# VIII RESIDUAL INTERESTS VALUATION AND MODELING

## INTRODUCTION

Banks have realized and may continue to realize significant losses resulting from downward adjustments in the value of residual interests they hold in securitizations. As a result, considerable emphasis is placed on reviewing the residual interest valuations, including the assumptions and valuation model structure, during the examination process. In December 1999, the Federal banking agencies issued the *Interagency Guidance on Asset Securitizations Activities* to remind financial institutions of fundamental risk management practices governing asset securitizations, including valuation and modeling processes. This guidance states that residual interests that lack objectively verifiable support or that fail to meet the supervisory standards set forth in the guidance will be adversely classified by the examiners as loss and disallowed as assets of the institution for regulatory capital purposes. The contents of this guidance are discussed in greater detail in the Risk Management and Examination Issues chapter. In addition, definitions for the terms used in this chapter are included in the Glossary and are consistent with the definitions included in the regulatory capital rules and the language used in the Regulatory Capital chapter.

Residual interests refers to any on-balance sheet asset that represents an interest (including a beneficial interest) created by a transfer that qualifies as a sale (in accordance with GAAP) of financial assets, whether through a securitization or otherwise, and that exposes a bank to any credit risk directly or indirectly associated with the transferred asset that exceeds its pro-rata share of that bank's claim on the assets, whether through subordination provisions or other credit enhancement techniques.

Regardless of the terms used or structure of the securitization, any interests that continue to be held by the selling bank in a securitization where losses are not shared pari-passu should be considered residual interests for accounting, capital, and valuation purposes. For example, while the cash flows and losses associated with seller's interest are typically shared on a pro-rata basis, there are some situations where the transaction is structured so that even the seller's interest absorbs more than its pro-rata share of losses. Again, it is important to look at the substance of the interests that continue to be held by the selling bank and understand their characteristics, not just their names, to determine their exact risks.

This chapter discusses the accounting requirements, valuation models, modeling risks, model evaluation, and model validation techniques used to account for and value the residual interests. It also provides general examination guidance when reviewing banks' models and assumptions.

## ACCOUNTING REQUIREMENTS

FAS 140 requires a transferor (bank)[36] to recognize an immediate gain (or loss) on a transfer of the receivables that qualifies for sale accounting. As part of this process, the previous carrying amount of the transferred receivables is allocated between the assets sold and the interests the seller retains (including any residual interests) based on their relative fair values at the date of the transfer.

Any residual interests (other than interests that must be accounted for as derivatives in accordance with FAS 133) that can contractually be prepaid or otherwise settled in such a way that the seller would not recover substantially all of its recorded investment must be subsequently

[36] For the purposes of this chapter, the transferor is assumed to be the bank under examination and the term bank is used rather than transferor as stated in FAS 140. In addition, this chapter also assumes the bank is the servicer.

measured at fair value like either an available-for-sale debt security or a trading assets. Consequently, banks must ascertain the fair value of these residual interests on a periodic (at least quarterly) basis.

Determinations of fair value at the date of transfer and at subsequent measurement dates should be based on reasonable, conservative assumptions about such factors as yields, discount rates, projected credit losses, and payment rates. Examiners should expect the estimated value of residual interests to be supported by verifiable documentation in accordance with GAAP.

The concepts presented in FAS 140 for the measurement of fair value can be applied to both initial and subsequent valuations. FAS 140 does not introduce a new definition or concept of fair value; rather, it continues to define the fair value of an asset as (paragraph 68) "the amount at which that asset could be bought or sold in a current transaction between willing parties, that is, other than in a forced or liquidation sale. Quoted market prices in active markets are the best evidence of fair value and shall be used as the basis for the measurement, if available." Paragraph 69 further states that "if quoted market prices are not available, the estimate of fair value should be based on the best information available in the circumstances."

The estimates of fair value should consider prices for similar assets and the results of valuation techniques to the extent available in the circumstances, such as the present value of estimated future cash flows, option pricing models, and matrix pricing. Most banks cannot find reliable quoted market prices for the assets retained in the securitizations, and thus, commonly rely on the present value of estimated future cash flows valuation technique. FAS 140 recognizes this limitation and provides the following guidelines (paragraphs 69 and 70):

- Assumptions used for interest rates, default rates, payment rates, and volatility should incorporate what market participants would use in similar circumstances.
- Future cash flow estimates should be based on reasonable and supportable assumptions and projections. All available evidence should be used to determine the assumptions giving appropriate weight to the evidence that can be verified objectively.
- If a range of possible cash flow amounts and timing is used, the bank should consider the likelihood of these outcomes either directly, if applying an expected cash flow approach, or indirectly through a risk-adjusted discount rate, if determining the best estimate of future cash flows.

In response to question 77 of FASB Staff Implementation Guidance, *A Guide to Implementation of Statement 140 on Accounting for the Transfers and Servicing of Financial Assets and Extinguishment of Liabilities (Q&A)*, the FASB staff expresses a preference for an expected present value technique using a multi-scenario approach versus the traditional "best estimate" techniques. Expected present value techniques are discussed and illustrated in general terms in FASB Concepts Statement No. 7, *Using Cash Flow Information and Present Value in Accounting Measurements.* In a multi-scenario approach, a bank would forecast several different, but possible, expected cash flows and then apply a weight that represents the likelihood of each cash flow occurring. For example, if the bank forecasts a range of expected cash flows in the first month of $100, $200, and $300, with probabilities of occurrence of 20 percent, 50 percent, and 30 percent, respectively, the expected cash flow for the first month in the discounted cash flow model using this technique would be $210[37]. This simplistic example contains only three possible scenarios, but in reality, valuations should include more possible scenarios (question 77).

## Cash-Out Technique

When estimating the fair value of the residual interests, the bank's assumptions should reflect the period of time that its use of the asset is restricted, any reinvestment income, and potential losses

[37] Deloitte & Touche, LLP, *Securitization Accounting: The Ins and Outs (And Some Do's and Don'ts) of FAS 140, FIN 46R, IAS 39, and More...,"* June 2005 edition.

due to uncertainties. The cash-out valuation technique is based on the time when the cash comes out of the trust (hence the term "cash-out") and is returned to, or made available to, the transferor (bank). For example, if the bank holds a spread account as one of its residual interests, it would have to determine when it expects to receive those funds. If the securitization documents state that the spread account cannot be released to the bank until the investors' certificates are fully paid, then the bank is not entitled to the cash until the expected final maturity date of the investor certificates. The bank must discount the cash flows from the date the spread account becomes available to the bank, which, in this scenario, would be the expected final maturity date of the investor certificates. Ultimately, when estimating the value of the credit-enhancing residual interests, banks' valuation techniques must encompass both the entire period that its use of the asset is restricted and the potential loss due to uncertainties.

## Cash-In Technique

In contrast, the cash-in method assumes the discount period ends when the trust receives the cash, hence the term "cash-in," meaning the time when the cash comes into the trust. However, the bank may not be entitled to the cash until a later date; therefore, the bank's use of the cash is restricted. The trust may hold the cash as additional protection for the investors and release it to the bank only after the required terms and conditions of the securitization agreements have been met. Credit uncertainties associated with the transferred receivables arising subsequent to the cash coming into the trust, and while the trust holds the cash, are not always considered in the valuation technique under a cash-in methodology. Also, since the trust holds the cash until some future point in time, the bank's use of the cash is restricted until the trust releases the cash to the bank. Using a cash-in method is inappropriate for credit enhancements such as cash reserve accounts and subordinated beneficial interests since it does not cover the period of time that the bank's use of the cash is restricted and may not capture all credit uncertainties that a market participant would consider. Uncertainties may include the need to draw on the cash to cover trust expenses, such as credit losses allocated to investors' certificates, funding a spread account, servicing costs, and investor coupons.

The "cash-out" valuation technique may be an acceptable method, but in no instance is the "cash-in" valuation technique acceptable.

## VALUATION MODELS

Development and implementation of valuation models and review of these models present inherent challenges. Valuation models are an abstraction from reality and can never be perfectly right. Plus, they are only good if users understand them completely. Often banks purchase or contract out the creation of a valuation model without fully understanding the model's design. Models are typically complex as they must take into account all aspects of each securitization transaction, including the optionality embedded in most transactions, which can significantly affect the resultant values.

The most common type of valuation model is a **static cash flow model**. In a static cash flow model, the bank estimates future cash inflows and outflows based on a static environment (such a fixed payment rate, etc.) and then it discounts the net cash flows using an appropriate discount rate. Static models have a basic fundamental flaw in that they ignore the fact that the point in time estimates may or may not happen. They assume or imply that the performance parameters put into the model are 100 percent accurate, which is not the case. While not perfect, static models may be the best some banks can do. Some banks may not have enough information to develop an accurate distribution of assumptions, and modeling using the probability of specific events occurring is typically not cost justified. Since banks cannot predict the expected cash flows with 100 percent certainty, the static model should at least incorporate stress scenarios. A static model with systematic, logical stress-testing may give management a better understanding of its exposure than a more complex model.

## Cash Flows

Valuation models typically have two parts. First, the cash flows thrown off by the underlying receivables must be modeled. Next, the allocation of those cash flows to the various claimants must be modeled. Allocations are dictated by the securitization documents and are referred to as the cash flow waterfall. Typically, cash flows are allocated to the certificate holders, credit enhancements, and residual interest holders.

The most difficult part of valuing the residual interests is predicting the behavior of the underlying receivables and, thus, the cash inflows they generate. For most revolving securitizations, each series represents an undivided interest in all the receivables of the trust (**socialized trusts**); thus, valuations should be done at the master trust level. Basic cash flow models use various estimates for receivable performance such as payment rate, yield, charge-off rates, and delinquency rates that are then discounted using an appropriate discount rate to produce a discounted present value estimate.

Cash flows into a securitization vehicle (trust) primarily come from interest, fees, and principal collections. Credit quality, competition, and market interest rates can cause significant variations in these sources. The amount of cash flowing into the trust is also dependent on the amount of outstanding principal receivables that generate the cash flow. When determining the value of a CE IO strip, the amount of outstanding principal is forecasted over the valuation or discount period, and the various cash flow sources identified above are calculated against the expected outstanding principal balance.

Banks commonly have one model that generates the valuation (typically the discounted cash flow model), referred to as the valuation model, and several other separate models that are used to predict the cash flow components, referred to as forecasting models. Forecasting models vary in complexity and can be based on simple historical data or vintage data, or can be more complex by incorporating the impact of different economic conditions on the performance of a specific pool of assets.

Cash flow allocations may be complex given the embedded optionality in most structures, but they are a straight-forward mechanical exercise and not typically assumption driven. Allocations must mirror the requirements in the pooling and servicing agreement. Examiners should review the cash flow distribution section of the pooling and servicing agreement (and the prospectus) and determine if the actual model used mirrors the allocations specified in the documents.

## MODELING RISKS

No active market exists for many residual interests, and, as a result, there generally is no marketplace from which an arm's length market price can be readily obtained to support the residual interest valuation. Many banks rely on quantitative models to determine the fair value of the residual interests. Attempting to determine the fair value of any asset using quantitative models presents certain risks that may lead to inappropriate values. Valuation models present two major sources of risk, either of which could produce asset values that are overstated:

- Inappropriate assumptions used to value the assets.
- Mechanical errors in the model construction.

The cash flow assumptions are impacted by the yield generated by the pool of assets and the level of credit and prepayment risk associated with the underlying receivables. As a result, the values of residual interests are extremely sensitive to changes in the underlying assumptions caused by the changing performance of the underlying receivables. In response to this elevated risk, the banking agencies revised their risk-based capital rules by requiring higher (ratings based approach or dollar-for-dollar) capital for residual interests. While the risk-based capital ratios are typically harmed (lowered) by overstated residual interest values due to the dollar-for-dollar

capital requirement, the leverage capital ratio is inflated by overstated residual asset values. In addition to the above noted risks, examiner should also be aware of the risk related to data input errors. Bank management should have sufficient controls ensure data inputs are accurate. Examiners should refer to the Regulatory Capital Chapter for further discussions on regulatory capital rules.

## Inappropriate Assumptions

Estimating the fair value for residual interests might be based on unjustifiable assumptions about expected future cash flows. Market events can affect the discount rate, payment speed, or performance of the underlying assets in a securitization transaction and can swiftly and dramatically alter the value of the residual interests. There is inherent uncertainty and volatility regarding the initial and ongoing valuation of CE IO strips and other residual interests. When a bank overvalues its residual interests it inappropriately generates “paper profits" (or masks actual losses) through incorrect cash flow modeling, flawed loss assumptions, inaccurate payment estimates, and inappropriate discount rates. This situation often leads to inflated earnings and capital levels, making the bank appear more financially sound than it really is. Assessing the reasonableness of model assumptions is probably the most significant and challenging aspect of the examination of securitization activities. This area is discussed in greater detail in the Evaluation of Model Assumptions section of this chapter.

## Model Construction

Errors in the model construction can lead to inaccurate valuations. Valuation construction errors can range from basic formula errors to more complex issues like the failure to adequately capture all possible cash flow distributions. As noted previously, the model must capture all cash inflows and all possible outflows (allocations), including any and all features that are specified in the securitization documents. If the model is not built to capture all of these features, the resultant values of the residual interests will be impacted, the degree of which depends on the error and the current situation.

# MODEL ASSESSMENT

The evaluation of the models and each of the assumptions requires considerable judgment and knowledge of valuation techniques, market factors that may affect the fair value, and actual and expected market conditions. As a result, examiners often consult with capital markets and accounting specialists for guidance.

## Evaluation of Model Construction

In order to review the valuation model construction, examiners should first obtain and review the bank’s most recent internal or external model validation reports and corresponding workpapers or programs. They should assess the validation review’s scope, process, and results. If any of these steps are incomplete or the results reveal flaws, the examiners should attempt to obtain the bank’s actual model.

When reviewing a valuation model, examiners should be able to track the cash flows through the model to ensure that it accurately captures the cash flow priorities (waterfall) as stated in the securitization documents, including all nuances and features that can alter how cash is allocated. For instance, if the securitization documents state that a spread account will be funded if the excess spread falls below a certain threshold, management should be able to demonstrate to the examiners that the model does in fact capture this feature. If at the time of the examination, the excess spread is above the threshold and thus the spread account is currently not being funded, the model’s ability to trap this cash may not be obvious. Management should be able to simulate the occurrence of a spread account trigger and demonstrate to the examiners how the model

captures this event. The examiners should be able to see in the actual model that cash flows are in fact diverted to the spread account as required. They can apply the same type of assessment techniques to other cash flow allocation specifications. Like valuation models, forecasting models used to forecast the various assumptions used in the valuation model also need to be assessed to determine if they are constructed properly.

Another method of verifying that the model captures all optionality embedded in the securitization is to run parallel analysis using a separate but comparable model. The challenge is to find a comparable model, or a shelf model that can be altered to be comparable to the requirements of the bank's securitization. The capital markets examination support section may be able to help an examiner run a parallel analysis. Also, external auditors often use a model developed by a specialist (third-party or internal) to value the residual interests in order to corroborate the reasonableness of the value calculated by the bank. If external auditors use such a technique, examiners should consider reviewing the auditor's workpapers and/or results of their review.

## Evaluation of Model Assumptions

Management must predict the monthly performance of the pool of receivables in the master trust over the expected life of the receivables. Depending on the volume of securitization activities, forecasting tools may vary from simplistic methodologies, such as a basic **roll-rate** model built using simple spread sheets to predict credit losses, to more sophisticated techniques, such as **econometric models** that assess the impact of the economy on the performance of a specific pool of assets. Bank management needs to determine the appropriate forecasting approaches. This decision should be based on the volume of securitization activities (and related financial statement impact), complexity or volatility of the underlying asset pool, the range of differing characteristics of the asset pool (prime, subprime, secured, unsecured, pricing), available historical data, data mining capabilities, the complexity of the securitization structures, available technical resources, and management expertise. This is not to say that it is acceptable to have less reliable forecasting if any of these aforementioned items are limited, but, instead, management should determine the best technique for the activity (considering both volume and complexity) the bank is engaged in, ensuring sufficient compensations are made for limited areas (such as the need to use proxies if historical data is limited), and decisions about investments in more advanced technology or expertise to adequately meet cash flow forecasting needs.

After forecasting the expected cash flows generated from the underlying receivables, management must then determine the appropriate discount rate applied to the forecasted cash flows. Determining the appropriate discount rate, which is discussed later in this section, is one of the most challenging and controversial aspects of the valuation process.

Forecasting is not isolated to determining the value of the residual interests, but is also used for other business purposes, such as budgeting and the allowance for loan and lease losses (ALLL). As a result, there should be some correlation between performance metrics assumptions used for the various business purposes. For example, the charge-off assumptions used for IO strip valuation purposes should have some relationship with the expected loss rate for ALLL adequacy purposes. Any significant variations should be explained and may reveal a potential flaw in either the valuation model assumptions or the assumptions used for other business purposes. Valuation models are only as good as the assumptions and data put into the models. The remainder of this section discusses the various residual interests and an assessment of the assumptions used to value these assets.

### *Credit-Enhancing IO Strips*

The valuation of the CE IO strip is based upon the present value of future cash flows in excess of amounts needed to service the certificates and cover credit losses and other fees of the trust. CE IO strips provide the first line of defense against credit losses on the receivables supporting the investor certificates, and, as a result, are typically the most subordinated residual interests in a

credit card securitization, presenting the greatest risk and volatility. Also, the value assigned to the CE IO strip is a significant driver of the resultant gain on sale for the initial and periodic transfer of the receivables; thus, impacting earnings performance, asset quality, and capital levels.

Cash Flow Assumptions

For a discounted present value technique, bank management must make certain assumptions about cash inflows and outflows generated by the receivables allocated to the investor certificates[38]. Typically, banks use historical analysis, baseline analysis, or a multiple-scenario analysis**,** or some combination of all three, to project performance. Using historical analysis for forecasting can be as simple as viewing historical data on a portfolio basis or more sophisticated by segmenting the portfolio by vintage, credit scores, or other criteria reflecting the predominate risk characteristics of the underlying receivables (asset type, size, interest rate, term, geographic location, etc.) and ensuring the data used in the forecasting captures the accounts' life cycles. Baseline analysis simply assumes what the bank is experiencing today is what it will experience in the future. Multiple-scenario analysis incorporates different possible management or economic scenarios into its forecasting. Every portfolio metric is impacted to some degree by the same forces, such as changing origination, account management, or collection strategies; account life cycles; economic conditions; seasonality; and competition. The challenge is to quantify the impacts on the various portfolio metrics. More sophisticated techniques involve segmenting the receivables into groups based on the predominate risk characteristics of the underlying receivables, incorporating macroeconomic factors, integrating seasonality, incorporating changing management strategies or scenarios, and modeling over the account lifecycles. Various statistical and quantitative techniques may be used to incorporate these variables.

*Yield assumptions*:

The yield represents finance charge collections and ancillary fees, such as annual fees, late fees, and over-limit fees, and is expressed as an annualized percentage of the outstanding principal balance of the pool of receivables in the master trust. The yield represents the expected cash inflow that is available to cover the expected expenses (cash outflow) of the securitization series within the master trust. When forecasting the yield, the assumptions should not include interchange fees or cash advance fees since these fees are not generated by the underlying receivables that have already been sold. They are generated by future transactions for interchange or by the future receivables created by cash advances.

The yield can be impacted by many different factors, and forecasting the yield should consider these influences. For example, the yield forecast should consider the presence of any teaser rates or different pricing structures in the asset pool. These should be quantitatively identified, monitored, and incorporated into forecasting models. Also, since the CE IO strip valuation is based on anticipated cash flowing into the master trust, the volume and trend of delinquent accounts impacts the cash yield. If delinquencies are on the rise and this trend is expected to continue based on internal and external factors, management should forecast a corresponding decline in its yield forecasts, all else held equal. The yield forecast may also encompass expectations regarding the interest rate environment, especially for variable-rate receivables.

Management should also track and assess the impact of convenience users on yield forecasts. If recent marketing solicitations are likely to attract and result in a higher proportion of convenience users, these will likely result an overall compression of the yield since convenience users do not incur finance charges. The bank should also incorporate a reasonable assumption or adjustment

[38] Cash flows should be calculated on the amount of credit card receivables supporting the investor certificates, and the valuation model should not include credit card receivables designated as seller's interest in the outstanding principal amount of receivables. For example, if the master trust has $12 billion in credit card receivables of which $2 billion represents seller's interest, the various cash flows (yield, charge-offs, etc.) will be calculated using the $10 billion that represents the investor certificate's collateral.

to the projected yield for cardholder payments that are returned for insufficient funds. Payments that are ultimately returned for insufficient funds compress the cash yield since no cash is ultimately collected.

The forecasted yield should also reflect fee-waiving practices. Management has flexibility with regards to certain fees, such as late or over-limit fees, and, in an effort to retain customers, management may waive these fees for certain types of account holders. Examiners should review the bank's fee policies and its actual practices. If the bank's policy has recently changed to either lower, increase, or alter fee assessment amounts or criteria, these changes should be reflected in the yield forecast. If the bank relies solely on historical information to project expected yields and does not make adjustments for changes in policies or practices, the assumptions may not be reasonable. In addition, if historical data includes cash advance fees, management should make an adjustment to the forecast to ensure these types of fees are not included in the forecast.

This manual provides only a few examples of factors that can influence the yield, and examiners should be aware of other factors occurring at the institution that may impact forecasting. Management's yield forecast and related documentation should be sufficiently robust to capture those nuances and strategies that impact the estimation and should be sufficiently transparent to allow for senior managers, the board, and the examiners to fully understand and assess the reasonableness of the various components of the yield and all cash flow assumptions.

*Charge-off rate:*

The charge-off rate measures the amount of credit card balances charged-off, or expected to be charged off, expressed as an annual percentage of the outstanding principal balance of the underlying receivables in the master trust. The charge-off rate has two components: the contractual loss rate and the non-contractual loss rate. Contractual losses are those losses that are recognized in accordance with the bank's charge-off policies based on customers' payment performance. Non-contractual losses arise primarily due to bankruptcies and to a lesser extent deceased cardholders.

Modeling credit risk in the underlying receivables is very challenging, particularly for banks experiencing financial difficulties. Using historical analysis to predict future credit losses presents both opportunities and traps. It can be easily supported and documented, but the past is not always a reliable predictor of future events. Historical analysis can also be skewed in a bank experiencing rapid growth as performance ratios are compressed and perhaps masking credit deterioration. In addition, the length of historical data can distort results. If a bank is experiencing deteriorating credit quality, it may opt to use a longer period of historical losses, which would result in a loss assumption that is probably too low. Conversely, if the bank is experiencing improving credit quality, it may opt to shorten the historical period. While this situation may be acceptable, banks must support their data manipulation decisions.

Banks use various historical analysis methods to monitor credit risk. The Risk Management Examination Manual for Credit Card Activities provides more discussion on the various credit monitoring tools that banks use when determining credit losses. These tools could also be used in the bank's cash flow valuation models. One tool is vintage analysis, which allows the bank to compare issues at a similar age. Roll-rate analysis, which depicts the percentages of accounts or receivables rolling between delinquency buckets and onto default, is used to compliment vintage analysis.

Roll-rate analysis is a simplistic method for forecasting charge-offs and is relatively reliable for the first six months of projected contractual losses; however, it becomes less reliable in later timeframes. With a roll-rate model, predictions are made by computing a moving average of historical roll rates. As noted, the length of historical data can skew the results. The roll-rate technique certainly has its limitations, particularly since it does not distinguish partial payments or payments that prevent an account or receivable from rolling forward, etc. Changes in the bank's

re-aging policies also impact charge-off forecasting. If the bank either liberalizes or tightens its re-aging practices, management should adjust the data used to predict future losses accordingly.

If bankruptcies represent a significant percentage of charge-offs, predicting future charge-off rates using a simplistic roll-rate analysis may not be sufficient. While predictive models and techniques are improving, the timing and amount of bankruptcies are difficult to forecast and this increased uncertainty should be captured in the valuation process by either increasing the discount rate applied to the cash flows or applying a more conservative charge-off rate assumption. Management must also consider the potential impact changing laws, regulations, and accounting rules may have on charge-offs and all forecasts, such as the October 2005 changes in the bankruptcy rules. Again, if using historical data, management should make some quantitative adjustment to its forecast to capture the impact of changing laws on its estimation of future charge-offs.

Many institutions are enhancing their loss forecasting by moving toward historical statistical analysis to determine the loss rate and its associated volatility. One example of a more statistical-based approach to using historical information would be a gross principal charge-off rate that is calculated based on the actual principal loss rate for a given time period using a moving average plus one standard deviation. However, management should ensure the results are not smoothing out increases in losses and that the time period includes periods of economic stress.

Larger credit card issuers and securitizers are increasingly employing more sophisticated loss prediction techniques in an effort to identify potential losses prior to an account becoming delinquent. While many of these techniques are used for portfolio management and strategic decisions, they may also be used to improve the forecasting of credit losses for CE IO strip valuation purposes. For example, management typically monitors new account activity to see if recent marketing campaigns are meeting expectations. If management observes that for a particular campaign a significant volume of cardholders run up high balances in the first month, leave little open-to-buy, and then make only the minimum payment, it is more likely that these accounts will become delinquent compared to other newly-acquired accounts having much different activities. Management could use this type of information to improve its loss forecasting.

Examiners reviewing charge-off assumptions should work closely with the examiners assessing asset quality and the related origination and credit administration practices for the on-book portfolio. If practices or portfolios that present elevated credit risk and the potential for higher losses in the future are identified, these issues should be incorporated into the assessment of the reasonableness of the charge-off assumptions used for valuing the CE IO strip.

*Base Rate:*

The base rate represents the sum of the coupon rate paid on all the investor certificates, expressed as an annualized percentage of the outstanding balance of the series at the beginning of the month, and the servicing fee percentage. Unlike the yield and charge-off rate noted previously, the base rate is calculated for each series in the master trust rather than on the entire pool of receivables supporting all the series. The coupon on the investor certificates varies from series to series depending on market and pool specific performance influences.

As noted, the base rate contains two components, the coupon rate paid on the investor certificates and the servicing fees. For the coupon rates, the index and spread are known variables (assuming a variable-rate structure), so the bank must forecast or estimate changes in the index based on assumptions about market conditions. However, many banks simply assume a constant interest rate environment for both the yield and coupon rate assumptions and then, using simulation techniques, assess the impact varying interest rate environments have on these components and the residual interest values, similar to interest rate risk measurement methodologies performed for on-balance sheet assets and liabilities. This type of simplistic analysis should be reviewed thoroughly and it would be reasonable to expect some other type of

adjustment, such as a higher discount rate, to compensate for the elevated cash flow uncertainties. The servicing fee component is merely the stated servicing rate specified in the pooling and servicing agreement.

*Principal Payment Rate:*

The principal payment rate is calculated as the amount of principal payments received each month expressed as a percentage of the outstanding principal balance at the end of the preceding month. The principal payment rate is very important to investors monitoring their investments or for making investment decisions since it measures the rate at which cardholders pay back their debts, and ultimately, the rate that investors will get paid in the event of an early amortization. For valuation purposes, estimating the principal payment rate indirectly impacts the CE IO strip valuation. If principal payment rate assumptions are too low, the length of time and amount of principal outstanding (weighted average life) will be higher thus inflating the CE IO strip value.

A pool's principal payment rate can be influenced by the bank's minimum payment policy. Recent changes in minimum payments, particularly for those banks with a significant number of customers that make only the minimum payment, may have a measurable impact on the principal payment rate. The impact of changing minimum payment policies should be captured in management's assumptions.

In addition, marketing strategies designed to attract either higher-risk or lower-risk accounts will ultimately impact principal payment rates. For example, if a recent campaign is expected to attract a larger volume of convenience users, the principal payment rate will likely increase accordingly. This type of information should be considered when forecasting principal payment rates on the pool of receivables for the CE IO strip valuation methodology.

To the extent possible, valuation models should consider attrition (cardholders who pay off their balances and close their accounts) of the underlying receivables. Modeling attrition can be challenging but data to perfect this technique is becoming increasingly available, and banks should attempt to model attrition rather than simply using a fixed principal payment rate. Much of attrition is a function of credit score, competition, and the mortgage market. As customers' credit scores improve, they may switch to a lower-cost or more attractive card, probably with another institution unless the bank has effective retention practices. Competitors offering more attractive pricing, products, and rewards also impact customer retention. Lastly, heightened cash-out refinancings or home equity lending usually correspond to increased attrition as cardholders commonly use the cash to pay-off higher-cost credit card debt or consolidate this debt into the home equity line of credit. Any other similar trends in lending should be considered and evaluated by the bank.

Some examinations have revealed a controversy over how the basic cash flow model is set up. When using the present value of expected cash flow technique, the model derives the cash flows from the assumed outstanding principal balance. The controversy arises over which principal balance should be used when calculating the cash flows, the original principal balance or the declining or current principal balance. The principal payment rate can be interpreted in two ways:

- Method 1: $ amount of the monthly payment = original balance x payment rate
- Method 2: $ amount of the monthly payment = current balance x payment rate

Each of these methods reveals two very different results:

- Method 1: Original principal balance: $100, payment method: 10%
    - Period 1: $100 - (100 x 10%) = $90 balance
    - Period 2: 90 - (100 x 10%) = 80 balance

  - Period 9[39]: 20 - (100 x 10%) = 10 balance
- Method 2: Current principal balance: $100, payment method: 10%
  - Period 1: $100 - (100 x 10%) = $90 balance
  - Period 2: 90 – ( 90 x 10%) = 81 balance
  - Period 9: 43 – ( 43 x 10%) = 39 balance

As illustrated, Method 2 results in a significantly longer weighted average life (WAL) of the underlying receivables, about twice as long as Method 1. Under method 2, the outstanding principal balance is about four times larger than Method 1, which results in the value of the corresponding CE IO strip being significantly larger as well. Both methods are allowed under GAAP. However, Method 1 is typically the method preferred by auditors and regulators since it results in a more conservative valuation. Examiners should review the model and determine which method the bank is using. If the bank is using a process similar to Method 2, examiners should contact their capital markets specialist and/or regional accountant and perhaps the bank's external auditors to determine the appropriate course of action. It is likely that the bank will be required to adopt a process similar to Method 1 and incur a loss for any book amount that is in excess of the fair value of the asset(s). Depending on the circumstances, the bank may also be required to amend prior call reports.

*Discount Rate:*

The discount rate applied to the expected monthly excess cash flows to derive their present value should reflect the internal rate of return that a market participant would require given the opportunity cost of waiting for the money (time value of money) and the degree of risk inherent in the asset's expected cash-flow stream. The discount rate is probably one of the most difficult assumptions to quantify and justify. There is no hard and fast process to determine the discount rate. Accounting literature requires that the discount rate be based on what others active in the market would require for an investment with similar risk characteristics. Since issuers' pools perform differently and each assumption used for the various cash flow components have different degrees of conservatism, it is challenging to identify a rate that represents a true, comparable market rate.

The discount rate chosen should be directly related to the reasonableness or conservativeness of the assumptions used for determining the cash flow stream. Theoretically, if the bank has carved out all possible risk of loss, the bank could use a risk-free rate. However, it is impossible to forecast with 100 percent accuracy given all the nuances noted previously and, therefore, virtually impossible to justify the risk-free rate. The discount rate should compensate for uncertainties in both model construction (potential mechanical or human error) and model assumptions. The degree of this compensation depends on the comfort level with the other assumptions and the quality of the model construction. If the bank does not perform adequate stress-testing, back-testing, or validation techniques, then this uncertainty premium should expectedly be higher. If the cash flow assumptions are very robust and the primary risks associated with the cash flows are dealt with by more sophisticated forecasting techniques, such as a multi-scenario approach, segmenting the portfolio into sufficient gradations of risk and related performance assumptions, considering macroeconomic influences in the forecasts, and other techniques previously noted, then the corresponding discount rate may justifiably be lower. However, if the cash flow assumptions are not very robust and represent simplistic projections that don't consider all influences, the discount rate should be higher to reflect the elevated uncertainty in the cash flow assumptions.

Banks use a variety of methods to arrive at a discount rate. Some look to corporate spreads for rated investments with similar characteristics and use these as a basis for deriving the discount rate. The problem with this method is that limited markets exist for deeply subordinated, low-rated (or non-rated) assets, requiring management to make assumptions about investor

[39] The interim periods (3-8) were calculated as shown in periods 1 & 2 but are not reflected in an effort to condense the example.

requirements for assets with a limited market. Regardless of the technique used to derive the discount rate, the ending rate must make sense given the risk present in the assets and be supported by reasonable and justifiable documentation.

*Day Count:*

Since all the components of determining the excess spread and corresponding CE IO strip value are on a cash basis, the number of days in any given month will impact the cash flowing into the master trust. Months with fewer collection days, such as February, will typically have a lower yield, all else held equal. Whether or not there is a corresponding reduction in charge-off rate depends on the bank's charge-off policies. Months with fewer collection days commonly reflect lower projected excess spreads.

Banks will also calculate and report rates for performance variables using different methods. Most banks annualize yields and charge-off rates using a "30 days per month and 360 days a year" process. Others calculate these measures using the actual number of days in the due period (month) by the actual number of days in the year.

Excess Spread

Excess spread is the resultant cash flow generated by the estimated assumptions. Excess spread is viewed as the measure of profitability of the securitized credit card portfolio. It is simply the yield minus the charge-off rate minus the base rate (and any other trust expenses that may exist, such as surety bond fee). Each month the bank must report its realized excess spread on the securitized receivables. If the bank is an SEC registrant, it reports trust information in monthly 8(K)s filed with the SEC. The number the bank reports represents the actual cash collected and the actual expenses paid. This amount includes interchange fee and cash advance fee income, which is not included in management's forecast of expected cash flows for determining the value of the CE IO strip. Therefore, when comparing the bank's actual excess spread to what it projected for that particular period, the interchange fee and cash advance fee must be subtracted from the excess spread realized, assuming the bank appropriately excluded these fees from the CE IO strip calculation. This should also be kept in mind when assessing the expected performance of a securitization. For example, if a CE IO strip valuation forecast shows a low or zero excess spread for some future month, examiners need to remember that interchange and cash advance fee income, which is not included in the forecast, will be included in the actual excess spread earned. Thus, examiners would want to understand the average interchange and cash advance fee income earned each month to have a more accurate assessment of the potential for triggering an early amortization event in future months.

The excess spread is not only impacted by incremental changes in yield, charge-offs, and base rate, but by the degree and timing of changes in each component. For example, if a bank is attempting to improve the quality of the underlying portfolio by originating and selling better quality receivables into the trust, there would be an expected corresponding decline in the yield probably immediately; however, the anticipated decline in charge-offs associated with higher-quality accounts may not be realized until sometime in the future (assuming no significant increase in volume). As another example, a rising charge-off rate may signal deteriorating credit quality, but the impact to the excess spread may not be significantly impacted if there is a corresponding increase in yields. These nuances should be considered in forecasting excess cash flows when deriving the CE IO strip value.

The CE IO strip valuation can also be impacted by the need to fund a spread account. If the bank's projections for the excess spread for some future month show it falling below a spread account trigger (keeping in mind the need to consider interchange and cash advance fee income), the model should reflect the fact that the bank will not be receiving those assumed cash flows in the months following a trigger event. Instead, those excess cash flows will be used to fund a spread account and will not be available to the bank until some time in the future, if at all. The challenge with modeling this scenario is that the bank may still be entitled to the cash

diverted to the spread account (assuming it is not ultimately used to pay obligations to investor certificate holders) but at some time later than it would have received the cash had the spread account funding requirement not been triggered. This future time period may be longer than the valuation period of the CE IO strip. Management needs to determine how to capture this nuance. Regardless, the CE IO strip valuation must reflect the expectation that these excess cash flows will not be received as scheduled if a spread account trigger is met.

The model also needs to consider the point in time when the spread account becomes fully funded because subsequent excess cash flows will again come back to the bank. However, this second event may occur at a time that is longer than the valuation period of the CE IO strip. For example, if the spread account trigger occurs at month eight and it is estimated to take five months to fill the spread account, but the CE IO strip is valued over its WAL of ten months, this second event would not necessarily be captured in the valuation since it will occur at month 13. However, if a bank is currently filling a spread account, and the spread account is expected to be filled in two months, then the discounted cash flow valuation should show the excess spread returning back to the bank following month two after the spread account is fully funded. The bank will separately value the spread account, which is discussed later.

### *Retained Subordinated Bonds*

Retained subordinated bonds should be valued based on their respective risk characteristics. If the bank retains a junior-rated bond that has a reasonably active market, management may have elected to determine its market value using recent market prices paid on bonds with similar characteristics. For example, if the bank retained a triple-B rated bond with a stated coupon priced off the one-month LIBOR, management could establish a market price based on recent trades of comparably-rated and -priced bonds. The challenge arises when the bank holds bonds that are either poorly rated or non-rated for which no or limited active markets exist. Banks typically resort to the discounted cash flow methodology to value these bonds. In this case, there are two key components to the valuation:

- The point (or points if an amortizing bond) in time that management expects the bond to be repaid from the cash flows generated by the underlying receivables (discounting period).
- The discount rate used to convert the future value of the bond to a present value.

Typically, the bonds are either interest-only or zero coupon bonds with no principal paid until maturity. As such, the discounting period would be the ultimate expected maturity of the bond. If the bond is an interest-paying bond, the cash flow stream should incorporate the periodic interest payments. If the bond is a zero-coupon bond, the only cash flow would be the ultimate principal payment received at maturity. The discount period and rate should be based on facts that are known to the market.

Again, the challenge is to determine the appropriate discount rate to apply to the valuation. Similar to the discussion in the CE IO strip section, many different methods can be used that derive varying results. In the end, the discount rate used must be reasonable for the situation (payment priority or subordination level in relation to other assets retained) and be fully supported with adequate documentation. A common rule of thumb is that the discount rate on a more subordinated bond should be higher than the coupon paid on a higher-rated bond. For example, assume that as part of the securitization, a triple-B rated bond is created and carries a coupon rate of one-month LIBOR plus 100bp (simply for illustrative purposes), which is assumed to be a market yield if this bond sells at par. In order to receive the triple-B rating in this example, assume the rating agencies required a 25 percent subordination (again, simply for illustrative purpose), which creates the size of an un-rated bond that is held by the bank. Given these facts, the discount rate used to value the un-rated bond held by the bank should be proportionately higher than the coupon paid on the more senior, triple-B rated piece. The discount rate applied to the un-rated bond would be LIBOR plus some spread that compensates an investor for the fact

that payments intended for the un-rated bond may be used to support the more senior bonds plus the fact that the un-rated bond has no credit enhancement (in this simplistic example). Therefore, in this example, it would appear inappropriate if the bank used a discount rate on the un-rated bond that was near or below the LIBOR plus 100bp coupon paid on the more senior bond.

The above is just one example of a reasonableness test examiners can use to assess the discount rate used to arrive at the value. There are other methods that apply similar common-sense approaches. In addition, there have been cases where bank management is applying a discount rate that is lower because it knows or believes something that the market does not. For example, banks have attempted to support a lower discount rate based on management's belief that it has stronger underwriting or collection practices than the market is aware of or based on the position that "it is worth more to us than it is to an investor." These are not valid arguments. The value of the asset must be based on what a market participant would pay after assessing all publicly-available information.

Examiners will need to review the deal documents to determine the exact cash flow allocations. In some cases, there is a spread account that supports only certain bond classes, not all classes.

### *Spread Accounts*

Spread accounts are very difficult to value since there is no active market from which to derive a market value. These assets are typically valued using the discounted cash flow technique noted previously. The key to assessing the valuation of the spread accounts is to determine if and how much of the cash will be needed to support investor certificates and when the cash, if not used to support investor certificates, will become available for the bank to use. The amount is then discounted using an appropriate market discount rate to its present value. The discount rate needs take into consideration the risk that all or a portion of the spread account may be used to support the investor certificates. Again, theoretically, the credit losses are absorbed or considered when valuing the CE IO strip. Therefore, if credit risk is captured with 100 percent certainty in the CE IO strip valuation, the discount rate would simply compensate an investor for the time the money is unavailable. But, again, assumptions and models are never 100 percent accurate and uncertainty must be considered in deriving the discount rate. Plus, the fact that a spread account trigger was met and a spread account is being or has been funded typically increases concerns about credit risk and the possibility that some or all of the funds may be used to support the investors. Also, if the spread account is available to support all bonds, even the un-rated, most subordinated bond, the discount rate should be commensurately higher than the rates used to value those more senior assets. For example, if the non-rated, zero-coupon bond described in the prior example was supported by the spread account and the discount rate used to present value this bond was the one-month LIBOR plus 500bp, then examiners should expect to see the discount rate on the more subordinated spread account to be commensurately higher than LIBOR plus 500bp.

Spread Accounts (as well as cash collateral accounts and reserve accounts) are typically invested in high-quality, highly-liquid investments, the type and term of which are specified in the pooling and servicing agreement. Examiners should review the investments and determine if they are in accordance with the governing securitization documents. Furthermore, the interest earned on these assets may impact the valuation of the spread account or other retained interests. The interest may be paid directly to the transferor and therefore included in the valuation of the spread account (included in the monthly cash flow assumption), used to further fund the spread account if it is not fully funded, or considered as part of the fees and finance charges and captured within the IO strip valuation. The securitization agreements should dictate how earnings generated by the spread account are treated and the valuation should be consistent with the required treatment.

## *Accrued Interest Receivable*

Accrued Interest Receivables (AIR) represent the bank's right to interest earned but not collected on the investors' portion of the transferred credit card receivables. When the bank retains a right to the excess cash flows generated by the transferred receivables, the rights are generally subordinated to the investors. The seller's right to the excess cash flows related to the AIR serves as a credit enhancement to the third-party investors, similar to other credit enhancement facilities. If and when the cash is ultimately collected on the AIR, the cash must first flow through the trust, where it is available to satisfy more senior obligations before the excess cash flow can be remitted to the bank. Since investors are paid from these cash collections before the selling bank receives the amount of the AIR that is due, the seller may or may not realize the full amount of its AIR asset. As a result of this feature, AIR created on the investors' portion of the transferred receivables is considered a residual interest for risk-based capital purposes and the bank must determine the fair market value of the AIR. At times, examiners have identified this type of AIR commingled with the AIR recorded for non-transferred receivables, including being a component of the seller's interest amount. Examiners need to make sure that the AIR generated by the investors' portion of the transferred receivables is identified as an other asset and appropriate risk-based capital calculations are applied.

Valuation methods must focus on the timing and likelihood of collecting of the AIR asset. The timing of collection can be difficult to determine. For example, assume a cardholder has not made a payment in 60 days and then makes a payment equal to one month's payment due. Rather than the bank simply reducing the AIR asset by that one month's payment, the cash must first run through the trust. If there continues to be cardholders allocated to the investors' certificates that don't make payments, this cash payment may instead be used to satisfy the investor coupon versus the bank's AIR asset. While this is a simple single case scenario, the bank is faced with the challenge of estimating the timing and amount of future cash flows that will ultimately be collected to satisfy the AIR assets. Banks use a variety of methods, from a simple estimation of uncollectible AIR deducted from the AIR asset (or a valuation allowance) to a suppression methodology where each month, instead of booking the full amount of accrued but unpaid interest it is entitled to receive, the bank only books the amount of accrued and unpaid interest it expects to receive. With this methodology, there are no subsequent reversals of previously accrued fees and typically no valuation allowance against the AIR asset; however, banks should be keeping track of how much interest income is suppressed each month and in any fiscal year (year-to-date). Regardless of the process, the assumptions used to derive the value must be supported by a logical and documented process.

Accounting and regulatory capital implications for the AIR asset are discussed in the Accounting and Regulatory Capital chapters, respectively, of this manual.

## *Other Residual Interests*

This chapter discusses the primary residual interests that are provided by either the cash flow generated by the transferred receivables or the securitization structure. Other external credit enhancements may also require fair valuation techniques. For example, if the bank is providing a cash collateral account, it needs to determine the fair value of that asset. If the bank has a loan with a third party to provide the cash collateral, the bank would still need to determine the fair value of the cash collateral. Regardless of the fact that the bank has the actual cash in its possession, the cash is for the benefit of the trust and the investors. The risk that the bank may not be able to keep the full value of the cash or a have sufficient amount in the cash collateral account to repay the loan impacts its value. If a third-party market participant wanted to purchase the right to this cash, it would consider these risks in the price it is willing to pay for the right to the asset.

## STRESS TESTING

Examiners should obtain and review the bank's most recent stress tests. The bank should be testing models to determine how sensitive the outcome is to various changes in assumptions. Model stress testing should be conducted against historical scenarios, against potential environmental scenarios to test for issues with the bank's risk profile, and against extreme non-sensical environments. Examiners should review the bank's documentation on the stress tests to determine if it fully explains and supports the scenarios used and resultant outcomes.

Examiners should expect banks to run different scenarios for the various assumptions to see the impact on the resultant value of the residual interests. Management should not be simply stressing each assumption in isolation but should incorporate the interaction between the different assumptions. For example, if delinquencies are projected to increase, this should result in declining yields and eventually higher losses (typically six months later if using a 180 day charge-off policy).

In addition, assumptions should be validated against industry standards, often referred to as benchmarking, but these standards should only be used as generic guidance. Data derived from the specific pool of assets is generally more reliable; however, any large divergences from industry standards should be justified. The sensitivity of the residual interest to different assumptions depends on the model structure, which itself is full of behavioral assumptions (how will cash flow be affected by different events).

## VALIDATION

The validation process consists of a wide range of activities intended to assure that the resultant residual interest values produced by the valuation process are logical, sound, and accurate. Timely, accurate, and reliable data are the foundation for an effective and supportable valuation process. Examiners should review the most recent validation reports and workprograms.

Periodic validations should be performed to reduce vulnerability to model risk. Validation of the model includes testing the internal logic, ensuring empirical support for the model assumptions, and back-testing the models with actual cash flows generated by the pool of assets in the master trust. The validation process should be fully documented to support conclusions. Examiners should review the validation process to determine if it is independent from line management as well as the modeling process.

Examiners should also expect the board to have approved an effective validation policy and review the policy for adequacy. The validation policy should set forth the required validation processes and procedures, scope, frequency, reporting, documentation requirements, and responsibilities. It should also include tolerance limits for differences between projections and actual outcomes plus any remedial actions required if the discrepancies fall outside of the policy limits.

Validation of the valuation process should focus on each element of the valuation, such as cash flow assumptions, discount rate, and model construction. Management should be completing a full, comprehensive validation process at least annually, which should be fully documented and reported to the board of directors or the audit committee.

The goal of the validation process is to evaluate the logic involved with the development of the valuation process. Developing the valuation process requires management to adopt forecasting methodologies, make adjustments to fine-tune the forecasts, and monitor the outcome of its forecasting and valuation models. These decisions all require management judgment. The validation process ensures that these judgments are based on plausible and informed analysis. Validation is also used to confirm that the process continues as intended. While there are several

aspects of the validation process, such as benchmarking if limited historical data is available, one of the most important aspects of validation is back testing.

## Back Testing

The validation process should include the comparison of estimated parameters or performance metrics with the actual outcomes. Banks should be conducting this type of back testing (or variance analysis) to determine the predictive ability of its model and the reliability of its assumptions, often referred to as in-sample testing. For this process, the bank uses the assumptions it used when it initially valued the residual interests and compares the results to its current fair value. Out-of-sample testing is more robust since it tests the predictive power of the model against a data set other than that used to set the parameters.

Most banks have internal reports that project the various cash in and outflow positions (finance charges, fees, charge-offs, principal payment rate, and base rate) for a specified period. For active securitizers, management updates this monthly, but at a minimum, all banks recording IO strips must do this quarterly for call reporting purposes. Examiners should obtain the projection that was done six months (or longer) prior to the examination and then compare the actual excess spread earned (remembering to remove interchange and cash advance fees) in the preceding six months to what had been assumed by the bank six months prior. Ideally, management should be completing and providing this type of analysis both numerically and graphically on a monthly or quarterly basis.

Back testing is only one element of the validation process. It merely identifies that discrepancies exist but does not identify the cause of the discrepancies. This next step of the validation process is equally important since management needs to understand the causes of discrepancies before it can decide on whether adjustments are needed to either the valuation model or any of the forecasting models. Any significant variations from what was projected compared to what was realized should be explained and, if necessary, incorporated into current assumptions. If the discrepancies demonstrate a systemic tendency to result in forecasts that increase the residual interests' values, the nature and source of this bias requires considerable scrutiny by management and the examiners.

## SUMMARY OF EXAMINATION PROCEDURES

While this chapter has provided some examples for assessing the valuation of residual interests, each bank and securitization structure is different and, thus, requires a flexible examination approach. Regardless of the complexities and approaches, the ending values and processes used to get there must make sense and be reasonable. It is incumbent on bank management to demonstrate and document the reasonableness of its techniques and assumptions. The following are general suggestions and are further discussed in the Risk Management and Examination Issues chapter.

Examiners should request the following items from the bank:

- Detailed model documentation on all portions of the model.
- Copies of recent detailed and summary reports from the residual interest models.
- All available documentation of the derivation of critical model assumptions and parameters.
- Documentation of any internally-conducted tests of model results, especially model validation, stress testing, and back testing.
- External auditor's workpapers (in certain situations).

Examiners should expect the bank to have:

- A clear, written model validation policy.
- Written documentation of model validation activity.
- Documentation of model development and construction with clear explanations of underlying analytics and assumptions.
- Reports that can be easily understood and interpreted by senior management, including identifying limitations and caveats of model effectiveness.