ANDREW DAVIDSON & Co., INC. the Pipeline

AD&Co News – Sep 08

By Rob Landauer

While the credit markets continue to provide unprecedented volatility and unrelenting distress for market participants, AD&Co has been hard at work refining our product suite and services to help our clients and friends navigate these treacherous times.

Over the summer, we announced that our LoanDynamics™ Model (LDM) has been fully integrated into the INTEX*desktop*™ product to provide a seamless credit solution for structured securities. To illustrate the ease of use and analytical firepower of LDM through INTEXdesktop, we have scheduled two webinars which will demonstrate the step by step approach. These webinars will be held on September 23rd and October 28th from 12-1 pm EST. Registration is limited and is on a first come first served basis. Registration is available online through our website or by clicking here.

We continue to refine, update and provide better documentation for our LoanDynamics™ Model. In August, we released v1.7.1b of the Model. This release enhanced the model's treatment of Option ARMs and added several other significant enhancements which are detailed in the Release Notes (password protected) on our website. Further, last week, we released new official tuning recommendations for LDM and the validation and support of these tunings. The recommendations and validation report are both available on our website (password protected). Also, we are working on a new detailed issue of *Quantitative Perspective* on LDM which should be available in early Fall.

Throughout 2008, we have been working with several clients to provide them with an independent third party valuation of their non-agency MBS holdings. These engagements have provided auditors and risk managers with guidance on accounting for Other Than Temporarily Impaired (OTTI) securities, as well as insight into the intrinsic value of these securities. We have developed a process that provides for quick turn around on these engagements and we are here to help if this is an issue for your firm. Please contact Rob Landauer for additional information.

Heading to ABS East (Oct 19-22nd in Hollywood, FL)? Look for the AD&Co Booth in the Exhibit Hall and don't miss Andrew Davidson present **OTTI: Assessing Impairment using Credit Models** on Sunday, October 19th on Track C at 5:00p or Anne Ching on the **Credit Analytics for ABS Investors** panel on Sunday, October 19th at 4:15 on Track B.

Most importantly, please know that AD&Co is here to help in any way we can. Just give us a call and together we can figure out solutions to your concerns and problems.

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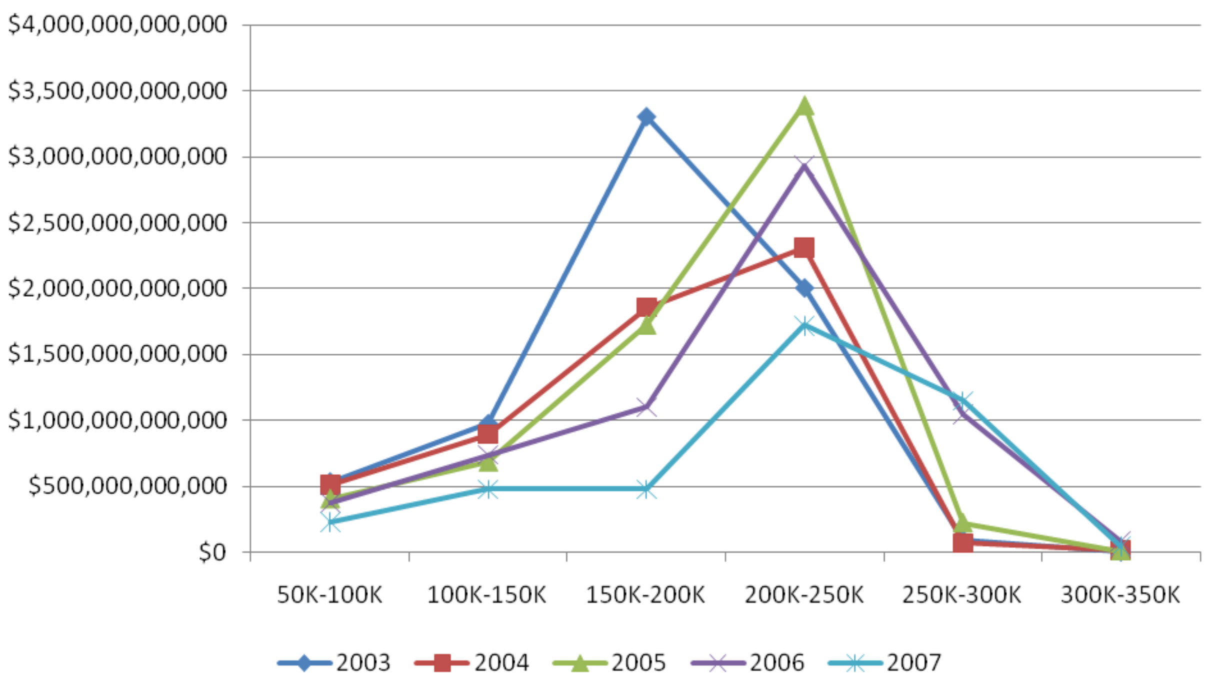
Prepayment Update – Sep 08

Agency MBS Performance Report

By Dan Szakallas

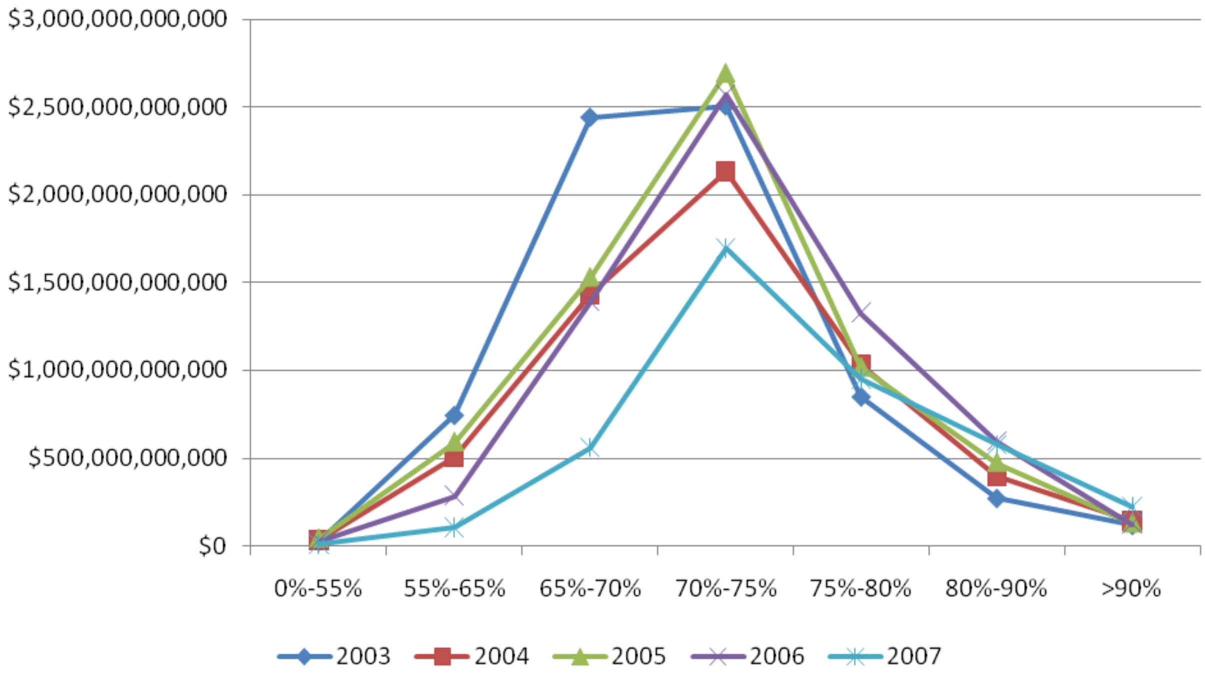
This month, we take a look at how Agency MBS of different vintages have been performing across pool attributes. Specifically, we look at FNMA 30YR pools of 2003-2007 vintage and at average monthly prepayment speeds across the coupon stack of 4.0-7.0. The weighted-average pool attributes we focus on are Loan Size, FICO score and LTV. We've divided the data into buckets for easier graphical analysis. We find some interesting trends. First, we show the outstanding pool balances of the different buckets.

WEIGHTED AVERAGE ORIGINAL LOAN SIZE



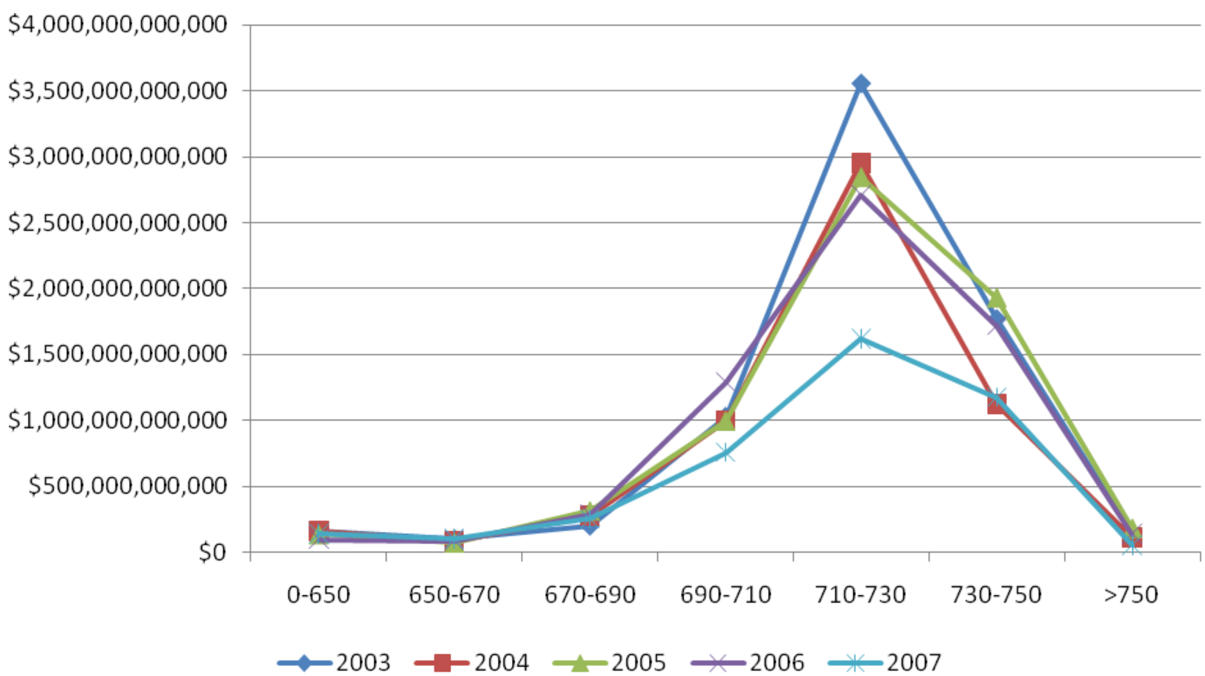
It is evident from this chart that the average loan size of FNMA 30YR pools has increased from 2003 through 2007, most noticeably by the increase in the $250-300K bucket for both 2006 and 2007 vintages.

WEIGHTED AVERAGE LTV



In contrast to loan size, LTV seems to have stayed pretty much the same from year to year, with the concentration lying in the 70%-75% bucked for all 5 years studied. Notice the slight rise in the 80%-90% bucket for 2006 and 2007 vintages.

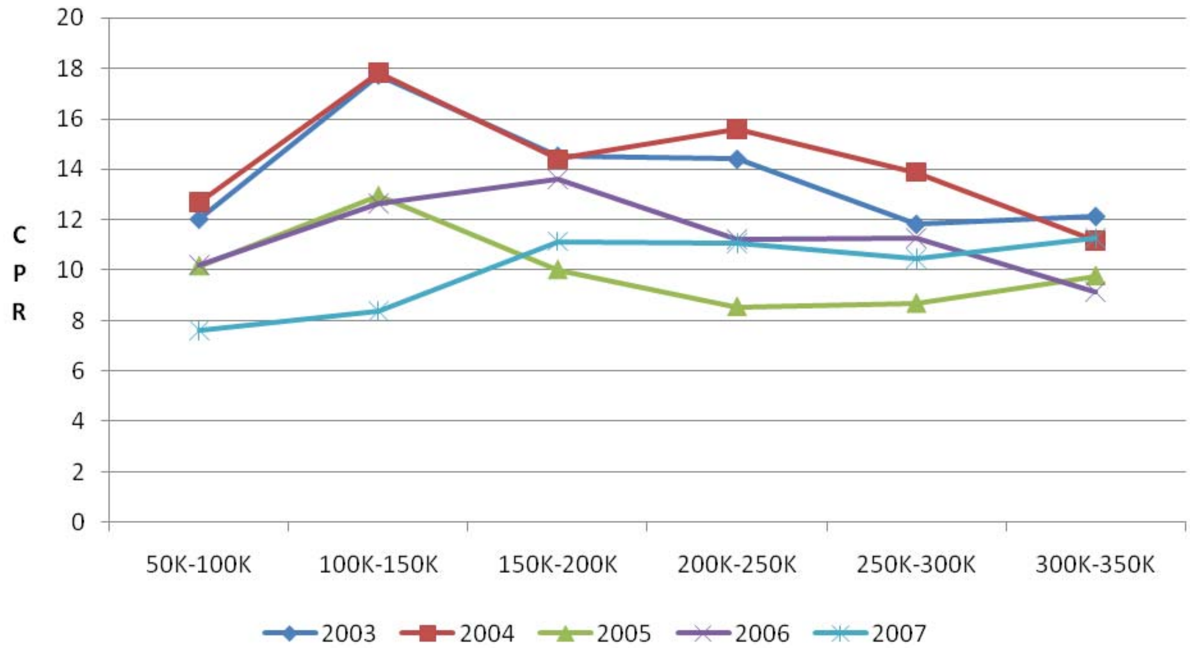
WEIGHTED AVERAGE FICO



When looking at average FICO scores, we see even less change than in the LTV graph, with the 710-730 bucket dominating the balance. Not much of a surprise here, as Agency pools are made up of very credit-worthy borrowers.

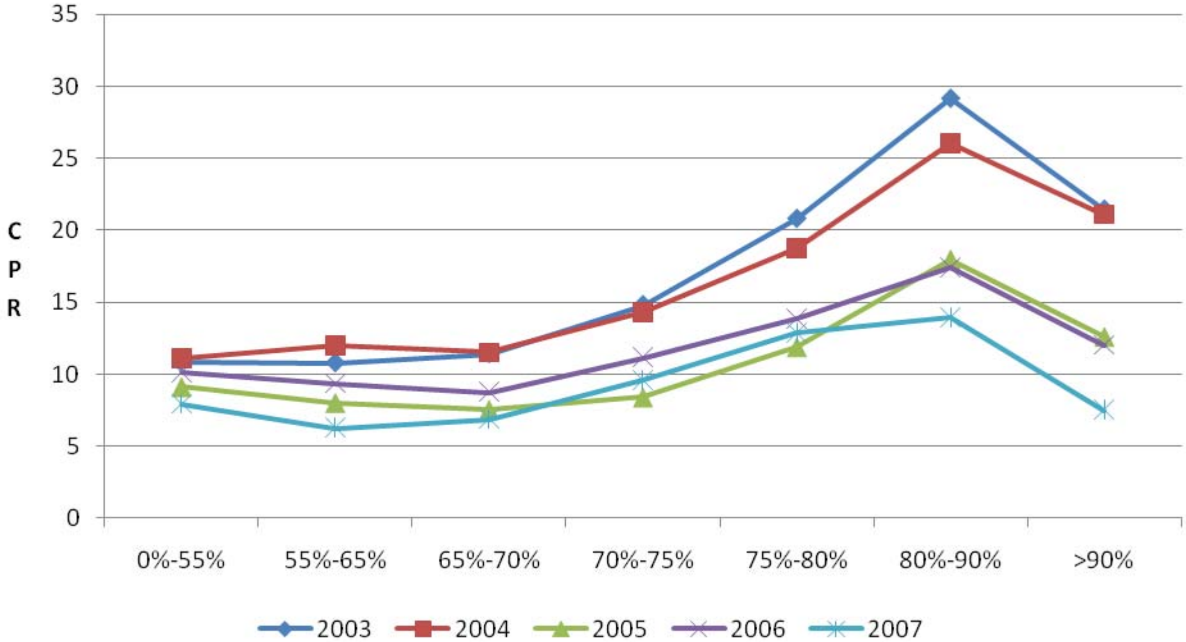
Next we show the average monthly prepayments over the last few years for these vintages across these same pool attributes.

WEIGHTED AVERAGE ORIGINAL LOAN SIZE



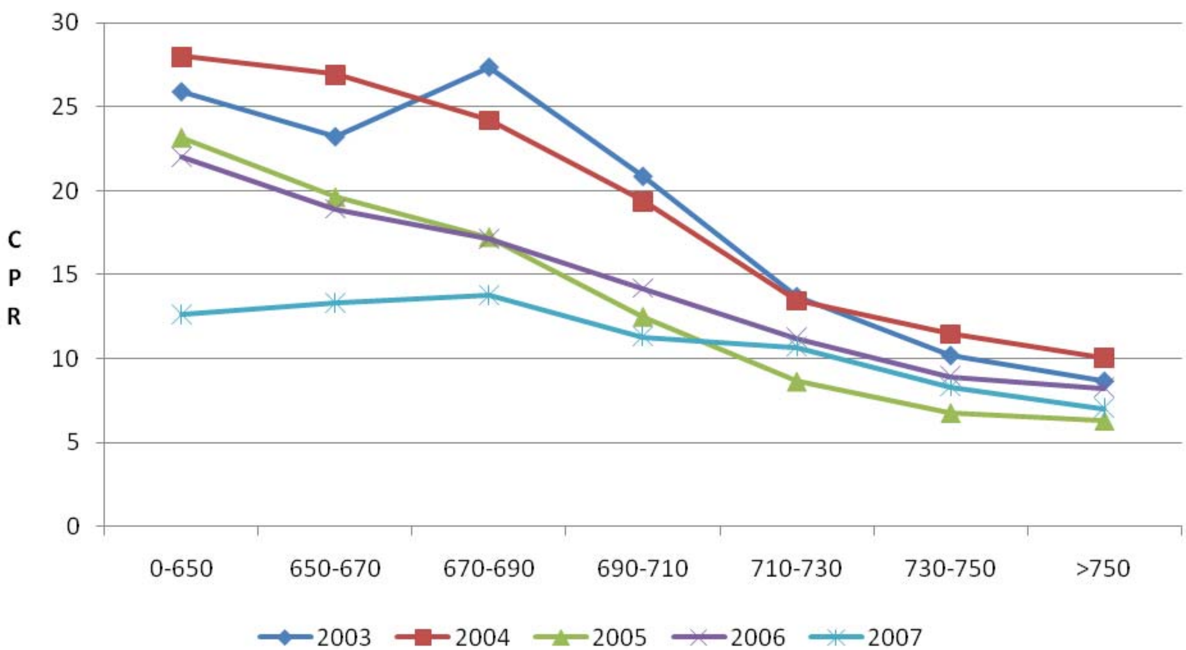
What's interesting about this chart is that for older vintages, the higher balance buckets show a noticeable downward trend from the 200K-250K bucket, but for the 2007 vintage, the trend is reversed.

WEIGHTED AVERAGE LTV



In contrast to the Average Loan Size graph, we see that the general trend has not changed across vintages, although speeds for the 2007 are noticeably slower for the higher LTV buckets, reflecting the tightened lending standards that are a result of the credit crisis.

WEIGHTED AVERAGE FICO



This chart clearly shows the fallout of the credit crisis. The lower FICO buckets in the older vintages show much more refinancibility as borrower's who made steady payments were offered refinancing by their lenders. This has not been the case for the 2007 vintage, as lenders are not as willing to offer new loan packages to those borrowers whose FICO's remain below 710. We also show the idea of “credit cure” from this chart, as the highest prepaying buckets have the lowest credit scores.

Please contact Dan Szakallas (dans@ad-co.com) with any questions or comments regarding this data.

Valuation Commentary – Sep 08

AD&Co's Home Price Simulator

By Alex Levin

A home price index, along with interest rates, is the key risk factor employed by AD&Co's Credit OAS analytics. It is generated by the Home Price Appreciation (HPA) Simulator, a stochastic process programmed in adco_HPI.dll and distributed with RiskProfiler™, the OAS 8 library package, or as a stand-alone module. Currently, several clients license it and we have more prospects who have requested a trial version. Since the model was originally developed in 2006, we added two important tunings and have recently designed an Excel demo that depicts its work. This article describes the ways our HPA model should be employed and tuned for applications seeking to value MBS and mortgage derivatives (such as CDS and mortgage insurance) subject to credit risk.

Summary of the Model

The AD&Co HPA model was introduced at the 2006 AD&Co Conference, and in several *Pipeline* articles. Most recently, we included a brief description of the model in the paper by Levin and Davidson [2008]. AD&Co's HPA model is a non-econometric stochastic simulator. It captures a home price volatility pattern and its relationship to interest rates in a way that is consistent with empirical evidence. With the exception of interest rates, it does not relate future home price to economic factors (which need forecasting themselves). Since the purpose of a stochastic simulator is to randomize the world, it relies heavily on the input description of the baseline HPA.

The HPA model was built using a dynamic asset model as a prototype. Let us assume that a home price index (HPI) is analogous to a stock or a stock index. It is random, but continuous; its return rate contains a systematic component (drift) and white noise (volatility). Hence, we start with modeling the HPI return rate, i.e. the HPA, rather than the HPI itself.

This systematic portion of the HPA is continuous; in addition, HPA features volatility, which we term "jumps." Note that this is a practical term that is simply used to describe white noise observed in discrete time and is mathematically unrelated to the Poisson jumps with random arrival. We can postulate that the US HPA rate can be generated by a dynamic stochastic model that includes 3 main components: the interest rate component pointing to the housing affordability, "diffusion" linked to other economic factors, and "jumps" associated with the immediate house price volatility. More formally, in continuous time,

$$HPA(t) = HPA_\infty + \underbrace{k[R_\infty - R(t)]}_{\text{housing affordability}} + \underbrace{D(t)}_{\text{diffusion}} + \underbrace{\sigma_{HPA} w_{HPA}(t)}_{\text{white noise (normal jumps)}} \qquad (1)$$

In (1), *R* is the key interest rate (like and MBS current coupon or a 10-yr rate), *k* and σ_{HPA} are positive constants; HPA_∞ and R_∞ are the historical averages for *HPA* and *R*, correspondingly.

For each *HPA*(*t*) scenario, *HPI*(*t*) is computed as $HPI(t) = HPI(0)\exp[\int_0^t HPA(\tau)d\tau]$. Model (1) includes a random disturbance, i.e. the white noise W_{HPA}, and a continuous random process $D(t)$. In our current model, $D(t)$ is a simple single-dimensional linear mean-reverting process:

$$dD(t) = a[D_\infty - D(t)]dt + \sigma_D W_D(t)dt\,, \qquad D(0) = D_0 \tag{2}$$

(Note that, in stochastic calculus, *Wdt* is often denoted as *dZ* – Brownian motion increment). A more complex and rigorous version would be a two-dimensional oscillator, linear or non-linear. An oscillatory behavior lets us view $D(t)$ as a realistic demand-supply imbalance that rises when demand exceeds supply and falls otherwise. In the single-factor case, the initial condition is just D_0, but, in the two-dimensional version, both D_0 and the first derivative $\dot{D}_0$ are necessary to initialize the process, which allows us to capture both the forming of and the bursting of a housing bubble, to some extent.

Our HPA model possesses some interesting properties. Each HPA measurement, no matter how often it is taken, contains a jump; hence the short-term uncertainty of HPA is σ_{HPA}. The short-term expectation is $HPA_\infty + k[R_\infty - R(0)] + D_0$; in particular, it is not equal to the previous HPA observation, which contains a jump. The long-term HPA uncertainty also includes standard deviations of interest rates and the diffusion term. The model purposely ignores an explicit dependence on economic factors other than interest rates. Should we decide to include these factors, we would have to model them too, but this task would be repetitive since we already introduce the "unnamed" forces: the white noises W_{HPA} and W_D.

We employ the Kalman filter algorithm to separate jump, diffusion and the interest rate components historically as well as to identify the model's optimal parameters. When applied retrospectively, the filter is able to estimate today's value D_0 for (i.e. "initialize") the diffusion term. Levin [2006] and Levin and Davidson [2008] show the three components of the HPA in historical retrospective, going back to 1989.

Because the diffusion term is mean reverting, AD&Co's HPI model is not a real world martingale. In particular, it is capable of explaining the inertial effect of both deficient and excessive housing stock. The diffusion term traces the formation of a housing price "bubble" and its burst (the diffusion term picked up in 2004-05 and fell rapidly in 2007). However, the mean reverting model always predicts HPA recovery.

Two Key HPA Tunings and Their Applications

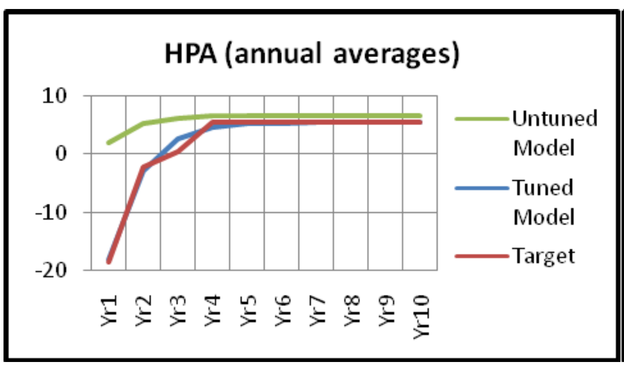
With properly selected parameters, the model captures well both the overall HPA volatility and its relationship to interest rates. We also like to view both D_0 and D_∞ as convenient tuning parameters as well as factors of risk. By altering them one can change the short-term dynamics and the long-term level of HPA, respectively. If we change D_0 by 1 unit, we will alter each path of $HPA(t)$ by exp(-*at*) where *a* is the mean reversion constant in (2). This is the same add-on for all paths; it starts at 1 and ends at 0. In contrast, a change D_∞ by 1 unit will alter each path by 1 - exp(-*at*), i.e. an amount starting at 0 and ending at 1. Hence, changing D_0 and D_∞ by the same amount is equivalent to simply shifting each path by that amount, which is equivalent to shifting HPA_∞.

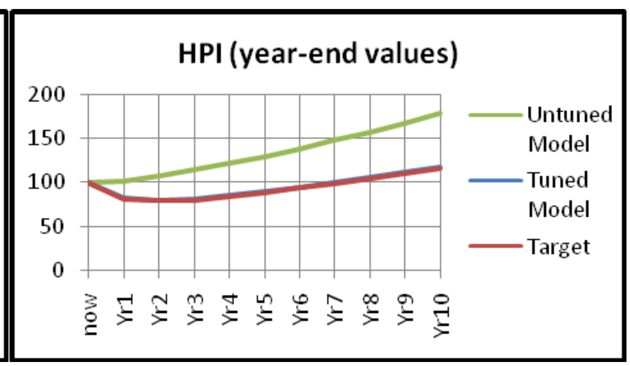
The use of two tunings, D_0 and D_∞ is crucial for measuring the HPI exposure of MBS/ABS or for altering the HPA simulator in such a way that it matches a desired baseline forecast. In particular, we can employ this method to achieve some replication of HPA risk-neutrality as Levin and Davidson [2008] explain. Below we describe this and other applications of the HPA model tunings.

Matching an HPA baseline target. Let us assume that we would like to alter the HPA modeled process so it approximates the implied RPX forward curve. This is the curve one can bootstrap from the "total return swap" on the RPX home price index traded by ICAP. We may view this as evidence of a risk-neutral HPA condition that can be employed for the valuation of credit risk embedded in MBS. In essence, we are trying to achieve the same goals as with no-arbitrage term structure models: plug-in market quotes for related instruments and alter the model so it reproduces values for these instruments (in our case – approximately).

Exhibit 1 depicts three lines: the RPX forward ("Target"), the unturned HPA base line, and the tuned one, all for July 1, 2008. The long-term tuning was found to be negative 1.1% whereas the short-term tuning came out as negative 30.8%; with these values, the long-term RPX and the current-to-trough drop are matched exactly.

Exhibit 1. Baseline HPA/HPI vectors, before and after optimal tuning





As shown, the tuned HPA line approximates the RPX forward curve quite fairly whereas their respective integrals (i.e. HPIs) come out extremely close to one another. Similarly, one can approximate a targeted empirical HPA forecast produced by an internal analyst, an outside consultant or, say, from economy.com.

Geographic adjustments. The HPA Simulator produces only one variable, the national HPA. This leads to a question: How should we apply this tool to an MBS or ABS with a known geographic distribution of underlying loans? The simplest practical approach would require us to formulate separate baseline HPAs in California, Florida, Arizona, Nevada, on one hand, and the rest of the US on the other. We then would weigh these forecasts by the pool's presence in those states. Naturally, MBS with a larger-than-average presence in CA and FL may be analyzed under worse-than-average HPA assumptions.

MBS shelf adjustments. Comparison of the OFHEO home price indices to the Case-Shiller (CS) indices suggests that the credit quality of loans materially affects the observed home price decline. A recent OFHEO paper written by A. Leventis [2008], shows that borrower characteristics such as FICO, LTV and debt-to-income (DI) affect home value dynamics. Namely, factors pointing to weaker credit are also associated with stronger home price decline. A. Leventis considers several plausible explanations; among them are:

- the disproportionate presence of distressed sales (foreclosures)
- inability and lack of willingness to maintain home quality
- inflated purchase price due to fraud or misperception

When performing credit studies for clients, AD&Co uses 3 short-term HPA tuning tiers that differ by several percentage points: "prime," "Alt-A," and "subprime."

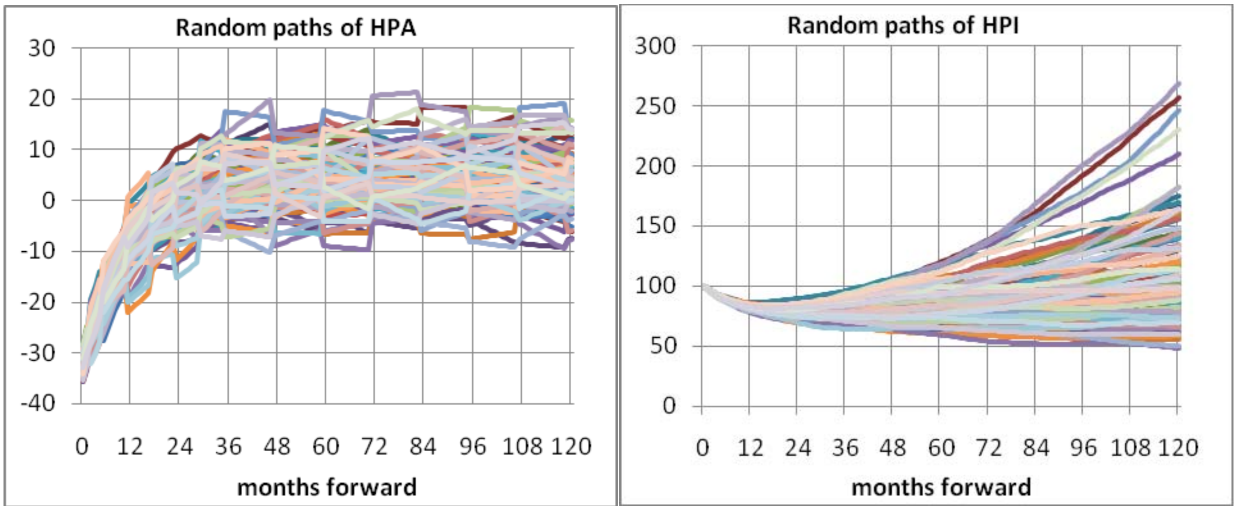
Using tunings as risk factors. The MBS/ABS value is exposed to home prices; hence, we can employ the short-term tuning and the long-term tuning as risk factors. In doing so, we follow the common standard for measuring "duration." For example, an HPA Tuning Duration of negative 1 year means that the MBS will gain 1% of its value if we add 1% to the HPA tuning.

HPA tuning Greeks are important measures for hedging the home price risk embedded in MBS and ABS. For example, when analyzing the CW0708 sub-prime deal, we found that the collateral losses and their Greeks generally agree with the option theory. The HPI convexity of losses is positive (default is an option!), but becomes close to zero for bad loans and bad home price scenarios (i.e. with a deep in the money default option). The duration of losses to the long-term HPI rate is found to be about 5 – 10 years; exposure to the short-term HPI rate is about 2 – 3 times smaller. Note that the duration of losses can be expressed relative to the value of the collateral (it will measure up to 0.75 yr for the same deal) rather than the value of losses. MBS and ABS tranches can lever these exposures materially; some mezzanine and junior bonds of sub-prime deals are extremely exposed to the HPA. Knowing these Greeks, a risk manager can Delta-hedge using other HPA-linked instruments such as property derivatives (RPX swaps or CS futures).

Visualizing the HPA simulations

AD&Co's Excel Demo tool allows you to depict generated HPA and HPI paths, both random and deterministic (baseline). You can enter a set of interest rate scenarios (random or deterministic), set the two HPA tunings, and enable or mute white noises W_{HPA} and W_D used in the model. With these noises disabled, each HPA vector will become a completely deterministic function of a respective interest rate vector. For example, this mode can be used to compute HPA forward rates linked to interest rate forwards. With the noises enabled we can visualize the stochastic work of the HPA model as depicted in Exhibit 2.

Exhibit 2. 100 random paths of HPA and HPI generated by the tuned model



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