III. Projecting Speeds on Hybrids

The Salomon Smith Barney prepayment modeling framework assumes that speeds result from four causes, namely **housing turnover**, **refinancings**, **defaults**, and **curtailment/payoffs**, with separate models for each of these components.[1] ARMs are handled within this general framework. However, in the refinancing component, we make a distinction between **ARM-to-fixed refinancers** and **ARM-to-ARM refinancers**.[2] ARM-to-fixed refinancers are the traditional ARM borrowers, who choose an ARM to obtain the lowest monthly payments but who plan either to sell the house before too long (i.e., have a short tenure horizon) or to refinance eventually and lock in the security of a long-term fixed-rate loan. Hence, refinancing decisions are driven by the level of long-term fixed mortgage rates. The second group represents a more recent development: aggressive refinancers who take out a **teasered** ARM (that is, one with an initial below-market coupon) and then refinance into another teasered ARM as soon as the coupon starts to reset upward. In this case, refinancing decisions are driven by the level of short-term rates. Thus, the refinancing incentive is based on different mortgage rates for the two types of borrowers.[3]

Hybrid ARM borrowers have characteristics of both ARM and fixed-rate borrowers, although one would expect most aggressive ARM-to-ARM refinancers (the so-called "teaser junkies") to opt for a one-year ARM. In fact, as indicated by the analysis of hybrid speeds in the previous section, the longer the first reset, the closer the hybrid's prepayment behavior to a fixed-rate MBS.

Based on the empirical analysis discussed earlier, in the **housing turnover** component of the model, a **high relative mobility** and **fast seasoning** is assumed, reflecting the shorter tenure horizons of many ARM borrowers.[4] However, the longer the first reset, the lower the relative mobility factor.

Refinancing Model for Hybrids

This component has several distinctive features.

Effective WAC

Because the loan coupon is not fixed for the term of the security but will eventually reset until it is fully indexed, a weighted average of the coupon path going forward — the **effective WAC** — is calculated assuming unchanged rates (it can be thought of as a blend of the current WAC and the fully indexed rate to which the ARM will

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[1] A detailed discussion of the general approach and of each of the components can be found in *Anatomy of Prepayments*, Lakhbir Hayre, Sharad Chaudhary, and Robert Young, Salomon Smith Barney, April 2000.

[2] Each type has the usual mix of slow and fast refinancers.

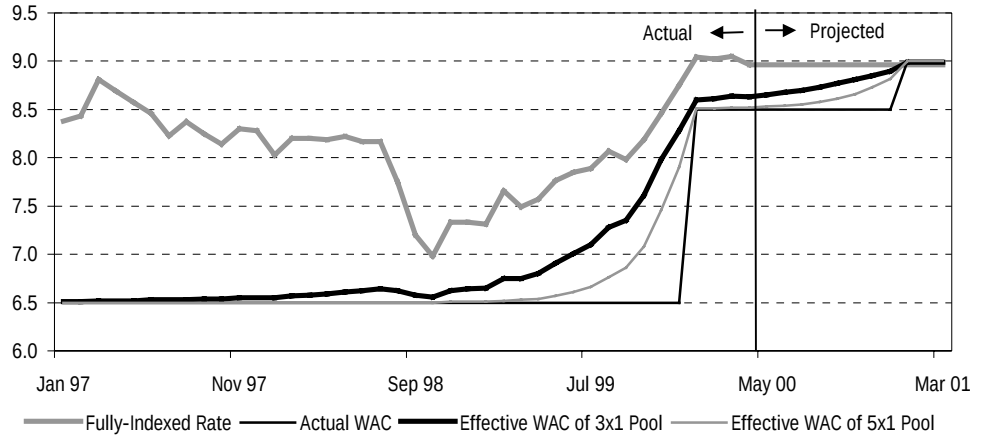
[3] For a description of the ARM prepayment model, see *Bond Market Roundup:Strategy*, Lakhbir Hayre and Debashis Bhattacharya, Salomon Smith Barney, May 16, 1997.

[4] In fact, many borrowers choose a hybrid as an alternative to a balloon mortgage, and the growth of the hybrid market has come at the expense of balloons.

eventually reset). The effective WAC is then compared with mortgage rates (in the same way as for the fixed-rate model) to obtain the refinancing incentive for ARM-to-fixed refinancings.

Figure 7 shows examples of effective WACs for 3x1 and 5x1 hybrids with similar coupons and similar months-to-first roll. Because of our assumption that the shorter the initial reset, the greater the sensitivity to coupon resets, the effective WAC for the 3x1 rises more sharply near the coupon reset date.

Figure 7. 3x1 and 5x1 Hybrid: Effective WACs, Jan 97–Apr 00 (Actual) and May 00–Mar 01 (Projected)



Note: For illustration, we have chosen a 3x1 pool (originated in Jan 00) and a 5x1 pool (originated in Jan 98), both with an original WAC of 6.5%.
Source: Salomon Smith Barney.

ARM-to-ARM Refinancings

This component captures the part of refinancing attributed to **opportunistic** ARM borrowers who would refinance into another teasered ARM. The refinancing incentive is captured by the difference in WACs between the ARM in question and a new teasered ARM, until their WACs converge to the fully-indexed rate. (The analysis is done for the unchanged and the +/- 100bp shift scenarios and an average value is calculated).

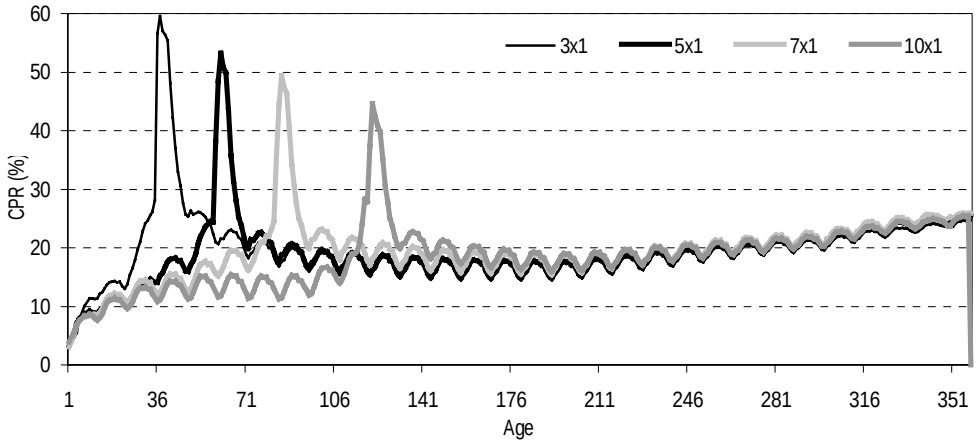
As indicated earlier, hybrids are assumed to have fewer opportunistic borrowers than one-year ARMs and, hence, to have a lower proportion of ARM-to-ARM refinancings. The proportion of ARM-to-ARM refinancing decreases with longer resets, because borrowers are assumed to become more risk-averse.

Projected Spike Around Coupon Resets

We assume a heightened sensitivity to refinancing opportunities into fixed-rate loans near coupon resets, because many borrowers will be anxious to lock in a fixed rate. In particular, at and around the first coupon reset, which may result in a sharp increase in the coupon because of the “teaser” nature of the initial coupon, there tends to be an extra spurt in refinancing activity.

Analogous to how the media effect captures the effect of sharp drops in interest rates,[5] the hybrid ARM model captures the effect of sharp changes in WACs around resets. This effect is most pronounced for the first reset (when most teaser ARMs reset up), for WACs that move from below the 30-year mortgage rate to above this rate, and for products with shorter initial resets. The longer the period to the the first reset, the lower this spike, because of the assumption that pools with longer first resets include fewer aggressive ARM refinancers. Figure 8 shows projected speeds around resets for different hybrid products. For 3x1 hybrids, for example, speeds are projected to increase to about 20% to 25% CPR by age 30 months and then spike to about 50% to 60% CPR after month 36, before declining back to about 20% CPR by about month 50. The spikes become less pronounced the longer the period to the first reset.

Figure 8. New Hybrid ARMS — Projected Speeds (Gross Coupon: 7.25%; Gross Margin: 300bp; Age: 4 Months)

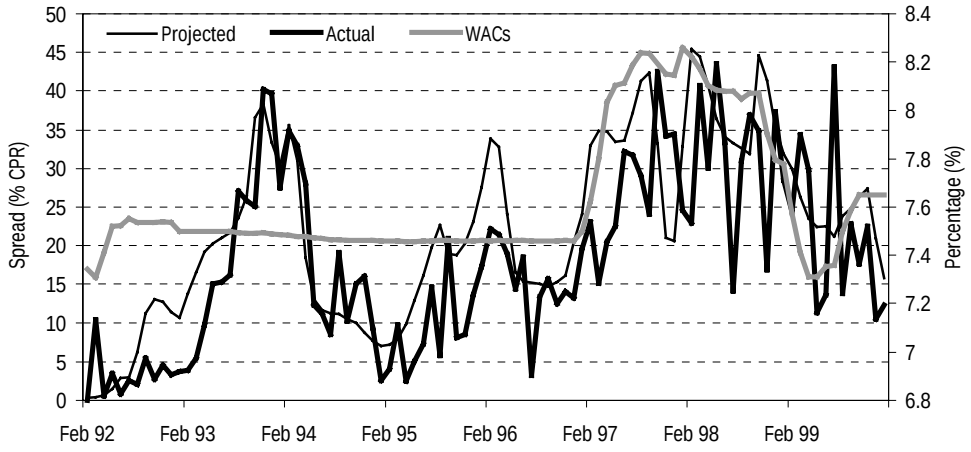


Source: Salomon Smith Barney.

Figure 9 shows actual and projected speeds for 1992 6.5% 5x1 hybrids, which had their first reset in 1997.

[5] See *Anatomy of Prepayments.*

Figure 9. Actual Versus Projected Speeds for 1992 6.5% 5X1 Hybrids, Feb 92–May 00

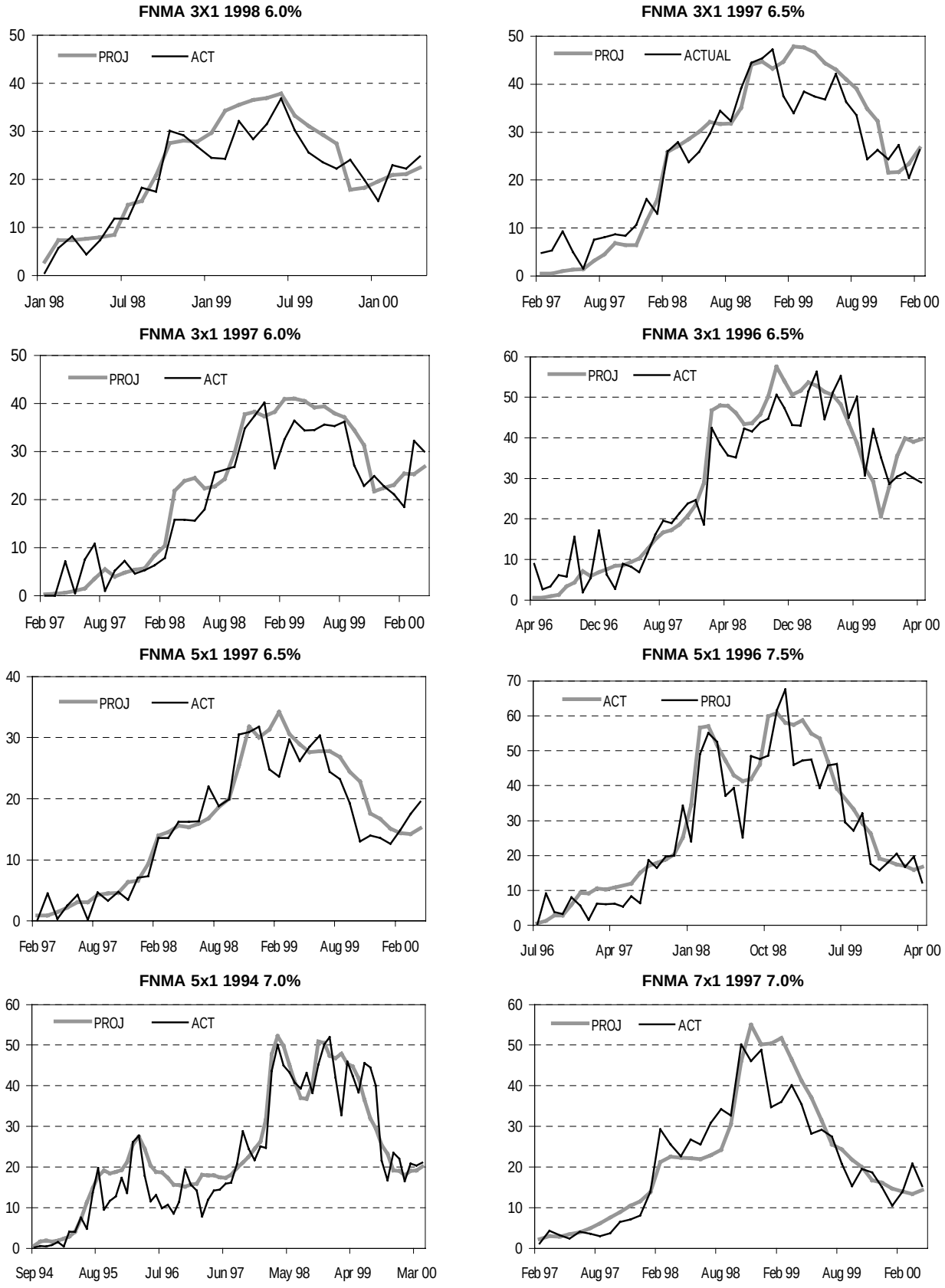


Source: Salomon Smith Barney.

There was an initial burst of refinancing activity in late 1993 and early 1994, when mortgage rates fell to multi-year lows. Another burst in refinancings came in the middle of 1997, illustrating the impact of the first coupon reset. Even though mortgage rates were relatively high around this time, many borrowers still chose to refinance. The spikes in 1998 reflected the interest rate rallies that year. The model has tracked speeds quite well, both during the fixed coupon period (before the first reset) and after the first reset, when the loans became one-year ARMs.

Figure 10 shows more graphs of actual and projected speeds, illustrating that the model, on average, has tracked speeds reasonably well.

Figure 10. Selected Coupons and Vintages: Actual and Projected Speeds



Source: Salomon Smith Barney.

IV. Investment Characteristics

Hybrid ARMs have traditionally been compared to balloon fixed-rate MBSs. For example, a 5x1 hybrid with an initial coupon of 7% would be compared to a 7% five-year balloon MBS, assuming some terminal exit price for the hybrid. This method is obviously simplistic, but provides a yardstick for investors when there are limited prepayment data and, hence, limited confidence in hybrid prepayment models. With hybrid prepayment modeling coming of age, we feel that OAS-based methods provide more accurate and meaningful valuation measures. We describe both methodologies.

Exit Price and Comparison to Balloons

The market convention has been to compare hybrid ARMs to balloons. To value the hybrid, a balloon payment is assumed at the first reset date, with a put price of 100 or 101. Figure 11 shows such a comparison, assuming an exit price of par for the hybrid and a constant 15% CPR prepayment assumption for both securities.[6]

Figure 11. 5x1 Hybrid Versus Gold Five-Year Balloon, as of 18 Apr 00

Pool	Coupon	WAC	Age	MTR (Balloon)	Current Price	Speed (CPR)	Exit Price	YTM
5x1 (N530552)	7.0	7.5	1	59	99-10	15 %	100	7.51
Balloon	7.0	7.5	1	59	99-28	15	—	7.05

Source: Salomon Smith Barney.

An exit price assumption of par (commonly known as par-to-put) was commonly used, but it is conservative and essentially equivalent to assuming that the entire hybrid pays down by the first reset. Over time, exit price assumptions have become more realistic, because it has become clear that hybrids do not completely pay down by the first reset. Figure 12 shows current factors for several hybrid vintages.

Figure 12. Factors for Selected Hybrid Vintages, as of Mar 00

Product	Origination Year	Factor
3x1 Non-Convertible	1997	0.47
	1996	0.27
3x1 Convertible	1997	0.49
	1996	0.26
5x1 Non-Convertible	1995	0.35
	1994	0.26
5x1 Convertible	1995	0.29
	1994	0.42

Source: Salomon Smith Barney.

[6] In an oversimplified sense, the hybrid price can be decomposed as follows: ***hybrid*** *= cash flow for five years + residual [exit price* factor at five years*discount]* and ***balloon*** *= cash flow for five years + par*factor at five years*discount*. Therefore, ***hybrid*** *=* ***balloon*** *+ factor*(exit price – par) * discount*, assuming the cash flows over the five years from the hybrid and the balloon (and hence, the factors) are similar. Consequently, the hybrid is **worth at least** as much as the balloon with either an assumption of exit price = par, or factor = 0. For example, in this example at a factor of 0.44 and exit price of 101 the hybrid is approximately worth 99 – 28 + 0.44 * (101 - 100) * 0.70 = 100-06, whereas it is priced at 99-10.

Even though hybrid speeds can approach 60% CPR near the first coupon reset date, in general a par price for a fully-indexed coupon is not justified unless the yield curve is unusually steep or discount margins are unusually wide. For example, the hybrid pool in Figure 11 would reset to a coupon of 8.14% [6.04% (current one-year CMT) + 2.15% (net margin)] for an unchanged one-year CMT rate. Even at a vector of 60% CPR for the first two years followed by a 15% CPR for the remaining term, the discount margin would have to be about 200bp, or 50bp wider than typical TBA hybrids and 40bp wider than fully-indexed hybrids or one-year conventional ARMs, to justify a par price.

Without a concrete understanding of possible exit prices and pay-downs under various scenarios, it is difficult to judge the value of a hybrid. Given a reliable prepayment model, OAS analysis allows a more meaningful valuation.

OAS Analysis of Hybrid ARMs

Figure 13 shows an OAS analysis for a 5x1 hybrid pool.

Figure 13. 5x1 Hybrid FNMA Pool N530552: OAS Analysis, as of 18 Apr 00

				Projected CPR			Opt.	Eff.	Eff.
Coupon	WAC	WAM	Price	1-Yr.	LT	OAS	Cost	Dur.	Conv.
7.0%	7.50%	29-11	99-10	7.0%	16.0%	93	25	2.90	-0.72

Note: Pool has a net margin of 214bp, gross margin of 275bp, life cap of 13.00%, periodic caps of 2%, and 59 months to first reset. Index is 6.04%. Source: Salomon Brothers Inc.

The OAS shown in Figure 13 is about 30bp–40bp higher than that for a comparable balloon MBS. Is the hybrid really worth this much more than the balloon MBS? A simple way of justifying the OAS valuation is to relate it to the traditional exit price approach. At the first reset date, in 59 months, assuming unchanged rates, the hybrid will reset to a fully indexed coupon equal to the one-year Treasury rate plus the net margin 2.14%, or (6.04% + 2.14%), which is 8.18%. This implies that since the hybrid is priced at 99-10 now, it will be worth even more after its first reset (depending on prepayments). In contrast, a five-year balloon will return principal at par after five years and is expected to have faster speeds in the interim.

Sensitivity to Prepayment Assumptions

One possible reason for the cheapness of hybrids relative to balloons is prepayment uncertainty, especially around the first coupon reset date. Although there is now at least five years worth of meaningful prepayment data on hybrids and our prepayment model tracks hybrid speeds reasonably well (see "Projecting Speeds on Hybrids"), it is still a useful exercise to stress test the results by using different prepayment assumptions.[7] Our model projects that speeds will spike to about 52% CPR around the first reset. Figure 14 shows the effect on the OAS of hybrid pool 530552 if speeds are assumed to spike much higher after the first reset than assumed by our base model. For the "fast" model, speeds spike to about 60.5% CPR after the first reset, while for the "faster" model speeds peak at about 68% CPR.

[7] In fact, this should be done for any MBS, regardless of how much data there are and how accurate the model has been in the past.

Figure 14. 5x1 Hybrid FNMA Pool 530552: Prepayment Sensitivity, as of 18 Apr 00

	Projected CPR				Option	Eff.	Eff.
	Peak (%)	LT (%)	Price	OAS (bp)	Cost	Dur. (Yrs)	Conv.
Base Model	52.0	16.0	99-10	93	25	2.9	-0.72
Fast Model	60.5	18.8	99-10	84	27	2.7	-0.74
Faster Model	68.0	21.2	99-10	78	28	2.6	-0.76

Note: The peak speed refers to the maximum projected speed after the first reset date (59 months from now). The long-term speed is the WAL-equivalent CPR of the vector of projected speeds from now until maturity.
Source: Salomon Brothers Inc.

The pool loses OAS for faster projected speeds, but even under a fairly severe assumption of speeds close to 70% CPR around the first reset, the OAS is still 15bp-20bp higher than those currently offered by balloons.

Returning to the exit price approach, we show in Figure 15 the price of the hybrid pool just after the first reset date (i.e., 59 months from now, when the ARM is seasoned five years), assuming unchanged interest rates and an unchanged OAS. We use the base model and the faster models defined above.

Figure 15. 5x1 Hybrid Pool N530552: Exit Price After First Coupon Reset, as of 18 Apr 00

	Coupon (%)	WAC (%)	WAM	Projected Peak (%)	CPR 1-Year (%)	LT (%)	OAS (bp)	Price
Base Model	8.18	9.6	24-10	52.0	37.9	24.0	93	102.50
Fast Model	8.18	9.6	24-10	60.5	43.3	30.6	93	102.01
Faster Model	8.18	9.6	24-10	68.0	52.0	37.4	93	101.70

Note: Pool has 11 months to roll. Index value is 6.04%.
Source: Salomon Brothers Inc.

Even under fairly severe prepayment assumptions, the price of the hybrid ARM is still projected to be close to 102, higher than the 100 or 101 put prices typically assumed by market convention when valuing hybrids.

One caveat: the price of the hybrid is higher than what would be projected for a fixed-rate MBS with a comparable coupon. This is because the option cost of the hybrid ARM is much lower. While the hybrid is assumed to have speeds comparable to fixed-rate MBSs if rates decline, it is assumed to slow down less if rates rise, with long-term speeds still in double digits even if rates rise several 100bp. While this can be justified by the double-digit speeds on conventional ARMs in the late 1980s — when mortgage rates exceeded 10% — it is an assumption of which investors need to be aware.

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