The Interaction of MBS Markets and Primary Mortgage Rates

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The U.S. mortgage market has emerged as one of the world's largest asset classes. According to Federal Reserve statistics, the total face value of 1–4 family residential mortgage debt outstanding was approximately $11.1 trillion as of the fourth quarter of 2007. For a variety of reasons such as product innovation, technological advancement, and demographic and cultural changes, the composition of the primary mortgage market has evolved at a rapid rate, with a host of new products being developed and marketed. Consequently, the mortgage-lending paradigm continues to be refined in ways that have allowed lenders to offer a large variety of products designed to appeal to consumer needs and tastes. This evolution has been facilitated by sophistication in pricing that has allowed for the quantification of the inherent risks in such loans.

Despite the importance of this market, a poorly understood phenomenon among participants in the various mortgage-backed securities (MBS) markets is the relationship between the total cost of consumer mortgage credit (in terms of both rates and fees) and conditions in the capital markets. As noted by Edelberg [2006]:

> "Overall, economists have much less of an understanding of the household's borrowing instruments than saving instruments. Extensive research has been done on how households choose savings portfolios, how returns on those portfolios are determined, and, in turn, what impact the portfolio returns have on the household. In contrast, much less is known about the borrowing portfolio even though roughly 70% of households hold debt. And, even less is understood about the determination of the interest rates on consumer loans, despite their importance in household decision-making."

Over the last few decades, the mortgage markets have become national in scope, diminishing the influence of local supply-and-demand conditions on consumer mortgage rates.[1] These changes reflect the increased importance of the capital markets in the loan funding and risk transfer process. Consequently, consumer borrowing rates have become directly linked with capital market rates and flows, as well as investor demand for the associated securities backed by these loans. In turn, mortgage originators have increasingly utilized the capital markets to fund their lending activities and channel the proceeds into the housing markets. Due to these influences, the determination of mortgage rates has become a complex interaction of market levels, risk-based analysis and pricing, securitization and credit enhancement costs, servicing valuations, and capital considerations. The importance of these factors grew with the proliferation of loan products between 2002 and 2006; the breakdown in some markets associated with the "credit crunch" that began in 2007 highlighted the links between capital market conditions and lending activity.

This article explains the complex links between the costs of residential mortgage credit and the pricing of capital market instruments. An understanding of the link between primary loan pricing and the capital markets is necessary for economists for the following reasons:

- The real estate markets have taken an increasingly important role in the macro economy, with home prices and homeowner equity a key component of consumer wealth. In turn, primary mortgage rates have a strong influence on the affordability of real estate. Therefore, an understanding of the factors that impact the pricing of mortgages at the consumer level will be increasingly important in forecasting economic performance over the next few years.
- Some of the recent weakness in residential real estate can be attributed to the recent erosion of liquidity in the capital markets. The collective struggles of the mortgage-backed securities markets and the mortgage lending industry kept primary rates relatively "sticky," in that they did not decline in concert with other interest rates. In fact, mortgage rates rose for "jumbo" loans, i.e., loans too large to qualify for inclusion in securities backed by either the GSEs or Ginnie Mae (collectively, "the agencies"). An understanding of how different types of loans are priced, and the factors driving this pricing, will be valuable to economists attempting to gauge the health of the housing markets.
- In a related development, some of the proposed solutions to the housing downturn attempted to assist home buyers and homeowners by expanding the types of loans eligible for inclusion in securities backed by the agencies. The Economic Stimulus Act of 2008, for example, temporarily increased the maximum balance of loans that can be purchased or guaranteed by the agencies. This action was taken in order to improve the availability, and lower the cost, of funds available to finance larger properties. As the pricing of "jumbo-conforming" loans will have a significant impact on the ultimate success of the legislation, economists should understand the factors influencing the rates offered to consumers on these new products.
- The generation of rates for borrowers applying for loans with non-standard credit attributes has, for a number of years, been generated through the paradigm of "risk-based pricing." The rate surcharge for borrowers seeking impaired loans is a function of both the absolute cost of credit and how that cost translates into rate terms. Observers attempting to gain perspective on the evolution of lending practices after 2004 will find a general understanding of this aspect of the loan-pricing process useful.

This article demonstrates how levels in the capital markets are translated into loan pricing, and how alternative execution options available to mortgage orginators/securitizers are weighed. It also explains the processes used to quantify various dimensions of credit risk. While there have been empirical studies that have examined the risk-based pricing of mortgage loans to investigate the risk premium of borrowers of different credit quality, the microeconomic models for establishing the risk premium based on the securitization process and the capital feedback have not entered into the analysis. The same can be said for the various theoretical models that seek to derive a relationship between differences in borrowing terms among consumers with different credit quality characteristics.[2]

SOME BASIC CONCEPTS

Before delving into this article's primary research focus, we will provide a review of the fundamentals of the mortgage and mortgage-backed securities markets. The concepts discussed here are used in the remainder of this article. Although our initial focus is on prime fixed-rate loans, later in this article we discuss some aspects of how other products (such as adjustable-rate mortgages) are priced.

Mortgages and Their Attributes

In general, a *mortgage* is a loan secured by underlying assets that can be repossessed in the event of default. For the purposes of this article, a mortgage is defined as a loan made to the owner of a 1–4 family residential dwelling and secured by the underlying property (both the land and the structure or "improvement"). After issuance, loans must be managed (or "serviced") by units that, for a fee, collect payments from borrowers and pass them on to investors. *Servicers* are also responsible for interfacing with borrowers if they become delinquent on their payments, and also manage the disposition of loans and the underlying properties if the loans go into foreclosure.

There are a number of key attributes that define a mortgage that can be characterized by the following dimensions: lien status, original loan term, credit classification, interest rate type, amortization type, credit guarantees, loan balances, prepayments, and prepayment penalties. The key attributes we review here, because of their relevance to this article, are credit classification and credit guarantees.

Credit classification: The majority of loans originated are of high credit quality, where the borrowers have strong employment and credit histories, income sufficient to pay the loans without compromising their creditworthiness, and substantial equity in the underlying property. These loans are broadly classified as *prime loans*, and have historically experienced low incidences of delinquency and default.

Loans of lower initial credit quality that are more likely to experience significantly higher levels of default are classified as *subprime loans*. Subprime loan underwriting often utilizes non-traditional measures to assess credit risk, as these borrowers often have lower income levels, fewer assets, and blemished credit histories. After issuance, these loans must also be serviced by special units designed to closely monitor the payments of subprime borrowers.

Between the prime and subprime sector is a somewhat nebulous category referenced as *alternative-A loans* or, more commonly, *alt-A loans*. These loans are considered to be prime loans (the "A" refers to the A grade assigned by underwriting systems), albeit with some attributes that either increase their perceived credit riskiness or cause them to be difficult to categorize and evaluate.

Mortgage credit analysis employs a number of different metrics, including the following: credit score, loan-to-value ratio (LTV), income ratios, and documentation. With respect to credit scores, several firms collect data on the payment histories of individuals from lending institutions and use statistical models to evaluate and quantify individual creditworthiness. The process results in a credit score, which is essentially a numerical grade of the credit history of the borrower. There are three different credit-reporting firms that calculate credit scores (Experian, Transunion, and Equifax), and while each firm's credit scores are based on different data sets and scoring algorithms, the scores are generically referred to as *FICO scores*. (FICO is an abbreviation for Fair Isaac & Co., the company that developed the scoring system). The primary attribute used to characterize loans as either prime or subprime is the credit score.

Credit guarantees: The ability of mortgage banks to continually originate mortgages is heavily dependent upon their ability to create fungible assets from a disparate group of loans made to a multitude of individual obligors. These assets are then sold (in the form of loans or, more commonly, MBS) into the capital markets, with the proceeds being recycled into new lending. Therefore, mortgage loans can be further classified based upon whether a credit guaranty associated with the loan is provided by the federal government or quasi-governmental entities, or obtained through other private entities or structural means. Loans that are backed by agencies of the federal government are referred to under the generic term *government loans*. As part of housing policy considerations, the Department of Housing and Urban Development (HUD) oversees two agencies, the Federal Housing Administration (FHA) and the Veterans Administration (VA), that support housing credit for qualifying borrowers. These guarantees are backed by the U.S. Department of the Treasury and are securitized largely under the aegis of the Government National Mortgage Association (Ginnie Mae), an agency also overseen by HUD.

In contrast, so-called *conventional loans* have no explicit guaranty from the federal government. Conventional loans can be securitized either as "private label" structures or as pools guaranteed by the two Government-Sponsored Enterprises (GSEs), namely Freddie Mac and Fannie Mae. While neither enterprise has an overt government guaranty, market convention has always reflected the presumption that the government would provide assistance to the GSEs in the event of financial setbacks that threaten their viability. That presumption was reinforced by the Housing and Economic Recovery Act of 2008, signed into law on July 30, which gave the Treasury Department authority for

18 months to inject equity into or provide credit support to Fannie Mae and Freddie Mac. The GSEs insure the payment of principal and interest to investors in exchange for a *guaranty fee*, paid either out of the loan's interest proceeds or as a lump sum at issuance.

Conventional loans that are not guaranteed by the GSEs can be securitized as private-label transactions. Traditionally, loans were securitized in private-label form because they were not eligible for GSE guarantees, either because their credit attributes did not conform to the GSEs' specifications or their balances exceeded the statutory limit of the GSEs.[3] A recent development is the growth of private-label deals backed either entirely or in part by loans where the balances conform to the GSEs' limits. In such deals, the originator finds it more economical to enhance the loans' credit using the mechanisms of the private market (most commonly through subordination) than through the auspices of a GSE.

Securitization Process and Mortgage-Backed Securities

In the most general sense, originators securitize loans to tap the capital markets for funding and liquidity. Mortgage lenders accept applications, fund loans, sell them into the capital markets in the form of MBS, and then recycle the resulting proceeds into new lending. Before the development of the MBS markets, lenders made mortgage loans from deposits and typically held the loans in their portfolios. This resulted in periodic shortages of mortgage money when local financial conditions were relatively illiquid; in addition, lenders' profitability was tied to the shape of the yield curve and the ability to earn a spread over funding costs. The development of an actively traded market for mortgage products over the last 40 years has resulted in the growth of a national primary mortgage market. Mortgage lending has evolved from a fragmented industry, where rates and availability of financing were based on local liquidity conditions, to a market where sources and users of funds interact on a massive scale.

The fundamental unit in the MBS market is the *pool*. At its lowest common denominator, mortgage-backed pools are aggregations of large numbers of mortgage loans with similar (but not identical) characteristics. Loans with a commonality of attributes such as note rate (i.e., the interest rate paid by the borrower on the loan), term to maturity, credit quality, loan balance, and product type are combined using a variety of legal mechanisms to create relatively fungible investment vehicles. With the creation of MBS, mortgage loans were transformed from a heterogeneous group of disparate assets into sizeable and homogenous securities that trade in a liquid market.

Groups of mortgage loans with common attributes are transformed into tradable and liquid MBS occurs using one of two mechanisms. Loans that meet the guidelines of the agencies (i.e., Fannie Mae, Freddie Mac, and Ginnie Mae) in terms of credit quality, underwriting standards, and loan size are classified as *conforming loans*. Such loans are assigned an insurance premium in the form of a guaranty fee, as noted above, and securitized in agency-issued pools.[4] Loans that either do not qualify for agency treatment (referred to as *nonconforming loans*), or conforming loans for which agency pooling execution is not efficient, are securitized in non-agency or "private-label" transactions. These types of securities do not have an agency guaranty, and must therefore be issued under the registration entity or "shelf" of the issuer. The insurance (or "credit enhancement") for the loans is in the form of either a private guaranty or, more commonly, structured in the deal through so-called "subordinate" classes. The senior portions of these deals are very similar in profile to agency pools, and are often referred to as *private label* or *senior passthroughs*.[5]

Once a pool (in either agency or private-label form) is created, it can be sold to investors in the form of a passthrough, in which principal and interest is paid to investors based on their pro rata share of the pool. However, the cash flows of pools can also be carved up to meet the requirements of different types of investors. The creation of so-called "structured securities" involves dividing (or "tranching") the underlying pools' cash flows into securities that have varying average lives and durations, different degrees of prepayment protection or exposure, and (in the case of private-label deals) different degrees of credit risk. These types of securities are broadly referred to as *collateralized mortgage obligations* (CMOs).

While the creation of private-label deals is conceptually similar to agency pooling practices, the lack of involvement by the agencies necessitates significant differences. Since there is no guaranty fee, alternative forms of credit enhancement must be utilized, as noted previously. Private credit enhancement is most commonly created in the form of subordination, which means that a portion of the deal is subordinate or "junior" in priority of cash flows, and is the first to absorb non-recoverable losses in order to protect the remaining (or "senior") bonds. A common technique is to divide the subordinated part of the deal into different bonds, each with different ratings (which typically range from double-A to unrated first-loss pieces) and degrees of exposure to credit losses. For example, the non-rated "first loss" bond class is the first to absorb losses; if this bond class is exhausted, the losses are then allocated to the bond class that is second-lowest in initial priority and so forth. Subordinate tranches trade at significantly higher yields than the senior bonds to compensate investors for the incremental riskiness and greater likelihood of credit-related losses.

A different subset of the MBS sector is the market for *mortgage strips*, or more precisely the market for principal-only and interest-only securities. Since mortgages are composed of both principal and interest, the two components can be separated and sold independently. The holder of the *principal-only security* (or PO) receives only principal paid on the underlying loans. The holder of the *interest-only security* (or IO) receives only the interest generated by the underlying loans.

THE ECONOMICS OF LOAN PRICING

Toward the end of the 1990s, the mortgage market evolved to a regime of *risk-based pricing*. In general terms, this means that the cost of individual loans to consumers was increasingly based upon an assessment of their relative riskiness. Attributes believed to impact the loan's riskiness, such as loan balance, loan-to-value ratios, and occupancy type, are utilized to price the loan. In order to manage the process, lenders typically classify loans based on a variety of attributes, including the credit classification (i.e., prime or subprime), interest rate type (fixed versus adjustable), and documentation style (full versus reduced-documentation alternatives), among others. Consequently, the menu of available loan products has grown substantially since 2000, with some of the variations being fairly subtle. For example, hybrid ARMs can be classified by the length of the fixed-rate period (e.g., a 5/1 product), their cap structure, and their amortization type (i.e., fully amortizing versus an interest-only period).

The growth in the variety of products created a paradox for lenders. On one hand, general program guidelines were created to broadly differentiate products in order to facilitate efficient loan pricing and processing. At the same time, many loan products were differentiated by subtle variations in the required borrower attributes. To manage this process, lenders typically classify loans into a series of programs with baseline loan-level, property-level, and borrower-level attributes. Loans that do not meet the product's base guidelines are priced to consumers using *add-on pricing*. Add-ons are additional dollar values added to a loan's up-front cost (quoted as discount points) paid by the borrower to compensate for the loan's incremental credit risk (Discount points are generated as a function of the pricing of the loan and paid at closing. As such, they are different from application costs and other fees often referenced as "origination points." In this article, any reference to "points" should be interpreted as meaning discount points).

Add-ons are used to price attributes not taken into account by the guidelines of a particular program. As an example, an interest-only fixed-rate loan with an LTV up to 80% might be priced within the program; an LTV above 80% would then require an add-on calculated for that product and attribute. As we will discuss later in this article, add-on pricing involves the extra steps of first calculating the add-on appropriate for a loan, and then using it to compute the rate associated with the amount of points the borrower wishes to pay for the loan. The pricing scheme balances the need of lenders to efficiently price large numbers of loans, while allowing for flexible treatment of a variety of loan and borrower characteristics outside the standard program parameters.

A key point to remember in this discussion is that the dependent variable is points, not rates. As we will demonstrate, any reasonable rate is available to a borrower; the relevant question is the amount of points charged (or rebated, for an above-market rate) to the borrower. Prospective borrowers are presented with a matrix of note rates and points, from which they choose the combination that meets their desired tradeoff of monthly payments versus out-of-pocket costs. For the lender, the process of pricing loans to the consumer incorporates the following steps:

- Decide which vehicle represents optimal execution for securitizing a given product. For example, a conforming-balance fixed-rate loan can either be included in an agency pool (i.e., a pool issued by Fannie Mae, Freddie Mac, or Ginnie Mae) or securitized as part of a conforming-balance alt-A deal, allowing for market conditions.

- Calculate the optimal securitization coupon for all rate strata. The relevant factors include the pricing of the pool or (in a private-label deal) the senior security, the valuation of base and excess servicing, and the cost (in dollar terms) of credit enhancement.
- Generate a rate/point grid by calculating the points associated with each rate level.
- Assess which add-ons should be added to the points associated with the loan based on its unique attributes.
- Calculate the loan rate associated with the points the borrower is willing to pay, given the values on the rate/point matrix and the amount of add-ons associated with the loan.

Despite the fact that agency and private-label securitization often serve as competing options for an originator/securitizer, the steps involved in generating loan pricing in either case are similar. In both cases, the process involves decomposing loans into their main cash flows, calculating the cost of credit enhancement, and computing the net value of cash flows remaining as a result of the securitization process. Once the net value is generated, the associated points are easily calculated. As discussed later in this article, the main difference is that the credit enhancement for agency pools is a direct cost, paid as a *guaranty fee (or "g-fee")* to the agency in question from the loan's interest cash flows. Private-label credit enhancement, by contrast, is a function of both the amount of subordination required by the rating agencies to create triple-A bonds and the price at which the subordinates can be sold. Note also that the consumer is unaware of the execution option ultimately chosen; securitization choices are solely reflected in loan pricing.

Agency Pooling versus Private-Label Execution

With respect to the agency securitization option, the key elements in the rate determination process are:

1. MBS to-be-announced (TBA)[6] prices;
2. the agencies' g-fee associated with the program;
3. the prevailing guaranty fee buydown multiples; and
4. the value placed on excess servicing.

While the market pricing of TBAs is straightforward, the other elements require some explanation. The guaranty fee is an interest strip, quoted in basis points, that is directed to one of the securitizing agencies (i.e., Fannie Mae, Freddie Mac, or Ginnie Mae) in order to receive the equivalent of credit insurance on a loan. It is paid out as part of the loan's monthly interest payment. The amount of the guaranty fee represents the cost of credit insurance that the agency charges to securitize the loan into an agency-backed pool, in which principal and interest payments are guaranteed by the agency. Since the guaranty fee represents the cost of credit insurance, the amount of the fee is a function of the perceived risk of the loan emanating from obligor and property characteristics. However, fees are not uniform across lenders; certain lenders may be able to negotiate lower guaranty fees, based on lending volumes or other considerations.

For the purpose of pooling efficiency, guaranty fees can be capitalized and paid as an up-front payment to the agency, a process called "buying down" the guaranty fee. Freddie Mac and Fannie Mae quote so-called *buydown multiples*, which serve to convert the g-fee into a single capitalized payment (A multiple is simply a convenient quotation mechanism for converting interest cash flows into a capitalized price. A multiple of 4, for example, means that 50 basis points of interest would be capitalized as 2 points. This nomenclature is commonly used in the interest-only market). As we will subsequently discuss, buying down the g-fee is an option in the calculation of optimal coupon creation.

Servicing consists of a series of monthly interest cash flows, and is also converted into price terms by using multiples. Servicing can be divided into *base* and *excess* servicing cash flows. Base servicing is a servicing strip required to be created as part of the securitization product, and is often held by the originating lender or servicer.[7] Excess servicing, by contrast, is strictly an interest strip that "falls out" as part of the securitization process. In addition to the normal factors influencing the valuation of IO-like securities (e.g., the shape of the yield curve and prepayment assumptions), base servicing values must account for factors such as tax and insurance float, principal and interest float, and the value of cross-selling opportunities associated with servicing the loan. The additional benefits that accrue from holding base servicing allow it to trade at multiples higher than those of comparable assets.

The private-label sector utilizes different securitization practices. The senior passthrough (i.e., the highest-priority or senior cash flows generated after subordinates are created) generally trades to a concession behind same-coupon Fannie Mae TBA passthroughs. The price concession reflects a function of a number of factors, including the reduced liquidity associated with the product, the lack of a dollar-roll market to provide convenient and (sometimes) advantageous financing, and the lack of an agency credit guaranty.

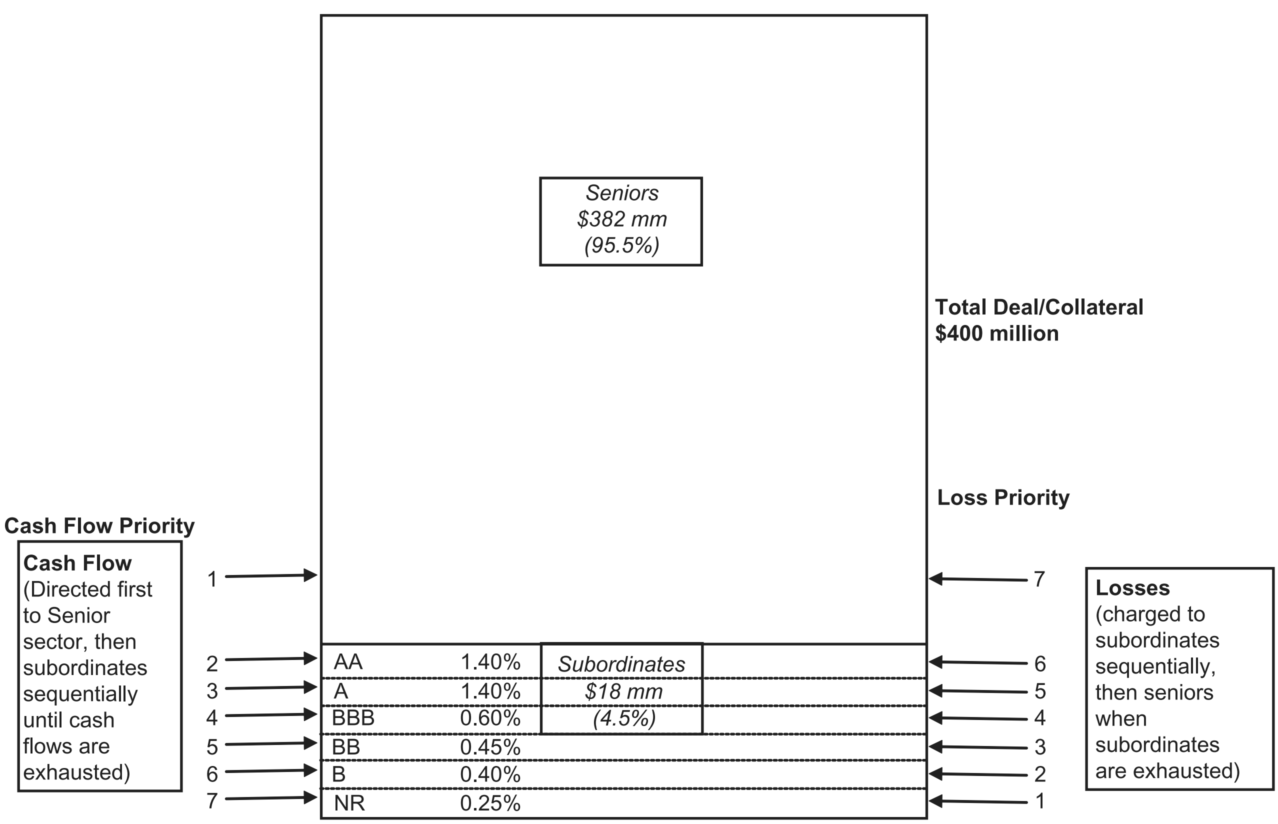
As the nomenclature suggests, private-label (or non-agency) credit enhancement must come from a private source, as the loan does not receive the backing of any outside entity (i.e., an agency). The most common form of non-agency credit enhancement is *subordination*. This methodology divides a deal's loan collateral into two classes of bonds. The *senior bonds* (or *seniors*) have priority in terms of receiving principal cash flows generated by the underlying loans. The *subordinate classes* (or *subs*) are lower in credit priority, and thus receive principal cash flows only after the higher-priority senior bonds are paid. As illustrated in Exhibit 1, the subordinate sector is typically structured (or *credit tranched*) into a series of bonds that have declining priority and credit ratings, and therefore trade to progressively higher yields. The weighted-average dollar price of the subordinates is calculated, and (as with senior bonds) quoted at a dollar spread behind same-coupon Fannie Mae TBAs. As discussed in more detail later in this article, this spread is used in evaluating the overall cost of private-label credit enhancement.

There are a few notable differences between the two forms of credit enhancement (i.e., from agency backing versus subordination). From the standpoint of credit risk management, the credit support extended through the agencies (either Ginnie Mae or one of the

EXHIBIT 1

Schematic of Hypothetical Structure for a $400 mm Private-Label Deal

Deal assumes 4.5% credit support.



GSEs) is more comprehensive than that offered through subordination. Once a loan is assigned a guaranty fee, the only concern for investors is the viability of the agency in question (For any of the agencies, the likelihood of default is remote. Ginnie Mae securities are backed by the taxation power of the U.S. government, while Fannie Mae and Freddie Mac are generally viewed as having the implied backing of the government). The credit support available to the senior bonds in a senior/subordinated structure, by contrast, is limited to the amount of subordination remaining at any point in time. As losses are incurred, they are absorbed by the subordinates; the amount of subordination protecting the senior bonds declines as the subordinate tranches are written down. Once the subordinate bonds are entirely written off and the subordination is exhausted, the senior bond effectively has no credit support. The possibility that the senior bonds may lose their credit support and be exposed to credit-related principal writedowns largely explains why private-label senior securities always trade to lower prices than agency pools.

Another difference between the two forms of credit enhancement is that the cost of subordination to the deal is a direct dollar cost. By contrast, the guaranty fee is an interest strip; the capitalized value of any interest strip is a function of the level of interest rates, the shape of the yield curve, and expected prepayment speeds. This suggests that the ultimate cost of agency credit enhancement is, at least in part, a function of interest rate levels and overall prepayment expectations. As discussed later in this article, this gives the relative costs of agency and private-label execution a degree of rate directionality often overlooked in the discussion of securitization options.

EVALUATING SECURITIZATION OPTIONS

Determining the Optimal Coupon for Agency Pooling

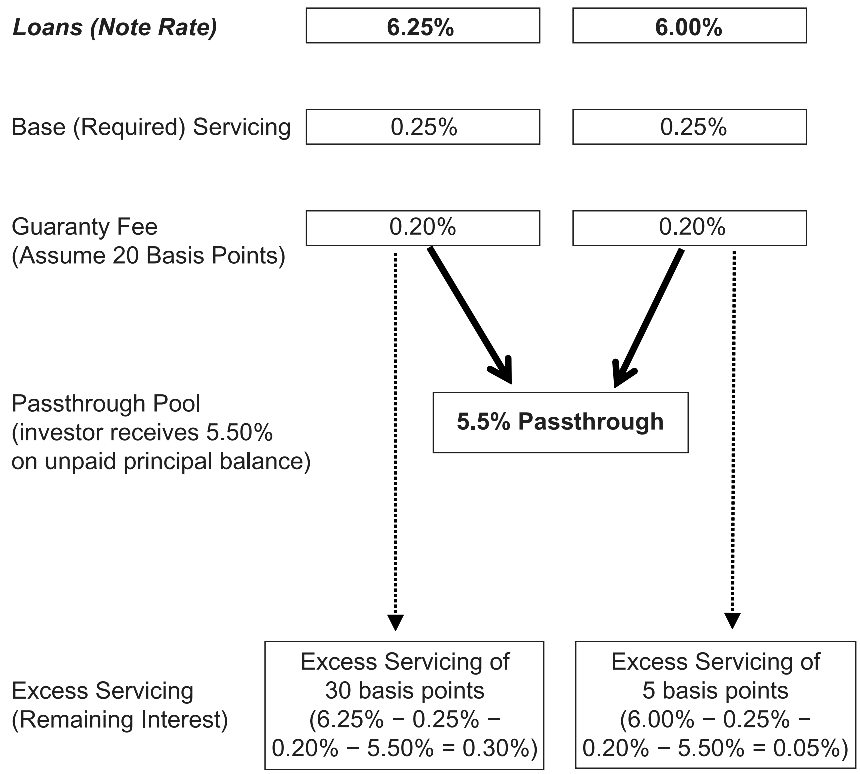
Fixed-rate agency pools are typically composed of loans with a variety of note rates, subject to pooling rules. In order to be included in an agency pool, a loan's note rate must be a minimum of 25 basis points higher than the pool's coupon (in order to account for the 25 basis points of base servicing that must be held by the originator),[8] and a maximum of 250 basis points above the coupon. Exhibit 2 shows a simple example of how loans with two different note rates (6.25% and 6.0%) can be pooled into the same 5.5% coupon passthrough. The difference is that the originator holds 30 basis points of excess servicing for the 6.25% loan, versus 5 basis points for the 6.0% loan, after allocating 25 basis points of base servicing and 20 basis points for the g-fee.

Exhibit 2 is simplistic, however, in a number of ways. It suggests that every loan can theoretically be pooled into a large number of different coupons, given the 250 basis point maximum note-rate-to-coupon spread. In practice, two pooling options are usually calculated for each note-rate level, and in many cases the pooling option is clear.[9] However, certain note rates can be efficiently pooled into a number of different coupons. For example, a loan with a 6.25% note rate can plausibly be securitized into pools with either 5.5% or 6.0% coupons. Including the loan in a 6.0% pool, however, means that there would not be enough interest available to pay the guaranty fee. This pooling decision would require the guaranty fee to be paid as a one-time fee at the time the loan is funded. As mentioned earlier, the process of monetizing the guaranty fee is referenced as buying down the g-fee, and the multiple at which the g-fee is converted to dollar terms is the buydown multiple.

Determining the optimal pooling coupon for a fixed-rate loan requires decomposing the loan into its component parts. These parts (i.e., the MBS passthrough, base and excess servicing, guaranty fees, and origination costs) are then valued, and the all-in execution for both options is subsequently calculated and compared. Exhibit 3 shows a hypothetical example of this comparison for a loan with a 6.25% note rate, assuming a required g-fee of 20 basis points. Including the loan in a pool with a 5.5% coupon would mean that the entire 20 basis points of guaranty fee would be directed to the agency; after accounting for the 25 basis points in base servicing, the originator would hold the remaining 30 basis points as excess servicing. Pooling the loan in a 6.0% passthrough would mean that no excess servicing is held, as the 25 basis points in base servicing utilize all the interest in excess of the pool's coupon rate. As there is no interest remaining to pay the guaranty fee, the g-fee must be bought down and paid to the agency at the time the loan is funded (In the example, the entire amount of the g-fee is bought down; however, lenders have the option of buying down some portion of the g-fee if desired).

EXHIBIT 2

Cashflow Allocation for Loans With Different Note Rates Being Securitized Into a 5.5% Agency Passthrough



In the example, the option of pooling into the 5.5% coupon (or "pooling down") achieves better execution, as it results in one-half point (or 0.5%) better execution than "pooling up" into the 6.0% coupon. In the example, both excess servicing and the g-fee buydown multiples are valued at a multiple of 4. The dollar cost of buying down the 20 basis point g-fee for the 6.0% passthrough is 0.8 points (or 0.8% of face value). The cost of paying the g-fee directly to the agency (as would be done for execution as a 5.5% pool) can be isolated by using the level of the coupon swap to calculate a multiple. In Exhibit 4, the coupon swap (i.e., the difference in price between 6% and 5.5% passthroughs) is 1.5 points. Converting a coupon swap into a multiple means that it is multiplied by 2 in order to make it applicable for 100 basis points in interest (as is the convention for other multiples). Using the 3x multiple for the coupon swap suggests that the cost of credit enhancement equals 0.6 points.

Fundamentally, the difference in execution between the two options represents different valuations for coupon interest in the passthrough market (as reflected by the coupon swap) versus the valuation of the IO-like elements (i.e., servicing by the lender and of guaranty fees by the GSEs). Execution differences result when valuations for the three primary components diverge. It is instructive to look at how relative execution changes when the factors are altered. For example, execution would be equivalent for the two coupons if the coupon swap widened to 2 points, increasing it to a 4x multiple, *ceteris paribus*. If the coupon swap were to widen further while the multiples for servicing and the g-fee buydown remain at 4x, the higher coupon would represent better execution, as it would imply a higher valuation for coupon in the form of a passthrough vis-à-vis that of IO-equivalent cash flows.

Therefore, optimal execution can vary as the pricing of interest in its different forms changes. However, valuations in the different markets do not move in lockstep. As an illustration, Exhibit 4 compares the valuations in the market (converted into multiples) for 6.0% and 5.5% Trust IOs (serving as a proxy for both servicing and g-fee buydown pricing) versus the pricing

EXHIBIT 3

Pooling Options for a Loan with a 6.25% Note Rate

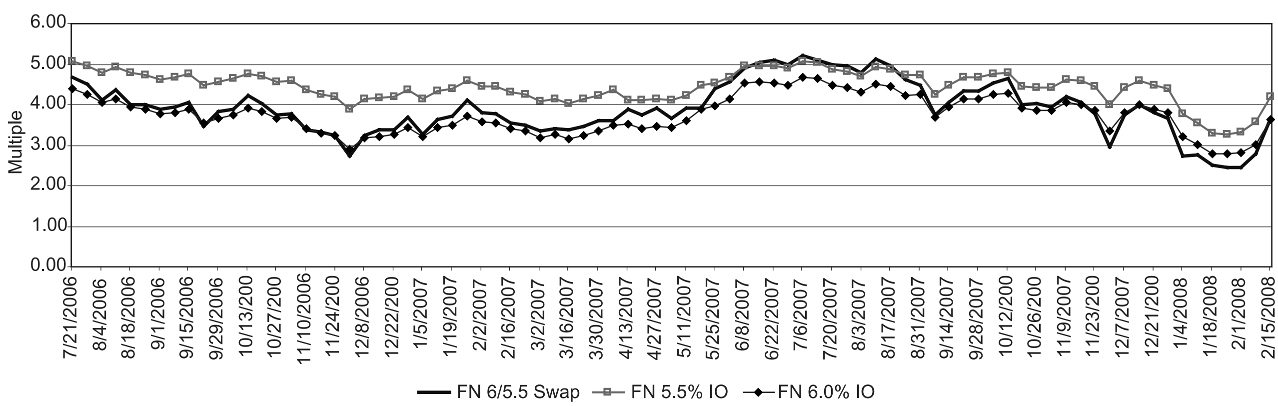
All values hypothethical.

	6.0% MBS	5.5% MBS	Comments
MBS Passthrough Price	100 20/32	99 4/32	TBA Prices for forward settlement
Proceeds			
Base Servicing	*1.3*	*1.3*	*25 bps in both cases—assumes 5x multiple**
Excess Servicing:			
Amount of Excess (in Basis Points)	0	30	
Excess Servicing Value	*0*	*1.2*	*4x multiple for 30 bps. for 5.5s**
Guaranty Fee Buyup/Buydown:			
G-fee (in Basis Points)**	(20)	(20)	
Value of G-fee Buydown	(0.80)		*Assumes 4x multiple for Buydown**
Total Proceeds	***101.1***	***101.6***	
Costs			
Total Origination Costs (includes allocation of G&A, hedging, and origination costs)	*−1.65*	*−1.65*	*Assumed same in both cases*
Net Proceeds	***99.4***	***99.9***	

*Notes: *Base servicing typically trades at higher multiples than excess servicing; for simplicity's sake, the multiples assumed for excess servicing and g-fee buydowns are the same; **The example assumes a 20 bp. g-fee. Note that the g-fee buydown is paid to the GSE, and is therefore treated as a negative value.*

EXHIBIT 4

Trust IO Multiples versus 6.0%/5.5% Coupon Swap (Quoted as Multiple)



of the Fannie 6/5.5% coupon swap. The numbers in the exhibit suggest that the relative levels in the two markets can vary; in turn, this means that optimal execution can vary over time. When IOs backed by both 5.5% and 6% coupons trade to a higher multiple, optimal execution will be obtained by securitizing loans into the lower coupon (i.e., "pooling down" into 5.5s). When the coupon swap trades relatively well (i.e., its multiple is higher than that of the comparable IOs), lenders have an incentive to "pool up" into the higher coupon.

Taken further, the difference in execution impacts the production of different coupons, even if primary rates remain relatively stable. When pooling down represents best execution, it often results in the creation of relatively large amounts of the lower coupon, albeit with a relatively high weighted-average coupon (WAC). In a regime where pooling up is optimal, larger amounts of the higher coupon with relatively low WACs will probably be produced. Note, however, that some lenders limit the amount of servicing they want to hold as a matter of policy. Such lenders would be inclined to pool up irrespective of relative execution, at least until the foregone proceeds become too great.

Determining the Optimal Coupon for Private-Label Execution

As noted above, a major difference between securitizing loans in agency and private-label vehicles is that, in the latter, the note rates of the loans can be either above or below the coupon rate. Since an originator will typically attempt to minimize securitization costs by executing a limited number of deals over the course of a calendar month, the loans included in a typical deal will carry a wide range of note rates. At this juncture, therefore, it is more useful to consider coupon optimization in the context of a loan package with a range of note rates, rather than the execution choice for a single loan.

The dispersion of note rates in a private-label deal creates additional considerations when calculating the optimal deal coupon. Creating a deal with a single coupon from a package of loans carrying a variety of note rates involves the creation of both excess servicing and principal-only cash flows. The cutoff is the deal's coupon rate. Loans with the net note rate (after taking into account base servicing and trustee fees) above the desired deal coupon will need to have excess servicing stripped from them, which is typically structured into a *WAC IO*. Loans with a net note rate below the coupon must have some principal stripped from them, in order to "gross up" the remaining note rate to that of the deal coupon. The principal carved from each rate stratum is typically combined into so-called *WAC POs*. Finally, credit enhancement is created through the mechanism of subordination. Optimal deal execution is therefore calculated as the combined value of the components (i.e., the senior and subordinate classes, the WAC IO, and the WAC PO) that generates the greatest proceeds.

However, the process is complicated by the fact that changes in the deal coupon affect the structure of the deal. In addition to pricing the senior and subordinate bonds to different coupons (which impacts their pricing, based on market conditions), the sizes of the WAC IO and WAC PO are altered as the coupon changes. For example, reducing the deal's coupon means that some loans that had net note rates below the deal coupon (i.e., *discount loans*) now have note rates above the coupon (i.e., they become *premium loans*). An example of these tradeoffs is shown in Exhibit 5. The exhibit shows how loans in a $400 million hypothetical package are classified and allocated for deal coupons of 6.25% and 6.5%, respectively. While the WAC of the loan package does not change, the attributes of the WAC IO and PO are altered significantly for a 25 basis point change in coupon (For example, the size, WAC, and coupon rate of the WAC IO are impacted, along with the size and WAC of the PO. For simplicity's sake, the loans are assumed to have note rates in discrete 12.5 basis point increments).

There are three issues to note with respect to Exhibit 5. First, both examples assume 25 basis points of base servicing and a 0.9 basis point trustee fee. In actuality, the base servicing assumption changes across different products. In the recent past, for example, generic (or "core") jumbo deals had 17.5 basis points of base servicing held; alt-A jumbo deals had 20 basis points withheld, and conforming-balance private-label deals required originators to hold 25 basis points of base servicing. The amount of base servicing held impacts the structure, since it changes the net note rates of the loan strata and thus the cutoff for discount and premium loans. Second, the size of the WAC IO is the face value of the premium loans. The WAC IO coupon is the WAC of the premium loans less the assumed deal coupon, base servicing, and trustee fee. Finally, sizing the WAC PO is more complex. For each note rate strata, a *PO percentage* is calculated. This percentage is calculated as: [Security Coupon—Net Note Rate]/Security Coupon.

The PO percentage represents the amount of PO that would need to be created such that the net note rate of the remaining principal of the note rate cohort equals the deal coupon. The PO percentage multiplied by the face value of the cohort is, therefore, the size of the PO created for that stratum; the sum of the PO balances for all strata represents the size of the WAC PO.

Exhibit 6 compares the deal execution for the two coupon alternatives, using hypothetical prices and

Exhibit 5

Division of Note Rate Strata, and Creation of WAC IO and PO, Using Different Deal Coupons For a $400 mm Private-Label Deal

			Premium Note Rates (for WAC IO Calculation)		Discount Note Rates (for WAC PO Calculation)			
			Net Note Rate minus Deal Coupon		6.25% Coupon		6.50% Coupon	
Note Rate	*Net Note Rate*[1]	*Balance in Cohort*	6.25% Coupon	6.50% Coupon	*PO%*	*PO Balance*	*PO%*	*PO Balance*
6.000%	5.741%	1,000,000	−0.509%	−0.759%	8.1%	81,440	11.7%	116,769
6.125%	5.866%	2,000,000	−0.384%	−0.634%	6.1%	122,880	9.8%	195,077
6.250%	5.991%	6,000,000	−0.259%	−0.509%	4.1%	248,640	7.8%	469,846
6.375%	6.116%	13,000,000	−0.134%	−0.384%	2.1%	278,720	5.9%	768,000
6.500%	6.241%	35,000,000	−0.009%	−0.259%	0.1%	50,400	4.0%	1,394,615
6.625%	6.366%	55,000,000	0.116%	−0.134%	0.0%	0	2.1%	1,133,846
6.750%	6.491%	75,000,000	0.241%	−0.009%	0.0%	0	0.1%	103,846
6.875%	6.616%	75,000,000	0.366%	0.116%	0.0%	0	0.0%	0
7.000%	6.741%	35,000,000	0.491%	0.241%	0.0%	0	0.0%	0
7.125%	6.866%	30,000,000	0.616%	0.366%	0.0%	0	0.0%	0
7.250%	6.991%	25,000,000	0.741%	0.491%	0.0%	0	0.0%	0
7.375%	7.116%	15,000,000	0.866%	0.616%	0.0%	0	0.0%	0
7.500%	7.241%	11,000,000	0.991%	0.741%	0.0%	0	0.0%	0
7.625%	7.366%	7,000,000	1.116%	0.866%	0.0%	0	0.0%	0
7.750%	7.491%	5,000,000	1.241%	0.991%	0.0%	0	0.0%	0
7.875%	7.616%	3,000,000	1.366%	1.116%	0.0%	0	0.0%	0
8.000%	7.741%	2,000,000	1.491%	1.241%	0.0%	0	0.0%	0
8.125%	7.866%	1,000,000	1.616%	1.366%	0.0%	0	0.0%	0
8.250%	7.991%	1,000,000	1.741%	1.491%	0.0%	0	0.0%	0
8.375%	8.116%	1,000,000	1.866%	1.616%	0.0%	0	0.0%	0
8.500%	8.241%	1,000,000	1.991%	1.741%	0.0%	0	0.0%	0
8.625%	8.366%	1,000,000	2.116%	1.866%	0.0%	0	0.0%	0
Totals		*400,000,000*				*782,080*		*4,182,000*

	Deal Details	
	6.25% Coupon	6.50% Coupon
Deal Size	*400,000,000*	*400,000,000*
Discount Loans	*57,000,000*	*187,000,000*
WAC IO Size[2]	*343,000,000*	*213,000,000*
WAC IO Coupon[3]	*0.468%*	*0.388%*
WAC IO Contributed WAC[4]	*7.224%*	*7.316%*
WAC PO Size	*782,080*	*4,182,000*

Notes: [1]*Assumes 25 basis points in base servicing, and a 0.9 basis point trustee fee;* [2]*The WAC IO size is equal to the face value of the premium loans;* [3]*The WAC IO coupon equals the WAC of the premium loans, less the deal coupon, the base servicing, and the trustee fee;* [4]*See the text for a discussion of the calculation of Contributed WAC.*

spreads. The three components with principal balances are shown as percentages of the face value of the deal (which in the example is $400 million), while the value of the WAC IO is based on the bond's coupon. The four major elements are discussed below.

Senior passthrough: These are typically priced at a dollar spread behind Fannie Mae TBAs for the same settlement, with pricing for the quarter-coupons interpolated from the TBA coupon stack. In the example, the 6.25% coupon is quoted at a concession of 1 4/32s to Fannies, while the higher 6.5% coupon is assumed to trade one point behind Fannies. The spread concession is a function of supply and demand for different coupons, and is typically sensitive to the level of rates (and the resulting dollar prices of the securities). Note also that the size of the seniors is reduced by the amount of the WAC POs; as noted below, they are priced separately, even though they are senior securities.

Subordinates: The subordinates are valued at a price spread behind Fannie Mae TBAs (in this case, assumed to be 20 points). This concession is calculated by subtracting the weighted average price for all the subordinate classes from the price of the Fannie Mae TBA. In practice, however, each subordinate tranche is

EXHIBIT 6

Comparison of Private-Label Execution for a Loan Package Using Different Deal Coupons

All values hypothetical.

		Coupon Option	
		6.25%	**6.50%**
A	Fannie Mae Price[1]	99 20/32	100 20/32
	Seniors		
B	Price Concession	1 4/32	1
C	Senior Price	98 16/32	99 20/32
D	Percent of Deal[2]	94.80%	93.95%
E	*Px times %*	*93 12/32*	*93 19/32*
	Subs		
F	Price Concession	20	20
G	Subordinate Price (5% of Collateral)	79 20/32	80 20/32
H	*Px times %*	*3 31/32*	*4 1/32*
	Excess Servicing (WAC IO)		
I	Strip (Basis Points)	46.8	38.8
J	Multiple	4	4
K	*Px*	*1 28/32*	*1 18/32*
	WAC PO		
L	Size	782,080	4,182,000
M	Price	50	50
N	Percent of Deal	0.20%	1.05%
O	*Px times %*	*3/32*	*17/32*
P	**Gross Proceeds (E+H+K+O)**	**99 11/32**	**99 23/32**
Q	Securitization Costs	4/32	4/32
R	***Net Proceeds (P-Q)***	***99 7/32***	***99 19/32***

Notes: [1]*Interpolated for the 6.25% coupon;* [2]*Excludes the face value of the WAC PO.*

valued separately, based on the bond's rating level, its credit support, and the expected credit performance of the loan collateral. These values are then used to calculate the sub's weighted average price. An example of subordinate pricing is shown in **Table 4?????** (In prime deals using a senior/subordinate structure, the subs typically have the same coupon as the seniors; however, since they trade to significantly wider spreads, their prices are significantly below par. For this reason, their spreads are typically insensitive to the bond's coupon).

WAC IO: If loans are securitized as the higher 6.5% coupon, there is less excess servicing to be held. Thus, the size of the WAC IO strip (in notional face) is smaller for the 6.5% option than for the 6.25% coupon, and the coupon rate of the strip is also smaller. For simplicity's sake, both WAC IOs are assumed in the example to trade to the same multiple. This is not the case in practice, as the cash flows generated by the different WAC IOs are altered based on changes to the assumed coupon. Since the valuation of any IO security is strongly influenced by its expected prepayment speeds, a small difference in structure can significantly impact the multiples used for different WAC IOs.

In addition, WAC IOs are assumed to exhibit fundamentally different behavior from other forms of IOs. This is because they represent the combined excess servicing stripped off all of the premium loans in a deal, based on a single deal coupon. In addition to necessitating a faster prepayment assumption, interest cash flows generated by higher-coupon loans comprise a greater share of the WAC IO's cash flows. If a deal had a 6.5% coupon, a loan with a 7.0% net note rate would generate 50 basis points of interest to the WAC IO. However, a loan with a 9.0% net note rate would contribute 250 basis points to the strip. In order to account for the disproportionate contribution of different loan cohorts, a metric known as the *Contributed WAC* is calculated as follows:

$$\text{Contributed WAC} = \frac{\Sigma(\text{Gross Note Rate} \times \text{Strata Balance} \times \text{Net Contribution})}{\Sigma(\text{Strata Balance} \times \text{Net Contribution})}$$

where the Net Contribution is defined as the excess of the net note rate (after adjusting for base servicing and trustee fees) over the deal coupon. In Exhibit 5, the net contribution is represented by the highlighted values for the WAC IO calculation. The difference between the calculation of Contributed WAC and a normal gross WAC is that the Contributed WAC weights the note rates by both the balance and the net contribution for each note rate cohort; the calculation for gross WAC (GWAC) uses only the balance of each stratum as the weighting factor.

Note that the contributed WAC is highly subject to the dispersion of note rates within a package. Depending on the degree of note rate dispersion, two groups of premium loans may have the same premium gross WAC but very different Contributed WACs.[10] Note also that the Contributed WAC is not the same as the WAC of the premium loans. The difference arises from the fact that the Contributed WAC accounts both for the weighted-average note rate of the loans and the amount of interest directed from each cohort to the WAC IO.

WAC PO: The pricing of both WAC POs is assumed to be the same, which is generally the case, even though the WACs of the two bonds are not the same (The WAC PO in the 6.25% coupon example has a WAC of 6.265%, while the PO in the 6.5% alternative has a WAC of 6.458%). The execution is noticeably impacted by the size of the PO classes, since they trade at a 35–40 point discount to the senior bonds. Exhibit 5 shows the computation of the size of the PO in the highlighted area under "WAC PO Calculations."[11]

Optimal Conforming-Balance Execution for Agency versus Private-Label

Private-label deals have often served as a securitization alternative for conforming-balance loans that might otherwise be included in agency pools. The availability of this securitization option depends on the issuer's ability to place senior and subordinate bonds with investors, as well as the levels at which securities can be sold. At various points between 2002 and 2007, private-label deals had been a viable securitization alternative; at other times, interest has either been non-existent or at levels such that the option is uneconomical. It is worthwhile to address how relative execution is measured, if only to better understand how the tradeoffs between agency and private-label execution are quantified.

There are fundamental differences in how execution is valued for agency pools and private-label structures. A major factor is the difference between the way credit support is quoted in the two markets. In an earlier section, we noted that the credit support for an agency pool is paid in the form of a guaranty fee, or a strip off the loan's interest stream paid to the GSE over time. The g-fee can be converted into a single capitalized payment through a buydown multiple quoted by Freddie Mac or Fannie Mae (Note that Ginnie Mae does not have a g-fee buydown program, making g-fee buydowns solely the province of the GSEs). Essentially, the buydown multiple is an offer of IO by the GSE; a lender buying down the g-fee is essentially buying IO, at a one-time cost to the securitization. All things equal, a larger buydown multiple implies a higher dollar cost of credit enhancement. Agency execution, therefore, is improved when buydown multiples are low. This typically represents periods when prepayments are expected to be fast, and the values of interest-only cash flows (including trust IO prices and servicing) are depressed.

In a private-label deal, by contrast, credit enhancement represents a dollar cost to the structure, which is much less sensitive to changing prepayment expectations. The total cost of credit support is a function of the pricing of the senior and subordinate sectors within the deal; better private-label execution (relative

EXHIBIT 7

Example of Structure and Pricing of Subordinates In Private-Label Deal (Using Hypothetical Prices)

Assumes $ 400 mm deal, Fannie 6.25s priced at 100-20.

	Deal Structure			Subordinate Pricing		
	% Support	% of Deal	Balances			
AAA	4.50	95.50	382,000,000			
AA	3.10	1.40	5,600,000	160	98 2/32	
A	1.70	1.40	5,600,000	185	96 10/32	
BBB	1.10	0.60	2,400,000	375	84 10/32	
BB	0.65	0.45	1,800,000	1100	54	
B	0.25	0.40	1,600,000	2300	30 24/32	
NR	0.00	0.25	1,000,000	14 (Px)	14	
	Total Subordinates		**18,000,000**		**80 20/32**	***Weighted Average Sub Price***
					20	***Spread (In Points) Behind Fannies***

EXHIBIT 8

Hypothetical Comparison of Agency and Private-Label Execution for a Conforming-Balance Fixed-Rate Loan

Note Rate	***6.25%***	
Base Servicing	***0.25%***	
Net Coupon	***6.00%***	
Fannie 6.0% Price	***101***	
Origination Costs (Overhead, Margins, etc.)	***1 16/32***	
	Agency	***Private Label***
Guaranty Fee	−0.250	
Buydown Multiple (6X)	6.000	
Cost of buyown	−1.500	
Seniors (95% of value @ 3/4 point behind Fannies)		95.238
Subs (5% of value @ 12 points behind Fannies)		4.450
Deal Costs		−0.125
Gross Proceeds	**99 16/32**	**99 18/32**
Net Proceeds (Less Origination Costs)	***98***	***98 2/32***

to agency pooling) results when the price concession behind Fannie Mae TBAs is reduced. The net value of credit support is, in turn, a function of both the levels at which the components (i.e., the senior bond and all the subordinate tranches) can be sold, as well as the credit structure of the deal (This refers to both the amount of subordination required and how it is divided between the sub classes, as illustrated in Exhibit 7).

Exhibit 8 illustrates the methodology used to compare the two securitization options. The hypothetical example uses a conforming-balance loan with a 6.25% note rate, and assumes that a 6% security coupon represents optimal execution for both options. The gross proceeds received from agency execution are calculated by taking the proceeds from the sale of the security and deducting the monetized cost of the g-fee. By contrast, private-label execution involves calculating the gross proceeds of the sale of the senior and subordinate sectors weighted by their relative size, allowing for the costs associated with creating the deal. Net proceeds for both options result from deducting origination costs, which include administrative expenses, an allocation for overhead, and the desired profit margin.

Note that the example in Exhibit 8 deliberately uses prices and multiples such that the two options result in similar proceeds. This has been the case during many periods of time; however, there have also been periods where one option is clearly superior to the other. During the period between 2004 and 2006, for example, private-label execution offered better execution than agency pooling, and resulted in sizeable issuance of conforming-balance private-label deals during that period. At levels prevailing during the credit crunch that began in 2007, however, private-label spreads were so wide that private-label execution was clearly uneconomical.

An alternative perspective can be obtained by calculating the break-even guaranty fee, i.e., the level of the guaranty fee at which both options are equivalent. This is computed by taking the overall cost of private-label execution (which includes the spread behind Fannies for both the seniors and subs trade, weighted by their percentages of the deal) and dividing it by the g-fee buydown multiple. The break-even g-fee for the hypothetical example in **Table 5** would be calculated as follows:

A. Senior Execution—95% of deal, priced 24/32s behind Fannies	23/32
B. Subordinate Execution—5% of deal, priced 12 points behind Fannies	19/32
C. Deal Costs	4/32
D. Total Private-Label Execution, behind Fannies (A + B + C)	1 14/32
E. Guaranty buydown multiple	6
F. Break-even Guaranty Fee (D/F, in basis points)	24.0

Using the levels quoted in Exhibit 8, a loan where a g-fee of 24 basis points or greater is required would receive better execution in a private-label deal; otherwise, agency pooling would represent the better execution option.

The factors that would increase the break-even g-fee would be 1) an increase in the price concession behind Fannies for the private-label seniors or subordinates (which would increase the costs associate with private-label execution); 2) an increase in the amount of required subordination; or 3) a decline in the g-fee buydown multiple (which reduces the cost of agency credit enhancement).

For example, if the subordinates collectively cheapen eight points to trade 20 points behind Fannies, the break-even g-fee increases to roughly 46 basis points, all other factors held constant. This means that loans with a greater degree of impairment (e.g., a combination of lower credit scores and higher LTVs) that would require a very high g-fee would nonetheless be securitized in agency pools. This has significant implications for both agency issuance and the prepayment performance of newly-issued premium pools, as highly impaired loans prepay differently than those with more generic attributes.

CALCULATING PRIMARY RATE OFFERINGS

As noted above, the notion that lenders offer "rates" to potential borrowers is misleading. It is more accurate to view lenders' loan offerings for different products as a matrix of rates and discount points, where lower rates are associated with higher points and vice versa. In fact, points become negative when rates rise to a certain level, indicating that the lender is willing to issue a rebate to the borrower (or cover some of the borrower's costs, depending on the size of the rebate). In addition to offering borrowers different choices with respect to the costs paid at the time of closing, rate/point matrices are important tools in risk-based pricing schemes, as they are utilized to convert loan add-ons into rates.

The Rate/Point Matrix

An example of a rate/point matrix is shown in Exhibit 9. The grid shows the discount points required to be paid (or the rebate to be paid to the borrower) for different rate levels at a point in time. Note that the relationship between rates and points is not constant. To illustrate this point, in Exhibit 10 we plot the level of rates on the vertical axis versus the points paid (or rebated) on the horizontal axis, using the data from Exhibit 9

Exhibit 9
Example of Rates/Points Matrix

All values hypothetical.

Note Rate	Points
6.750	2.000
6.875	1.500
7.000	1.125
7.125	0.750
7.250	0.375
7.375	0.125
7.500	0.000
7.625	−0.250
7.750	−0.500
7.875	−0.625
8.000	−0.875
8.125	−1.000
8.375	−1.125
8.500	−1.250

(and referenced hereafter as the *rate/point curve*). The exhibit indicates that the relationship between rates and points is fairly linear until points decline to roughly 1/4 point; at that point, the relationship between rates and points becomes both less linear and more steeply sloped, particularly when points are less than -0.5. This non-linearity of the rate/point curve is quite common, but the degree of curvature depends on the market environment at the time of pricing and the product being priced. We will discuss the factors driving this phenomenon later in this section, as it strongly influences the pricing of loans with non-standard or impaired credit.

To create a rate/point matrix for a program at a point in time requires the lender to simultaneously price each 12.5 basis point rate increment. For each rate stratum, the lender values all the components of a loan, including both proceeds and costs, based on optimal execution determined using the methodologies discussed previously. Par (or 100%) is then subtracted from the loan's net value to determine the points either paid by, or rebated to, the borrower.

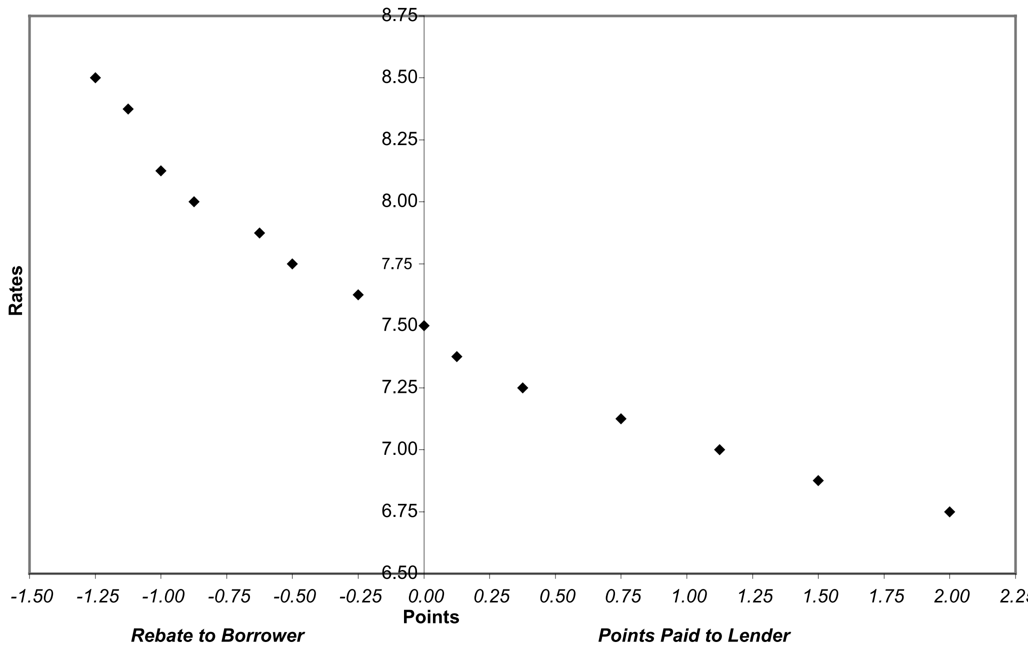
Examples of how loans with different note rates are priced are shown in Exhibits 11 and 12. Exhibit 11 shows the pricing of two conforming-balance loans with different note rates where optimal execution (determined by the previously discussed process) is in the form of agency pools with a 6.0% coupon. The key components are 1) where the newly-issued agency passthrough would trade, 2) where the servicing components are valued, and 3) the cost of GSE-based credit enhancement. In this example, the 6.25% note rate is associated with a 0.75 point charge; the 6.625% note rate would result in points of –1.125, or a rebate to the borrower of 1.125 points.

Exhibit 12 shows a hypothetical pricing example of two loans with different note rates where a private-label 6.5% coupon deal is utilized as the securitization vehicle. The note rates shown in the example reflect both the wide range of note rates included in private-label deals, and the ability to include loans with note rates below the coupon rate. In the example, the 6.25% note rate would be grouped with the discount loans, and would require the creation of a small amount of PO (in order to gross-up the note rate of the remaining balance of the loan to the deal coupon). This reduces the proportion of the loan sold with the senior securities; that portion of principal is priced at the discounted level of the PO. The loan with a 7.0% note rate is associated with the creation of excess servicing, which is sold as a WAC IO and priced accordingly. As with the previous example, par value is subtracted from the net pricing of the loans in order to determine the points paid or received by the borrowers for both note rates.

It is helpful to note the factors influencing the relative pricing of the different note rates in the two examples shown in Exhibits 11 and 12. Looking first at Exhibit 11, note that both note rates are priced using the same passthrough coupon; therefore, the servicing and the g-fee buydown multiples are the drivers of execution. When more note rates are evaluated, additional passthrough coupons are utilized. Therefore, relative pricing in the passthrough coupon stack influences the pricing levels across the broad range of note rates, as illustrated by the rate/point curve introduced in Exhibit 10.

This is not the case for private-label execution, since the economics typically dictate that only one coupon at a time is viewed as optimal. In this case, the size and pricing of the WAC PO exert some influence on the pricing of discount loans. However, the primary

EXHIBIT 10
Plot of Rates Versus Points



factors driving the pricing across note rates are the multiples assumed for the valuation of servicing.

Without minimizing the importance of other factors, the shape and non-linearity of the rate/point curve illustrated in Exhibit 10 can be viewed as a function of servicing multiples (and g-fee multiples for agency pricing). The value of servicing, as with any IO-like security, is strongly influenced by its expected prepayment performance. As higher note rates typically are associated with faster prepayments, the valuation multiples placed on servicing decline as note rates increase. This causes the level of rates to rise at an increased pace for a given decrease in points. As note rates reach a certain level, the curvature of the rate/point relationship becomes increasingly pronounced. This non-linearity of rates for low and negative points can be viewed as a corollary of price compression for premium-coupon MBS.

Lenders have a distinct incentive to limit the points rebated to borrowers. In the same way investors exhibit a reluctance to put principal at risk by buying loans above parity, lenders are reluctant to pay large rebates to borrowers; since borrowers can often refinance higher-rate loans fairly quickly (particularly for loans without prepayment penalties), paying large rebates puts the lender at risk of quickly losing the points paid up-front. There are a few different ways for lenders to mitigate this risk. One way is for lenders to alter servicing values. For example, the declining multiples placed on higher-rate servicing can be further reduced by the lender through a manual adjustment. They can also explicitly cap the rebate paid for products viewed as especially vulnerable to these types of highly competitive refinancing behaviors. These types of adjustments act to further steepen the rate/point curve, and serve to discourage borrowers from taking loans associated with large rebates.

Utilizing the Rate/Point Matrix to Price Impaired Loans

In a prior section, we described the utilization of add-ons to price a variety of out-of-program attributes. The general practice of lenders is to create pricing matrices for loan programs with a stated set of attributes—i.e., minimum FICO score, required levels of documentation, maximum LTV and combined LTV (CLTV), and so on. To price alternative attributes for a product, lenders use a matrix that specifies add-on pricing for both individual characteristics and combinations of factors. As an example, the baseline characteristics of a conforming fixed-rate loan might require full documentation, a

EXHIBIT 11

Sample Calculation of Points Given a Lending Rate Assuming Agency Pool Execution

Assumes 20 basis point guaranty fee, all values hypothetical.

Note Rate	**6.25**	**6.625**
Optimal Passthrough Coupon[1]	6.0	6.0
MBS Passthrough Price	*101*	*101*
Servicing Values:		
Base Servicing		
Basis Points	25	25
Value (assuming 5x multiple)[2]	1.3	1.3
Excess Servicing		
Basis Points	0.0	17.5
Value (assuming 5x multiple)[2]	0.0	0.9
Guaranty Fee Buydown		
Basis Points	20	0
Value (assuming 5x multiple)[2]	−1.0	0.0
Total Value of Servicing and Buydowns	*0.3*	*2.1*
Gross Value (Passthrough Price plus Value of Serviding and Buydowns)	**101.2500**	**103.1250**
Total Costs (Including Origination, Administrative, and Hedging Costs, as well as an allocation for a targeted profit margin)	2.0	2.0
Net Value	**99.2500**	**101.1250**
Discount Points (100 – Net Value)	***0.7500***	***−1.1250***

Notes: [1]*Determined by the methodology described previously, and illustrated in Exhibit 3;* [2]*For this example, the assumed multiples are the same for both note rates. In practice, the multiples are generally different, due to different valuations placed on the servicing of the two note rates. In addition, the example assumes the same multiple for Base and Excess servicing; in practice, the multiples will probably be different;* [3]*For 6.25% note rate, 20 basis points of g-fee must be bought down. No buydown is required for 6.625% note rate, since the 20 basis point g-fee can be paid out of the note rate after base servicing.*

minimum FICO score of 720, and an 80% CLTV. A loan with a FICO score between 690 and 720 might have an add-on of 1/4 point; a loan with an LTV between 81% and 85% might also require a quarter-point add-on; and a loan with a combination of a lower FICO and higher CLTV may be given a one-point add-on (The fact that the add-ons for multiple attributes are often not additive reflects the recognition of the interaction of multiple risk factors, or *layered risk*, on credit performance).

Once the add-ons are computed, the revised note rate of the loan can be determined using a rate/point matrix for the product being priced. In theory, the

EXHIBIT 12

Sample Calculation of Points Given a Lending Rate Assuming Private-Label Execution

All values hypothetical.

Note Rate	**6.25**	**7.00**
Optimal Passthrough Coupon[1]	6.5	6.5
MBS Passthrough Price	*103*	*103*
Net Note Rate[2]	*5.991*	*6.741*
Senior Bonds: 1 point behind Fannies		
Premium Bond—95% of Deal		96.90
Discount Bond—87.2% of Deal	88.944	
Servicing & PO Values:		
Base Servicing[3]		
Basis Points	25	25
Value (assuming 4x multiple)		1.0
Value (assuming 5x multiple)	1.3	
Excess Servicing[3]		
Basis Points	0.0	24.1
Value (assuming 4x multiple)	0.0	0.964
PO:		
N/A		0.0
7.8% of deal @ 60	4.68	
Subordinates:		
5% of deal @ 12 points behind Fannies	4.4	4.4
Gross Value	**99.274**	**103.264**
Total Costs (Including Origination, Administrative, and Hedging Costs, as well as an allocation for a targeted profit margin)	2.0	2.0
Net Value	**97.2740**	**101.2640**
Discount Points (100 – Net Value)	***2.7260***	***−1.2640***

Notes: [1]*Determined by the methodology described previously, and illustrated in Exhibit 3;* [2]*Assumes 25 basis points of Base Servicing, and 0.9 basis points in Trustee Fees;* [3]*The example assumes the same multiple for Base and Excess Servicing for the 7.0% note rate. In practice, the multiples will probably be different.*

borrower can simply take the loan and pay the full value of the points; in practice, however, lending rates are generally increased in order to reduce the up-front costs of the loan after taking add-ons into account. Exhibit 13 shows an example of the rate adjustment for a loan requiring one point of add-ons, using the rate/point

EXHIBIT 13
Example of Converting Add-Ons Into Rates, Using the Rates/Point Matrix

Points	Note Rate
2.000	6.750
1.500	6.875
1.125	7.000
0.750	7.125
0.375	7.250
0.125	7.375
0.000	7.500
−0.250	7.625
−0.500	7.750
−0.625	7.875
−0.875	8.000
−1.000	8.125
−1.125	8.375
−1.250	8.500

Notes: 1) Initial Rate: 7.25% w/ 3/8 of a point; 2) Borrower pays 1 point in add-ins; 3) All-In Rate: 7.875% w/ 3/8 of a point.

matrix shown in Exhibit 9. The original note rate for the borrower was 7.25% with 3/8 of a point. If the borrower still wishes to pay 3/8 of a point up front, the loan's note rate would have to be increased. In the example, 3/8 of a point less a full point (i.e., the total add-on) is equivalent to −0.625 points. The pricing matrix shows that −0.625 points is associated with a rate of 7.875%, or 62.5 basis points higher than the base rate for the program.

The factors used to calculate total add-ons are adjusted periodically to reflect changes in guaranty fees (for agency paper) or the structure and pricing of subordinates (in private-label securities). The methods used to calculate add-ons for agency and private-label execution differ. For loans being priced to agency execution, the GSEs typically specify an incremental guaranty fee for both individual and combined attributes. The additional g-fee then is converted to an add-on value by applying a multiple (which typically is the multiple used for buydowns of loans with at-the-money note rates).

Calculating add-ons for private-label execution is more complex. Each attribute or combination of attributes is evaluated through a rating-agency model to evaluate how much additional credit enhancement would be required, and revised levels are estimated for each subordinate tranche. Once this is accomplished, the subordinate sector is revalued, using the methodology described previously and outlined in Exhibit 7. The goal of this exercise is to compute, in price terms, the incremental cost in execution for the attribute or attributes in question, which is utilized as the add-on for pricing purposes.

Finally, the relationship between rates and points (illustrated by the shape of the rate/point curve, as shown in Exhibit 10) has a significant impact on the rates paid by consumers after add-ons are taken into account, and thus impacts the pricing of mortgage credit to the borrower. Once total add-ons are calculated, the tradeoff between rates and points is dictated by the values calculated in the rate/point matrix. This has important implications for the pricing of impaired loans where add-ons are necessary. Impaired, originated for products with steeper rate/point curves (especially when points are in negative territory), will have a higher rate than for products with a flatter curve and, presumably, less exposure to prepayments when adjusted for add-ons. In addition, the relationship between rates and points is not constant over time, as it is strongly influenced by market values for IOs and servicing. This means that measures such as "spread at origination," which uses a loan's note rate as a proxy for impairment, can be misleading; the incremental rate associated with impairment changes with market values and sentiment.

SUMMARY

This article outlined the processes utilized for generating loan pricing for fixed-rate products. Similar logic is utilized for the pricing of other products, such as adjustable-rate mortgages (ARMs), although the securitization mechanics are somewhat different. For example, there is no TBA market for agency ARMs to dictate pooling attributes and coupons. Therefore, all agency ARM pools trade in specified-pool form, and coupons are pool-specific (and generally carried out to three decimal places). In addition, the GSEs do not offer guaranty-fee buydowns for ARMs, which means that altering a pool's coupon is a function of both the pricing of servicing and the lender's willingness to hold servicing on its balance sheet. Finally, the menu of ARM products is much more diverse than for fixed-rate loans, with variations in parameters such as reset index, cap structure, and interest-only period (There are literally dozens of product designations or "sub-types" specified by the GSEs for 5/1 hybrid ARMs, for example). In order to allow the creation of securities having marketable pool sizes, pooling practices allow the inclusion of loans with note rates below the pool coupon; the gross WACs and coupon are weighted averages of the loans included in the pool.

We conclude by noting that some of the practices discussed in this article are not applicable at this writing. For example, virtually all conforming-balance loans are being securitized through agency programs; the lack of acceptance of private-label subordinates in the markets prevailing in early 2008 makes the private-label securitization option uneconomical. The cyclical nature of both the mortgage and financial markets leads us to conclude that, over time, it is likely that private-label alternatives to agency execution will again become viable. This will occur once investor demand returns for private-label senior and subordinate securities, and spreads tighten to the point where private-label securitizations again become an economically feasible option.

ENDNOTES

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[1]A historical development of the U.S. mortgage market is provided in Fabozzi and Modigliani [1992] and Green and Wachter [2005].

[2]See, for example, Geanakoplos [2002].

[3]Prior to 2008, the balance limits were changed annually based on the change in the average purchase price of a home, as reported by the Federal Housing Finance Board. At the beginning of 2008, the GSEs' maximum loan size was $417,000. However, the previously mentioned Economic Stimulus Act of 2008 made the limits a function of the median home price in an "area," subject to a national ceiling of $729,750.

[4]Note that many lenders categorize loans as being "conforming" if they generally qualify for GSE pooling based on a set of criteria. These parameters include, but are not limited to, the balance limits described previously. For clarity's sake, loans that meet the balance limit criteria are referenced as "conforming-balance loans" irrespective of their other attributes.

[5]The term "passthrough" indicates that principal and interest is passed on to investors pro rata with their holdings. Using this definition, the senior portion of a private-label deal is technically not a passthrough, because principal is redistributed within the structure; however, the term is nonetheless utilized to describe the senior cash flows before they are restructured.

[6]In a *trade* the security is identified (e.g., Fannie Mae 6.0s) and a price is set, but the actual pools identities are not provided by the seller until just before settlement.

[7]While the amount required to be held depends on the product, most fixed-rate securitization vehicles require 25 basis points of servicing to be held. Hence, base servicing is sometimes called "required servicing;" the requirement stems from the need for servicers to hold an economic asset that can be seized in the event the servicer becomes insolvent and enters receivership.

[8]In actuality, originators may sell or otherwise dispose of servicing; therefore, the servicer need not be the same entity as the originator. For clarity's sake, however, we assume that the originator holds the servicing strips.

[9]For example, the pooling options for a 6.125% loan are limited. The loan cannot be pooled into a 6.0% pool due to the requirement that 25 basis points of base servicing must be held. Quarter-coupon fixed-rate pools trade quite poorly, and pooling the loan with a 5.0% coupon would require a large amount of excess servicing to be held by the originator. Therefore, the loan would almost always be pooled into a 5.5% coupon.

[10]As a general rule, the greater the degree of coupon dispersion, the higher the Contributed WAC of the pool, even if the WAC of the premium loans is the same.

[11]Unlike the WAC IO, the WAC of the PO is not the same as the WAC of the discount loans, since the proportions are dictated by the PO percentage.

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