鵬元國際
PENGYUAN

General Structured Finance Rating Criteria

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Summary

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These criteria describe PENGYUAN's approach in evaluating the creditworthiness of structured finance transactions. The criteria provide a general guideline for the analysis of structured finance transactions and are applicable to all structured finance asset classes. The criteria may be used directly or in conjunction with PENGYUAN's asset-specific rating criteria. Due to the wide range of asset classes and the flexibility of the transaction structures, these criteria are not intended to be an exhaustive discussion of how PENGYUAN analyzes each risk factor in every transaction. Instead, they are intended to provide a general understanding of how PENGYUAN analyzes these risks and should be interpreted in the context of the particular applications.

When assigning and monitoring credit ratings of structured finance transactions, PENGYUAN applies a multifaceted analytical framework, which incorporates the following analytical components: 1) legal structure and documentation, 2) credit quality of the securitized assets, 3) financial structure and cash flow mechanics, 4) counterparty risks, and 5) operational risks.

PENGYUAN typically starts its analysis by assessing a transaction's legal structure and documentation. A key focus of PENGYUAN's legal structure analysis is whether a securitization structure effectively isolates the collateral pool from the insolvency risk of the entities participating in the securitization. PENGYUAN reviews transaction documents and associated legal opinions to ensure they adequately address concerns regarding the bankruptcy remoteness of the Special Purpose Vehicle (SPV), the enforceability of the transaction documents, or other issues related to the legal structure of the transaction.

As part of its quantitative analysis, PENGYUAN analyzes the credit quality of the securitized assets to estimate expected losses under the stress scenarios commensurate with various rating levels. In the estimation of the expected losses, PENGYUAN evaluates historical performance data and takes into account the factors that potentially affect the asset performance. Depending on the asset class to be securitized, the expected losses are estimated via an actuarial approach or Monte Carlo simulation.

PENGYUAN conducts cash flow analysis to assess the transaction structure and adequacy of the credit enhancement. The cash flow modelling replicates the transaction's structural features including the security waterfall and trigger mechanisms. PENGYUAN applies various stress assumptions specific to different rating levels to determine whether the cash flow generated by the securitized asset pool would be sufficient to make timely interest and principal payments on the rated securities by the stated legal final maturity date.

Securitization transactions rely on the credit quality of third parties such as account banks, liquidity providers, and swap counterparties. PENGYUAN analyzes counterparty credit risks in a securitization transaction by reviewing the counterparty dependency and evaluating the creditworthiness of the counterparty. If a transaction is dependent on a counterparty without any structural mitigants, the rating of the transaction is usually credit-linked to the counterparty.

PENGYUAN reviews the operational risks of transaction participants involved in the origination and servicing of the securitized assets. The review process primarily focuses on assessing the quality and capacity of the asset origination, servicing and management. Based on the assessment, PENGYUAN may adjust the estimated loss expectations, apply a rating cap or even decline to rate a transaction.

Exhibit 1 shows the key analytical components and sub-factors PENGYUAN considers when assigning and monitoring credit ratings for structured finance transactions.

Exhibit 1 Rating Components

Structured Finance Ratings

A structured finance instrument is a transaction where the credit risk of an exposure or pool of exposures is securitized. The transaction's payments are dependent on the performance of the exposure or pool of exposures and the distribution of losses is determined by the transaction's senior-subordinated structure. Structured finance asset classes include, but are not limited to:

- Asset-backed securities (ABS);
- Asset-backed commercial paper (ABCP);
- Collateralized loan obligations (CLO):
- Collateralized debt obligations (CDO);
- Commercial mortgage-backed securities (CMBS);
- Residential mortgage-backed securities (RMBS); and
- Future flow securitizations.

To comply with regulatory requirements, PENGYUAN differentiates rating categories for structured finance instruments from ratings of other financial instruments by adding "(sf)" to all structured finance ratings. However, the issue's creditworthiness represented by a rating symbol does not change with the additional symbol "(sf)".

Transaction Legal Structure and Documentation

PENGYUAN analyzes the legal structure of securitization transactions by reviewing transaction documents and associated legal opinions. In its legal analysis, PENGYUAN evaluates the structure's legal risks that could affect the creditworthiness of the transaction. Key legal aspects assessed by PENGYUAN in relation to a structured finance transaction include： 1）asset isolation, 2) insolvency remoteness and non-consolidation of the SPV, 3) transaction documents, and 4) tax liabilities.

Asset Isolation

A defining feature of securitization is the legal isolation of a pool of assets from the credit risk of the asset originator (or "seller") and other entities participating in the securitization. The primary goal of the isolation is to ensure that the creditworthiness of the securitization transaction is related to the credit risk of the underlying assets instead of that associated with the originator. By delinking the underlying assets from the originator's credit risk, the structured finance securities may obtain a rating higher than that of the originator. In cash flow securitization, although there may exist other legal mechanisms, the asset isolation is typically achieved by transferring the subject asset on a "true sale" basis from the originator or seller to an SPV that issues the rated securities.

True Sale

The term "true sale" is generally used to describe a transfer of ownership of the underlying assets from an originator to an SPV, such that the assets are not considered part of the bankruptcy estate of the insolvent originator. Depending on the asset securitized and jurisdiction involved, a true sale may be achieved in various forms. Some jurisdictions have enacted securitization laws that specify the conditions for constituting a true sale. In such jurisdictions, comfort over the existence of a true sale can be obtained by verifying whether the conditions have been fulfilled. In other jurisdictions where no securitization laws exist, general legal principles are usually applied to determine whether a structure achieves a true sale of assets. In jurisdictions without securitization laws, courts may consider a range of factors in determining whether a transaction amounts to a true sale instead of a secured lending. The typical factors reviewed by courts include 1) the intent and conduct of the parties, 2) the extent of the originator's control over the transferred assets, 3) the extent of transfer of economic benefits and burdens, and 4) the accounting and tax treatment. To gain comfort on the validity of the true sale, PENGYUAN generally expects a true sale legal opinion to be provided by the transaction's legal counsel.

Perfection, Formality, and Claw-back

To ensure the SPV is entitled to fully benefit from the underlying assets, the asset transfer needs to be legally valid, binding and enforceable. In some jurisdictions, certain legal formalities need to be met to achieve a true sale. The perfection requirements of the transfer, such as providing notice to each obligor, may not be practical or cost-efficient. Some originators do not want to make their obligors or clients aware of the asset transfer via notices. Others may find the notification costly and burdensome. Consequently, certain transactions, such as credit card or trade receivable securitizations, are structured in such a way that the obligors are not notified at the time of transfer. In addition, the asset transferability and enforceability may be restricted due to legal or economic reasons. In most jurisdictions, insolvency laws could declare void the asset transfer because of fraudulent conveyance or preferential treatment claims. Claw-backs can also occur where a transfer, which is unfavorable to the creditors, falls within a specified period before the originator enters an insolvency proceeding. PENGYUAN typically reviews the transaction documents and legal opinions to evaluate whether all the necessary steps have been taken to perfect an asset transfer and whether the transfer is subject to claw-back risks.

Set-off Risk

Set-off occurs when a borrower is able to use amounts owed to it by a creditor to reduce a liability owed by it to the same creditor. In the context of securitization, set-off risk may exist when the originator of the securitized assets has contractual relationships with the underlying obligors, such as holding deposits of the underlying obligors in the originator's accounts. Set-off implemented by the underlying obligors could result in a reduced payment or no payment to the SPV, which in turn may affect the creditworthiness of the rated securities. When the set-off risks exist, PENGYUAN assesses whether appropriate structural or contractual mitigants are put in place, and whether the risks and mitigating mechanisms are consistent with the assigned rating.

Synthetic Securitization

In a synthetic securitization, the credit risks of the assets are transferred using credit derivatives. Since there are no asset transfers in synthetic transactions, PENGYUAN's legal risk analysis for a synthetic securitization focuses on whether the contracts used to transfer the credit risks to an SPV are legally valid, binding and enforceable.

Insolvency Remoteness and Non-consolidation of SPV

The insolvency-remote SPV is another essential component of the transaction legal structure. A securitization transaction can be negatively impacted in various ways if the SPV enters insolvency proceedings. Under insolvency proceedings, the payments from the SPV to the noteholders are likely to be interrupted since the SPV's payments may be suspended to protect other creditors. In an insolvency scenario, the noteholders may suffer a loss due to the modifications of the terms of the SPV's obligations or the transaction's payment priority. The enforcement may result in a further market value loss caused by asset fire sales. In addition, an entry in an insolvency proceeding usually triggers the termination of the support contracts that the SPV has entered into, which can significantly affect the SPV's operations and payments to the noteholders.

SPV's formation and subsequent activities are expected to satisfy various criteria to ensure the isolation of the securitized assets from the insolvency of, or claims against, the entities that participate in the transaction. These criteria generally fall under one of two main categories: insolvency remoteness and non-consolidation. The first includes those that restrict the SPV to prevent it from entering insolvency proceedings. The second includes those applied to ensure that the assets of the SPV are not affected by the insolvency of the originator or other entities.

Insolvency Remoteness

The SPV is typically structured to minimize the risk of its insolvency by limiting the SPV's operational and financial activities. The restrictions are intended to prevent the SPV from generating unexpected creditors other than the noteholders and transaction parties. The transaction creditors' rights are usually limited under strict terms of limited recourse and non-petition provisions.

The SPV's organizational documents and the transaction documentation should restrict the SPV's activities only to what are necessary to perform its obligations and carry out its functions in the transaction. The SPV should also be restricted from incurring additional obligations other than those specified in the transaction documents. The restrictions on the SPV's activities and debt limitations typically include:

- No operating business;
- No merger or reorganization;
- No change to organizational documents;
- No subsidiaries;
- No employees;
- No outstanding liabilities from the pre-existing creditors;
- No activities which will result in additional liabilities such as debts, guarantees, pledges, tax liabilities and fines.

Transaction documentation should contain limited recourse and non-petition provisions to dissuade the transaction parties from filing a bankruptcy petition or taking recovery action against the SPV. Under the limited recourse provisions, all expected creditors of the SPV, including the noteholders, agree to limit their recourse against the SPV only to the assets backing the rated securities in accordance with the waterfall of payments set out in the transaction documentation. Each creditor of the SPV is commonly required to agree not to initiate or participate in a bankruptcy petition against the SPV.

Non-consolidation

The SPV's structure should ensure it maintains legal separateness and its assets will not be consolidated with those of an insolvent originator or affiliate of the SPV. The consolidation risk could be reduced by means such as using an orphan SPV or setting up an SPV in a jurisdiction where the consolidations are not allowed. However, in jurisdictions where substantive consolidations are possible, the SPV should be structured in a such manner that a court would treat the SPV as a separate legal entity and not apply substantive consolidations to the SPV. In such cases, the SPV's organizational documents and the transaction documentation usually include various separateness covenants to contractually ensure the separate identity of the SPV. Independent management or directors is another structural feature that not only helps maintain the SPV's legal separateness, but also prevents the SPV from filing a voluntary insolvency proceeding to benefit the originator or other

transaction parties. If its analysis concludes the SPV cannot achieve insolvency remoteness, PENGYUAN will assess the rating impact on a case-by-case basis. When assigning a rating, PENGYUAN will take into account both the likelihood of insolvency and the resulting losses to the noteholders.

Transaction Documents

The transaction documents are essential to the securitization and rating analysis. When conducting a legal assessment of the contractual arrangements to which the SPV is a party, PENGYUAN generally investigates 1) whether the obligations created by the transaction documents or agreements are legally valid, binding and enforceable; 2) whether the transaction documents contain the required provisions, representations and covenants; 3) whether the transaction documents specify the necessary services provided by various agents; and 4) whether the credit enhancements by third parties or deal structures are valid. To gain comfort, PENGYUAN typically expects the provided legal opinion to cover all the transaction documents.

Tax Liabilities

Tax liabilities typically rank most senior in the SPV's payment waterfall. Unexpected tax liabilities could have a negative impact on the associated cash flow and payments. In addition, failure to pay taxes may incur regulatory penalties or actions which could interrupt the payments to the noteholders.

At the asset level, the major tax issue is that the payments derived from the underlying assets are not free of withholding tax. The asset transfers may also result in tax liabilities such as value-added tax or stamp duties. The SPV could be subject to tax liabilities in its own right. For instance, the earnings of the SPV could be taxable in some jurisdictions. In addition, taxes unpaid by other transaction parties may expose the SPV to the risk of a secondary tax liability. PENGYUAN generally expects the tax concerns to be addressed by appropriate legal opinions or tax opinions. When the tax erodes the payments on the underlying assets, PENGYUAN takes into account the impact of the tax in its cash flow analysis.

Legal Opinions

PENGYUAN's legal analysis is expected to be supported by legal opinions which typically confirm:

- The effectiveness of the true sale;
- The effectiveness of the SPV's insolvency remoteness features;
- The authority and capacity of the transaction parties entering into and performing their obligations under the transaction documentation;
- The validity, bindingness and enforceability of the transaction documents;
- The validity, bindingness and enforceability of the created security interests;
- The validity, bindingness and enforceability of the asset transfers;
- The validity, bindingness and enforceability of the limited recourse and non-petition provisions; and
- The impact of tax requirements on the underlying assets, transaction parties and SPV.

If a 'clean' legal opinion is not provided, PENGYUAN will discuss with transaction counsel the impact of the risks on the structure. PENGYUAN assesses these circumstances on a case-by-case basis.

Credit Quality of the Securitized Assets

PENGYUAN analyzes the credit quality of the securitized assets to develop a base-case loss expectation, which generally corresponds to the amount of credit enhancement sufficient to support a 'B' rating. The base-case loss expectation is estimated as the expected losses under the economic scenario which is the most likely to occur. In addition to deriving a base-case loss expectation, PENGYUAN estimates the amount of losses that the assets would suffer under the stress scenarios commensurate with the rating levels above 'B'. A security rated higher than 'B' should have sufficient credit support to withstand the expected losses that are generated under more severe stress assumptions. For instance, a security rated 'AAA' should survive an extremely stressful environment similar to the Great Depression of the 1930s. We develop the stress assumptions based on historical studies of the asset class in the jurisdiction where the studies exist, or referenced to similar asset classes in other regions for which studies are available.

PENGYUAN's approach to deriving the loss expectations depends on the type of asset class. For well-diversified and homogeneous portfolios, PENGYUAN typically applies actuarial approaches to derive an expected loss based on historical default and loss data. PENGYUAN may conduct a portfolio analysis based on the originator's historical performance, or perform a loan level analysis and assign a foreclosure frequency and loss severity to each individual loan. For concentrated pools with several large obligors, PENGYUAN's estimation utilizes more information from the creditworthiness of the obligors than from historical default data. For some asset classes, for example CDO and CMBS, PENGYUAN uses default probabilities and recovery rates based on credit opinions, ratings or a bank's internal rating system. Monte Carlo simulations based a multi-factor credit portfolio model are typically applied to account for asset correlations when determining the default or loss rates commensurate with various rating levels.

Asset Classes

The structured finance transactions can be backed by a wide variety of assets, ranging from consumer loans, mortgages, trade receivables, corporate bonds to esoteric assets such as aircraft leases and intellectual property royalties. The collateral assets can be classified as existing assets versus future flows or cash flow versus synthetic assets. Depending on the characteristics of the underlying assets, PENGYUAN adopts different approaches to conduct the collateral default and loss analysis. Exhibit 2 provides a summary of characteristics for typical structured finance asset classes and the corresponding analytical approaches to estimate the collateral defaults and losses.

Exhibit 2： Typical structured finance asset classes

Asset classes	Underlying assets	Diversity	Homogeneity	Collateral analysis	Modelling approach
CLOs	Corporate loans	Concentrated	Heterogeneous	Loan by loan	Monte Carlo Simulation
CBOs	Corporate bonds	Concentrated	Heterogeneous	Loan by loan	Monte Carlo Simulation
SME ABS	Loans to SMEs	Typically diversified	Mixed	Loan by loan or portfolio	Monte Carlo / Actuarial
CMBS	Commercial mortgages	Concentrated	Heterogeneous	Loan by loan	Monte Carlo / Actuarial
RMBS	Residential mortgages	Diversified	Homogeneous	Loan by loan or portfolio	Actuarial Approach
Auto ABS	Auto loans or leases	Diversified	Homogeneous	Securitized portfolio	Actuarial Approach
Consumer ABS	Consumer loans	Diversified	Homogeneous	Securitized portfolio	Actuarial Approach
Credit cards	Credit card balances	Diversified	Homogeneous	Historical performance	Actuarial Approach
Trade receivables	Trade receivables	Diversified	Homogeneous	Historical performance	Monte Carlo / Actuarial
ABCP	Various financial assets	Diversified	Homogeneous	Historical performance	Actuarial Approach

CLOs and CDOs

CLOs/CDOs are generally highly concentrated and heterogeneous, which require a loan-by-loan analysis to evaluate the creditworthiness of the underlying portfolios. PENGYUAN utilizes a Monte Carlo simulation approach to project the underlying portfolio defaults and losses when analyzing CLOs/CDOs. In particular, PENGYUAN develops the default probability, recovery rate and asset correlation assumptions based on the underlying assets' attributes. A multi-factor model is then applied to simulate the portfolio default rates or loss rates commensurate with various rating scenarios.

SME Backed Securitization

When analyzing the transactions backed by loans granted to small and medium enterprises (SMEs), the particular approach PENGYUAN applies relies on the data availability and granularity of the underlying portfolio. PENGYUAN typically uses an actuarial approach to derive the portfolio's default and loss rates, if the transaction is backed by a granular and diversified SME portfolio. This approach requires sufficient historical performance data to develop the default and recovery assumptions and estimate the portfolio defaults and losses based on its characteristics. For the non-granular and heterogeneous portfolios, PENGYUAN estimates the expected portfolio default and loss distributions using Monte Carlo simulation which adopts the same modelling techniques used in the above-mentioned multi-factor model. The credit estimates or originator's internal ratings are utilized to determine the SMEs' default and recovery rates.

CMBS

The underlying assets of CMBS transactions could be commercial mortgage loans from a diversified or concentrated borrowing base or even a single borrower. When rating CMBS transactions, PENGYUAN typically conducts a loan-by-loan analysis. Depending on the concentration of the collaterals, various analytical approaches are applied to estimate the loan defaults and loss severities. For concentrated portfolios, PENGYUAN uses a simulation approach to account for the uncertainty of the property values and varying degrees of diversification. For large and well-diversified portfolios, an actuarial

approach is generally adopted. The credit quality of tenants and macroeconomic conditions are also important factors in evaluating the expected losses.

RMBS

The collateral portfolios underlying RMBS transactions are generally diversified and consist of a significant number of mortgages. PENGYUAN conducts a loan-by-loan analysis to estimate the expected default rates and loss severities on the proposed residential mortgage portfolio. PENGYUAN first estimates the defaults and losses for each loan based on the relevant borrower, loan and property characteristics. Then, the portfolio-level default rates and loss severities are calculated as the average of loan-level default rates and loss severities weighted by individual loan balances. When projecting the residential mortgage portfolio credit losses, PENGYUAN takes into account the originator's underwriting standards, servicing quality and its forward-looking expectations of the housing market and macro-economy. If loan-level data are not available, PENGYUAN may use pool-level adjustments with relatively conservative assumptions to estimate the portfolio credit losses.

Auto ABS, Consumer ABS, and Credit Card ABS

In structured finance, collateral pools of consumer credits such as auto loans, consumer loans and credit card receivables are often granular and homogeneous. A static pool analysis is usually conducted to develop a base-case expected cumulative net loss level which is consistent with a 'B' stress scenario. The expected losses associated with successively higher rating categories are estimated based on successively more stressful scenarios.

Trade Receivables

Trade receivables are short-term debt arising from sales of goods or services from the seller to the obligors. PENGYUAN generally adopts an actuarial approach to analyze the credit risks of a trade receivable portfolio. PENGYUAN applies the base-case assumptions to derive expected losses corresponding to a 'B" scenario, which reflects the expected economic and business conditions. Stress factors are applied to derive the expected losses under more stressful scenarios. For less granular pools, PENGYUAN may apply a Monte Carlo simulation to address obligor concentration risk.

ABCP

PENGYUAN's analysis of ABCP depends on whether an ABCP program is fully or partially supported. For the fully supported program, the analysis focuses on the transaction structure and support mechanisms. The creditworthiness of the support providers is the primary consideration of the rating analysis. For partially supported program, PENGYUAN may conduct an analysis on the underlying assets in addition to the support providers' credit risks and transaction structures.

Credit-linked Notes and Repackaging Vehicle

The main characteristic of the Credit-Linked Note (CLN) and Repacking Vehicle (Repack) is the absence of credit enhancement. That means a failure by any of the transaction parties to perform its obligations can cause a default of the notes. PENGYUAN's analysis of CLN or Repack focuses on the legal structure and creditworthiness of the securitized assets and counterparties.

Market Value Decline

Market value securities, such as market value CLOs, rely on the liquidation of the assets to pay off the principal and interest on the securities' liabilities. The main risk these securities are exposed to is the price fluctuations of the underlying assets. PENGYUAN's analysis of the market value securities focuses on the underlying asset's potential price volatility, which depends on the asset's characteristics, market liquidity, currency etc. According to asset type and data availability, we use either Monte Carlo simulation or historical price declines to project the potential future changes of the asset market values.

Sensitivity Analysis

PENGYUAN conducts sensitivity analysis to mitigate the potential model and methodology risks. In particular, we test the rating sensitivity with respect to assumptions such as default probabilities, recovery rates, correlation coefficients and rating quantiles. We systematically modify the assumptions and investigate whether such changes would result in a significant change in model outputs and ratings. The rating committee will consider the sensitivity analysis results when assigning ratings based on the model outputs.

Financial Structure and Cash Flow Mechanics

The transaction financial structure has a significant impact on the performance of the rated securities. Typical structural features include internal and external credit enhancements, priority of payments, performance triggers and other protective mechanisms. PENGYUAN generally conducts cash flow analysis to evaluate whether the transaction's financial structure is robust enough to support the payments on the rated securities under various stress scenarios. In the cash flow analysis, PENGYUAN replicates the financial structure of the rated transaction and simulates the impact of different stress assumptions on the cash flows.

Credit Enhancement

Credit enhancement is a risk-reduction technique that provides loss protection in the form of internal or external financial support. Typically, the internal credit enhancement measures include subordination, overcollateralization (OC) and excess spread, while the external measures could be the provision of a reserve fund account or other third-party support. PENGYUAN reviews the composition of the proposed credit enhancement in a transaction and assesses whether the credit support is sufficient to withstand losses on the underlying collateral pool at a stress scenario commensurate with the relevant credit rating.

Subordination

Structured finance transactions typically have multiple tranches. The tranche structure serves as a base protection for the senior tranches, indicating that after all other credit enhancement measures have taken effect, the tranche seniority determines the allocation of additional losses. In a multiple tranche structure, the junior tranche absorbs the losses first and serves as credit support for the more senior tranches. The holders of senior tranches are protected by the subordination of the junior tranches and other credit support available for the junior tranches.

Overcollateralization

OC is a credit enhancement method under which the face value of the underlying collateral is larger than the par value of the securities issued by the SPV. As a result, if some of the payments from the undelrying assets default, the transacation may still have sufficient assets to cover the principal and interest payments on the rated securities. According to the transaction documents, PENGYUAN may apply multiple haircuts for OC tests.

Excess Spread

Another source of funds for covering losses is the excess spread, which is the revenue remaining after payment of note interest and deal expenses. The credit enhancement amount provided by the excess spread highly depends on the underlying assets' defaults and repayments, as well as changes in interest rates and exchange rates. In certain cases, we may apply sensitivity tests or assign a lower rating for transactions that depend heavily on the excess spread for building other forms of credit enhancement, compared to those without the reliance.

Depending on the particular structure, PENGYUAN may model the excess spread by releasing them to the residual holder (or seller) or the deliquent reserve account or overcollateralization if applicable. Some triggers might be involved in reducing the reliance on excess spread. For transactions with these features, PENGYUAN may model the cash flows and set sensitivity tests on a case-by-case basis. PENGYUAN considers situations where the excess spread is negative, and we typically assume the principal payments may be used for paying the shortfall of expenses or note interest. For auto loan ABS transactions, a yield supplement analysis may be applied by PENGYUAN when the collections prove insufficient for paying expenses and note interest.

Reserve Fund Account

In structured finance transactions, reserve fund accounts may be set up as liquidity or credit support to provide payments when the cash gained from the collateral pool proves inadequate. The reserve accounts can be constructed in various forms: some are established for supporting certain classes of notes and the reserve funds could be funded or unfunded at issuance. For instance, the credit card ABS typically depends on the credit spread for funding the reserve accounts. PENGYUAN reviews the transaction documents and determines the appropriate assumptions for reserve accounts. PENGYUAN typically assumes

that cash in reserve accounts increase at the reinvestment rate level and the cash earned is often regarded as interest proceeds.

Third-Party Protection

Structured finance transactions may include external credit enhancement by a third-party provider, such as letters of credit, insurance policies, liquidity facilities or other third-party support agreements. Given the wide variety of third-party protection, PENGYUAN generally evaluates how the external credit enhancement affects the rated securities on a case-by-case basis. PENGYUAN's analysis focuses on the counterparty risk associated with the external credit enhancement providers, since the payment obligations of the support providers are essential to ensuring the holders of the rated securities are paid on time and in full. PENGYUAN analyzes the exposure of the credit risk of the counterparty based on its counterparty risk criteria discussed later in this article.

Cash Flow Analysis

PENGYUAN performs cash flow analysis to assess the transaction structure and adequacy of credit enhancement. The cash flow modelling replicates the transaction's structural features including the security waterfall and trigger mechanisms. PENGYUAN applies various stress assumptions to different rating levels to determine whether the cash flow generated by the securitized asset pool would be sufficient to make timely interest and principal payment on the rated securities. Other than the stressed default and recovery rates derived in the asset quality analysis, the stress assumptions we apply may include, but are not limited to, the timing of defaults and losses, timing of recoveries, prepayment rates, interest-rate stresses, basis risk stresses, foreign exchange stresses and set-off loss stresses. The extent and nature of the applied stresses depend on the asset class and transaction structure.

Exhibit 3: Typical Cash Flow Stress Scenarios

Exchange Rate Stress		
Interest Rate Stress (Up)		
Base-case Prepayment / Base-case Default Timing	Base-case Prepayment / Front-loaded Default Timing	Base-case Prepayment / Back-loaded Default Timing
Low Prepayment / Base-case Default Timing	Low Prepayment / Front-loaded Default Timing	Low Prepayment / Back-loaded Default Timing
High Prepayment / Base-case Default Timing	High Prepayment / Front-loaded Default Timing	High Prepayment / Back-loaded Default Timing
Interest Rate Stress (Down)		
Base-case Prepayment / Base-case Default Timing	Base-case Prepayment / Front-loaded Default Timing	Base-case Prepayment / Back-loaded Default Timing
Low Prepayment / Base-case Default Timing	Low Prepayment / Front-loaded Default Timing	Low Prepayment / Back-loaded Default Timing
High Prepayment / Base-case Default Timing	High Prepayment / Front-loaded Default Timing	High Prepayment / Back-loaded Default Timing

Defaults

PENGYUAN's asset default assumptions used in its cash flow analysis are grouped into two dimensions: the default rate and timing of default. The default rate determines the level of defaults in various stress scenarios, while the timing of default specifies when the default occurs. Both assumptions affect the cash flows provided by the asset pool. PENGYUAN derives the stressed default rate and default timing assumptions based on the credit quality analysis described previously and its asset-specific criteria. PENGYUAN generally adjusts the default rate stresses based on asset characteristics. For homogenous products such as RMBS and consumer ABS, we may apply an actuarial approach to measure the expected losses. For CLO and CMBS transactions, we may take into account the asset correlation when we project the expected losses via Monte Carlo simulations.

In many instances, defaults occurring at an early period and a late period can exert different pressures on the transaction structure and affect the excess spread in the cash flow analysis. PENGYUAN typically applies three default timing patterns for cumulative default rates: base-case, front-loaded and back-loaded. For each timing pattern, the default stresses are assumed to be a distribution that allocates defaults throughout the deal payment period. For transactions with certain structural features that could materially affect the default timing, we may determine or adjust the default timing patterns on a case-by-case basis. For example, if portfolios have a significant barbell maturity structure, PENGYUAN adjusts its default stresses as a consequence of the extremely long or extremely short maturity structures.

Recoveries of Defaulted Principal

The recovery directly affects the cash flows generated from the collateral pool, especially for transactions that rely on the recovery amounts to pay the notes, for example, securitizations backed by non-performing loans. In a cash flow analysis, PENGYUAN specifies the recovery stresses mainly through the recovery rate and timing assumptions.

The recovery rate assumptions generally depend on historical recovery rates, asset chacateristics, seniorities, resolution strategies and market conditions. For secured assets, we derive the expected recovery rates by analyzing the recovery value of the collateral under various stress scenarios. For unsecured assets, we typically assume lower recovery rates based on historical data and expected economic environments. To account for the uncertainty of recovery rates, PENGYUAN may use Monte Carlo simulations, where a Beta distribution is typically chosen to fit the recovery distribution.

PENGYUAN determines the timing of recovery by analyzing the asset characteristics and resolution strategies. The recovery timing assumption is expressed as a recovery lag after the default occurs. We typically assume the recovery lag falls between 12 and 24 months. For certain assets, PENGYUAN may not impose delays on recoveries or assume a longer recovery time according to the defaulted asset's characteristics. For transactions with specific structures that may materially affect the recoveries, the related lag adjustments and rationale for the adjustments should be well discussed and documented.

Prepayment Rates

Voluntary prepayments occur when the collateral principal is returned at a higher level compared to the amount specified in the transaction contract. The prepayments may have significant structural impact on the asset pool. Specifically, the excess cash flow in a pool of securitized assets could increase the risk of reinvestment while the interest income could be greatly reduced, causing a reduction in the excess spread available. In addition, the prepayments of higher credit quality assets could lower the average credit quality of the portfolio's remaining assets.

PENGYUAN's base-case prepayment rate assumptions are derived by analyzing the asset characteristics and historical prepayment data. PENGYUAN may conduct sensitivity tests for prepayment rates by applying a range of stressed prepayment rates to cash flows. For collaterals with positive excess spread, we may use a faster prepayment rate with the aim of shortening the weighted average life of the asset pool, reducing the interest income and thereby obtain a more conservative rating result. However, for collaterals with certain structural features, such as a pool of securitized assets with a significant balloon payment structure, PENGYUAN may apply a slower prepayment rate. We may also analyze the prepayment characteristics according to geographic and industrial factors. For certain asset types, we may adjust or determine additional prepayment patterns on a case-by-case basis. When necessary, the committee can decide to adjust the stress assumptions. The adjustments and rationales should be discussed and well documented.

Waterfall Analysis

PENGYUAN's waterfall analysis aims to picture the flow of funds, from a bunch of assets into a series of payment buckets that include the deal expenses and note payments. When a bucket fills up, the excess flow would go downwards to another bucket, and so forth. We generally start from the source of funds, that is, the collateral pool. The cash inflows are typically composed of interest and principal payments, which are significantly affected by the defaulted rates, prepayment levels and the recoveries realized from the repossession and sale of the assets secured by the deal. For certain transactions, an initial cash reserve is preserved. The accrued interest from the cash are assumed to be a source of the fund inflows. The outflow of funds typically include deal expenses, interest payment, principal amortization, reserve fund account, seller and hedging instruments. The payment waterfall is also associated with credit enhancement meansures and performance triggers that provide protection from credit and liquidity risks, according to the transaction documents.

Deal Expenses

The first buckets are typically a series of expenses that pay the master servicer, the trustee of the deal and other parties who help manage the transactions. We generally include in the deal expenses of up to two parts: one paying fixed amounts and the other paying floating expenses based on outstanding notes. For transactions with a cap on senior expenses, the expense accruals are typically set at the cap level; for deals with a minimum level of expenses, the expenses are paid at the minimum level when the sum of fixed and floating fees is lower than the minimum requirement. PENGYUAN generally assumes the payments have no tax liability, but in some cases where the tax liability mechanism is materially changed or such liabilities are caused by asset transitions, we may adjust or add to our tax assumptions when necessary.

Payment Structures

In general, PENGYUAN analyzes the payment structures according to the transaction documents. In some situations, the interest on all notes has the priority to be filled up, and the principal payment follows. For some transactions, the subordinate interests are not repaid until the senior principals are filled up. Some deal triggers may be included in a number of transactions that may switch the payment structure from the former to the latter. For transactions with certain requirements on payment structures, a case-by-case analysis is used for capturing the flows of cash.

Principal Payment Priority

Two common structures for principal payments are the sequential and pro rata payment structures. When structured finance products are issued as sequential-pay securities, the principals are paid in order of seniority. This structure ensures that the senior principals are filled up first and subordinated tranches are paid after the seniors are retired. By this structure, investors of the junior tranche may observe large losses. In the pro rata structure, the principals are paid as sheduled in the amortization patterns. All tranches receive the proportional distribution of principal payments over the contractual life. For certain transactions, the pro rata payments are applicable until a threshold breach occurs or a minimum level of collateral remains. There may exist additional triggers that would change the cash flows paid to certain tranches, or additional provisions that pay pro rata for certain tranches. For these featured transactions, PENGYUAN may adjust our payment structure assumptions on a case-by-case basis. We may apply tranche tests when a minimum level of subordination is required in the transaction contract or in other situations. The tranche tests are typically composed of a test on a minimum subordination level and another test on a minimum payment reserve level.

Hedging

Before the funds flow into interest items, we generally model the waterfall structure in line with the hedging strategies stated in the transaction documents. The hedging instruments mainly include swaps, caps and floors. The specific structural terms typically arise for resolving the risks from interest rates or foreign exchange rates, or the basis risks introduced by mismatches between the note and asset reference rates. For interest rates that are not hedged, we may apply interest rate stresses to test the interest rate change vulnerability of structured finance transactions. If the assets and liabilities are held in different currencies and no currency swaps are included in the deal, we may add exchange rate stresses for testing the ability of the deal to withstand movements in currency depreciation.

Reinvestment

PENGYUAN generally assumes that the excess spread or recovery would be reinvested in securities that yield at a level equivalent to a reference rate. Interest reinvestment tests may be evaluated when applicable.

Deal Triggers

The deal triggers in a securitization's waterfall structure include but are not limited to: event triggers, clean-up triggers, default triggers, capture triggers, global triggers and wind-down triggers. The event trigger is breached when a nonfinancial condition event occurs, such as a servicer default or breach of a contractual arrangement. We may apply all cash flows to the outstanding principal balance when the event triggers are breached. For clean-up and default triggers, there is typically a threshold level that determines whether the trigger is breached. For instance, a percentage limit on the rolling three-month default rate could be set as the threshold for default triggers and clean-up triggers. The threshold may be set at a percentage of the original balance of the notes. The global trigger presents a combination of selected triggers. For certain deals, an event of default based on a collateral coverage ratio is set for triggers. The breach of wind-down triggers indicates the termination of the waterfall due to the deal's inability to pay the necessary fees or capital gains. The deal continues if the wind-down trigger is not breached. PENGYUAN will review the transaction documents to capture the structural triggers and may adjust or add assumptions for certain factors.

Interest Rate and Currency Risk

We may run a series of interest rate stress curves to test the sensitivity of structured finance transactions to interest rate movements, when the interest risk is not fully hedged. In situations where portfolio assets and note liabilities refer to different interest rates, a failure of interest payment could possibly occur as the rates are volatile before the maturity of the securitization transactions. Typically, we generate both upward and downward stresses for interest rates, and these curves are differentiated based on rating levels. The upward curve under AAA converges to the highest level, while the AAA downward curve converges to the lowest level.

For transactions where assets and liabilities are held in different currencies, we may conduct foreign exchange stresses to assess the foreign exchange risk in structured finance transactions. We generate a series of foreign exchange rate depreciation curves under each rating stress level and apply the depreciation stresses when the foreign exchange risks are

not fully hedged. Please see *Appendix 2 and 3* for further details on how we project the stressed interest rates and the currency depreciation scenarios respectively.

Revolving Period

A revolving period may exist for certain structured finance transactions. The note holders are exposed to additional risks during this period, as the asset principals are used for purchasing additional receivables and thereby incur a longer risk horizon and changes in asset quality. There are some structural features that could mitigate the risks from revolving assets. For example, some amortization triggers or eligible criteria might affect the amounts of cash intended to purchase additional receivables. All features are included in PENGYUAN's cash flow model, and adjustment will be discussed and well documented. For some transactions with long revolving periods, we may set a cap on the maximum achievable rating of the transactions.

Counterparty Risks

Securitization transactions rely on counterparties being able to perform their obligations. In structured finance transactions, cash collected from obligors is typically held by counterparties in bank accounts temporarily before being distributed to investors. In certain cases, the collected cash is allowed to be invested in some qualified investment instruments. The default of the counterparties, account banks and investment instruments may interrupt the transactions' cash flows and in turn lead to default on the rated securities. Many structured finance transactions use derivatives, such as swaps, to hedge interest risks or currency risks. The creditworthiness of the derivative counterparties will have a direct impact on the performance of the transactions. In addition, issuers generally enter into agreements with a number of other counterparties, including liquidity facility providers, paying agents, collection agents, calculation agents, servicers and trustees. To the extent that such agreements create obligations, the counterparty risk becomes an important risk factor in analyzing the structured finance transactions.

When assigning credit ratings of structured finance transactions, PENGYUAN takes into account the risks associated with the transaction counterparties, in addition to the creditworthiness of the underlying assets. PENGYUAN analyzes counterparty risks in a securitization transaction by reviewing the counterparty dependency, evaluating the creditworthiness of the counterparty, and assessing whether the mitigants available to the transaction sufficiently reduce the counterparty risks. The principle of PENGYUAN's approach is the removal of counterparty risk from the rated securities before the counterparty defaults. To achieve this, the transaction documentation could include certain structural features, such as the counterparty replacement trigger, collateralization of the counterparty's obligations, or a guarantee of the obligations, such that the counterparty risk can be mitigated when the counterparty's creditworthiness deteriorates, but before it is expected to default.

PENGYUAN begins its counterparty risk analysis with a review of the counterparty dependency and the potential impact of the counterparty dependency on the rated securities' creditworthiness. Based on the potential risks the counterparty dependency imposes on the rated securities, PENGYUAN classifies counterparties into three categories: excessive, limited and immaterial. A degree of exposure to a counterparty is characterized as "excessive" if the rated securities are expected to be impacted negatively by ten notches or more under the scenario where the counterparty fails to perform or defaults without taking any remedial action. An excessive exposure to a counterparty usually results in that the creditworthiness of the transaction is directly linked to that of the counterparty and the ratings of the rated securities are constrained by the rating of the counterparty if there are no additional mitigants implemented. An immaterial exposure typically does not exert a significant impact on the creditworthiness of the rated securities. PENGYUAN does not take into account the immaterial exposure when conducing credit analysis on a structured finance transaction. An exposure to a counterparty is deemed "limited" if it is not classified as "excessive" or "immaterial". In cases where the exposure is "limited", PENGYUAN assesses whether the mitigants available to the transaction sufficiently reduce the counterparty dependency and protect the transaction from the counterparty's failure to perform.

PENGYUAN assesses the remedial actions specified in the transaction documentation for isolating the rated securities from counterparty risks. When counterparties become ineligible, typical remedial actions include replacing the ineligible counterparty, posting collateral and obtaining a guarantee. To assign a higher rating on the rated security than the rating of the counterparty, PENGYUAN expects the remedial actions in the transaction documentation to be able to mitigate exposure to the ineligible counterparty in a limited period of time. PENGYUAN's analysis focuses on the minimum counterparty rating

for replacement or other equivalent remedial actions, the nature of the remedial actions and the contractually agreed remedy period. If no remedial actions are implemented upon the counterparty becoming ineligible, PENGYUAN generally assigns the rating on the rated securities no higher than that of the counterparty.

When evaluating the creditworthiness of the counterparty, the minimum counterparty rating refers to a public or private rating of the counterparty, unless stated otherwise. PENGYUAN mainly relies on its own public or private ratings. When PENGYUAN ratings are not available, we might evaluate and monitor the counterparty risk using available public ratings issued from credit rating agencies licensed by the Hong Kong Securities and Futures Commission (SFC) or recognized by other regulators. In such cases, PENGYUAN selects the most relevant public ratings and reserves the right to modify the ratings to align with our rating principles. For the counterparty without an applicable rating, PENGYUAN evaluates the exposure to the counterparty by focusing on mitigants other than the replacement of the counterparty.

Derivative Counterparties

Structured finance transactions normally use derivative arrangements to hedge interest rates, foreign exchange rates or other risks. Typical derivative arrangements used in securitization transactions include interest rate, basis and currency swaps, or caps, floors, collars. The default of the derivative counterparty can directly impact the creditworthiness of the rated securities.

For derivative counterparties, PENGYUAN expects the transaction documentation to provide remedial actions and specific time frames should the derivative counterparty become ineligible, i.e. the rating of the derivative counterparty is lower than the minimum counterparty rating. In particular, PENGYUAN's analysis is based on the derivative counterparties satisfying the minimum counterparty rating requirements in Exhibit 4.

The minimum counterparty ratings in the column 'Without Collateral' apply to derivative counterparties which do not post collateral to mitigate the risk. Given that collateral increases a counterparty's ability to perform its obligations and incentive to replace itself, the minimum counterparty ratings are generally higher than those shown in the other two columns where collateral is posted upon a downgrade below the minimum counterparty ratings.

The minimum counterparty ratings in the column 'With Collateral and No Flip Clause' apply to derivative counterparties that post sufficient collateral and we believe the 'flip clauses' are not included in the transaction documents or are not enforceable in the jurisdiction. Although the court case related to the bankruptcy of Lehman Brothers casts a doubt on the enforceability of flip clauses in the US, they have been confirmed as enforceable in English courts. When we believe there is insufficient legal comfort on the enforceability of flip clauses, the counterparty risk can only be mitigated by a replacement, should the derivative counterparty be downgraded lower than the minimum counterparty ratings specified in the column 'With Collateral and No Flip Clause' of Exhibit 4.

Exhibit 4: Minimum Counterparty Ratings for Derivative Counterparties

	Minimum Counterparty Rating		
Maximum Rating of Rated Security	**Without Collateral**	**With Collateral and No Flip Clause**	**With Collateral and Flip Clause**
AAA(sf)	A or A-1	BBB+ or A-2	BBB- or A-3
AA+(sf)	A or A-1	BBB+ or A-2	BBB- or A-3
AA(sf)	A- or A-1	BBB+ or A-2	BBB- or A-3
AA-(sf)	A- or A-1	BBB or A-2	BB+ or A-3
A+(sf)	BBB+ or A-2	BBB or A-2	BB+ or A-3
A(sf)	BBB+ or A-2	BBB or A-2	BB+ or A-3
A-(sf)	BBB or A-2	BBB- or A-3	BB
BBB+(sf)	BBB or A-2	BBB- or A-3	BB
BBB(sf)	BBB- or A-3	BB+ or A-3	BB
BBB-(sf)	Security rating	BB+ or A-3	BB-
BB+(sf)	Security rating	Security rating	BB-
BB(sf)	Security rating	Security rating	BB-
BB-(sf)	Security rating	Security rating	B+
B+(sf)	Security rating	Security rating	B
B(sf) and below	Security rating	Security rating	B-
Maximum Timing of Remedial Action	30 calendar days	60 calendar days	60 calendar days

Account Bank and Other Direct Support Counterparties

The issuer account bank refers to all bank accounts under the name of the issuer, such as collateral accounts, reserve accounts and distribution accounts. Other than the issuer account bank, direct support counterparties also include

counterparties which provide essential direct support to the structured finance transactions such as qualified investment instruments and liquidity facility providers. A failure to perform on the part of the issuer account bank and other direct support counterparties will have a significant impact on the rated securities. Due to the nature of the exposure, in this case, the counterparty risk usually cannot be reduced by posting collateral. PENGYUAN expects the direct support counterparties including the issuer account bank to meet the minimum counterparty rating listed below in Exhibit 5. We categorize the counterparty risk exposures as "substantial exposure" based on the extent to which the impact on the counterparty's ability to fulfill its obligations is significant.

Exhibit 5: Minimum Counterparty Ratings for Account Bank and Other Direct Support Counterparties

	Minimum Counterparty Rating	
Maximum Rating of Rated Security	**Substantial Exposure**	**Minimal Exposure**
AAA(sf)	A or A-1	BBB or A-2
AA+(sf)	A or A-1	BBB or A-2
AA(sf)	A- or A-1	BBB or A-2
AA-(sf)	A- or A-1	BBB- or A-3
A+(sf)	BBB+ or A-2	BBB- or A-3
A(sf)	BBB+ or A-2	BBB- or A-3
A-(sf)	BBB or A-2	BB+
BBB+(sf)	BBB or A-2	BB+
BBB(sf)	BBB- or A-3	BB
BBB-(sf)	Security rating	BB
BB+(sf)	Security rating	BB
BB(sf)	Security rating	Security rating
BB-(sf)	Security rating	Security rating
B+(sf)	Security rating	Security rating
B(sf) and below	Security rating	Security rating
Maximum Timing of Remedial Action	60 calendar days	30 calendar days

Commingling Risk

Commingling is a practice that the funds collected from obligors for the SPV remain in the servicer's accounts and the funds become commingled with the servicer's own funds. It leads to potential losses for the rated securities when the servicer or the collection account bank defaults. PENGYUAN assesses the materiality of the commingling risk based on the potential exposure. Where the collected funds are transferred to issuer accounts less frequently than once a month, we believe the rated securities are exposed to substantial commingling risks and apply the minimum counterparty ratings under the column 'Substantial Commingling Risk' in Exhibit 6. Otherwise, we expect the counterparties to meet the minimum counterparty ratings listed under the column 'Minimal Commingling Risk'.

Exhibit 6: Minimum Counterparty Ratings for Commingling Risk

	Minimum Counterparty Rating	
Maximum Rating of Rated Security	**Substantial Commingling Risk**	**Minimal Commingling Risk**
AAA(sf)	A or A-1	BBB or A-2
AA+(sf)	A or A-1	BBB or A-2
AA(sf)	A- or A-1	BBB or A-2
AA-(sf)	A- or A-1	BBB- or A-3
A+(sf)	BBB+ or A-2	BBB- or A-3
A(sf)	BBB+ or A-2	BBB- or A-3
A-(sf)	BBB or A-2	BB+
BBB+(sf)	BBB or A-2	BB+
BBB(sf)	BBB- or A-3	BB
BBB-(sf)	Security rating	BB
BB+(sf)	Security rating	BB
BB(sf)	Security rating	Security rating
BB-(sf)	Security rating	Security rating
B+(sf)	Security rating	Security rating
B(sf) and below	Security rating	Security rating
Maximum Timing of Remedial Action	60 calendar days	30 calendar days

Operational Risks

A failure to perform of a transaction party, that provides an essential service to a structured finance transaction, may affect the performance of the underlying assets and cause credit instability or even a downgrade of the rated securities. As part of its rating process, PENGYUAN reviews the operational risks of transaction participants including the originator, servicer and asset manager. The review process primarily focuses on assessing the quality and capacity of the asset origination, underwriting, servicing, collection and management. Based on the assessment, PENGYUAN may adjust the estimated loss expectations, apply a rating cap or decline to rate the transaction.

The purpose of the originator review is to understand the originator's products, programs, documentation processes, underwriting guidelines, and the quality of origination practices and controls. Based on the review, we can form an opinion on whether the credit quality of the underlying assets from the originator is likely to be in line with that of the assets originated from peers. The qualitative assessment of the originator will be factored into our quantitative analysis of the credit quality of the securitized assets. Where we believe the quality of the originator's practices and controls results in credit deterioration, we may apply a rating cap which limits the maximum potential rating of the rated security.

PENGYUAN generally focuses on a review and analysis of the following aspects of an originator's operations:

- Company Structure and Management
- Staff and Training
- Origination and sourcing
- Underwriting Guidelines
- Procedures and Controls
- Technology and Disaster Recovery
- Financial Condition

The review of origination operations is particularly important for the transactions with revolving periods, where cash flows from the pool assets may be used to originate additional pool assets.

Servicing is an essential component in structured finance transactions. The servicer acts as an interface between the obligors and investors. Servicers are responsible for, among other things, administrative functions for collecting and distributing funds, loan administration, asset and property administration, defaulted loan management, and information dissemination to market participants. Servicers' capacities to process payments, mitigate delinquencies and maximize recoveries can significantly affect the transactional performance and repayment of rated securities.

PENGYUAN's servicer review typically evaluates the quality of a servicer's loan administration and default management processes, collection techniques, compliance with procedures, and operational and financial stability. For some asset classes, like non-performing loan securitization for instance, where the servicer plays a dominant role in generating cash flow from defaulted borrowers, the experience and expertise of the servicer is of particular importance to PENGYUAN's rating.

PENGYUAN evaluates both quantitative and qualitative risk factors when assigning a servicer's operational risk. The key performance areas assessed by PENGYUAN include

- Company Structure and Management
- Staff and Training
- Loan Administration
- Nonperforming Loan Management
- Procedures and Controls
- Outsourcing Vendor Arrangements
- Technology and Disaster Recovery
- Financial Condition

For rating CLOs, PENGYUAN assesses the asset manager's ability to manage a CLO transaction, which will be explained in the asset specific criteria.

Maximum Potential Ratings Based on Operational Risk Assessment

Based on its operational risk assessment, PENGYUAN might set a maximum potential rating for a structured finance transaction. When determining the rating cap, PENGYUAN focuses on the likelihood of a disruption in the transaction party's

services (disruption risk) and the likelihood that the transaction party's responsibilities could be transferred to another party following the disruption (risk of transferability). In its assessment, PENGYUAN also takes into account the mitigants to the disruption in the transaction party's services.

PENGYUAN's assessment of a transaction party's disruption risk is based on the transaction party's creditworthiness, business profile, willing to perform and track record. After considering all the factors, PENGYUAN places the transaction party into one of four disruption risk rankings: 'very low', 'low', 'moderate' and 'high'. We use the transaction party's credit rating as the initial assessment of its disruption risk. Although the likelihood of servicing disruption is normally lower than the likelihood of the transaction party defaulting, the transaction party's credit rating provides an indicator of its financial condition and capacity to perform. We believe a transaction party with a credit rating of 'B' or lower generally has a high disruption risk; 'BB' and 'BBB' rated transaction parties have moderate and low disruption risks respectively; and transaction parties with a credit rating of 'A-' or above are robust enough to perform their servicing responsibilities and have very low disruption risks. The initial assessment is then adjusted to obtain the final disruption risk ranking by incorporating other risk factors and performance attributes.

The next step is to assess the risk of transferability upon service disruption. Our assessment of transferability is dependent on a review of the market depth of the particular service, the fees for a replacement transaction party, the expertise and system required for the service, and the historical record of transfers in the region. According to the assessment, we rank the risk of transferability into one of four categories: very low', 'low', 'moderate' and 'high'.

Exhibit 7: Maximum Potential Ratings with Limited or no Mitigants

		Risk of Transferability			
		Very Low	**Low**	**Moderate**	**High**
Disruption Risk	Very Low	AAA	AAA	AAA	AA
	Low	AAA	AAA	AA	A
	Moderate	AAA	AA	A	BBB
	High	AAA	A	BBB	BB

PENGYUAN uses the ranking results of the disruption risk and risk of transferability to determine the transaction party's operational risk level and its maximum potential rating, where no or few mitigants are included in the transaction structure. However, in certain transactions, effective mitigants can reduce the operational risk and enable the transaction to achieve a higher rating than what is described in Exhibit 7.

Surveillance

PENGYUAN conducts the rating surveillance on an annual basis or more frequently in the event of material changes that may affect the credit rating or outlook. The surveillance process starts once PENGYUAN assigns an initial rating to a security. PENGYUAN monitors the creditworthiness of the underlying assets and key counterparties based on the performance data and other information. PENGYUAN also monitors the macroeconomic environment and industry dynamics that may have an impact on the rated securities.

Appendix 1: Modelling Portfolio Default and Loss Expectations

Depending on the characteristics of the underlying assets, PENGYUAN applies different approaches to conduct the portfolio default and loss analysis. For well-diversified and homogeneous portfolios, PENGYUAN typically utilizes an actuarial approach to derive the portfolio default and loss expectations, based on an analysis of the originator's historical default, delinquency and write-off experience. For concentrated pools with several large obligors, PENGYUAN applies Monte Carlo simulation to derive the portfolio default and loss rates commensurate with various rating levels.

Actuarial Approach

The actuarial approach is usually applied where the underlying portfolio consists of a large number of homogeneous and well-diversified assets. The approach is based on the assumption that the securitized portfolio is representative of the provided portfolios being analyzed. The information provided by the originator should include details of the originator's origination, underwriting and recovery guidelines, and the originator's historical default, delinquency, and write-offs. With this information, the analyst could estimate the asset default rates and cumulative credit loss distribution function. The net loss expectations are then stressed to various rating levels. The analysis is typically conducted while taking into account various risk factors including economic conditions, the originator's underwriting practices, and changes in the size and characteristics of the originator's portfolios.

Monte Carlo Simulation Approach

For heterogeneous portfolios or pools with several large obligors, PENGYUAN uses Monte Carlo simulation to project portfolio default and loss rates, which accounts for potential asset correlations in the portfolio. Using this approach, we can project portfolio default scenarios by simulating the default behavior of individual assets. Portfolio default and loss distributions, generated by the simulation, are utilized for further analyses of the structure's credit risk. In our Credit Portfolio Simulation (CPS) model, the asset default is defined based on the structural credit models, where a firm defaults if the value of its assets is less than that of its liabilities. The correlation of default behaviors is modelled using a multi-factor framework.

Dependency Structure Modelling

In our model, an asset defaults when the standardized asset value is below a predefined default threshold. Historical data show that defaults usually do not occur independently but tend to cluster. The default clusters can be caused by industry conditions, geographic concentration or the macroeconomic environment. To account for the default correlation, we apply a multi-factor modelling approach.

$$Y_i = \sum_{j=1}^{N} A_j F_j + B\varepsilon_i$$

where Y_i is the standardized asset value of asset i. F_j is the j common risk factor which is standard normal distributed, A_j is the factor exposure of the common risk factor F_j and we assume there are N common risk factors. The idiosyncratic risk factor of a firm i , ε_i, is a standard normal random variable and

$$B = \sqrt{1 - \sum_{j=1}^{N} A_j^2}\ .$$

In this approach, the dependence on the common risk factors leads to the correlation of defaults across assets.

Recovery Rate Modelling

We assume asset recovery rates follow a beta distribution $Beta(\alpha, \beta)$ and draw random numbers from the distribution as the asset recovery rates. The beta distribution is determined by PENGYUAN's recovery assumptions which are based on asset types, countries, priority or seniority of asset, and rating scenarios.

The generation of stochastic asset recovery rates based on the inverse transform method follows the steps below:

i. Count defaulted obligors and denote the number as N since recovery is only considered under given default

ii. Generate N random numbers from the uniform distribution $U(0,1)$ and denote them as $u_i\ where\ i = 1,2,3 \cdots, N$

iii. The recovery rate of defaulted assets is calculated as follows:

$$Recovery\ Rate = F^{-1}(u_i)\ ,$$

where $F(\cdot)$ is the distribution function of the beta distribution and u_i is the uniform distributed random number corresponding to this obligor i. Here, assets that belong to the same obligor will use the same uniform distributed random number.

iv. Repeat steps i to iii to generate asset recovery rates for all rating scenarios.

Monte Carlo Simulation

Monte Carlo simulation is a common method to estimate portfolio defaults and losses in evaluating portfolio credit risk. It generates a large number of trials to simulate obligors' credit behaviour. For each trial, we check if an obligor defaults by comparing its simulated asset value with a default threshold. Then, we calculate default rates of the portfolio for each trial and generate a portfolio default distribution. The Monte Carlo simulation includes following steps:

i. Simulate the standardized values of assets in the portfolio

ii. Determine the default threshold based on the definition of asset default

iii. Calculate the default rate of the portfolio by comparing the simulated asset values with the default thresholds

iv. Generate the asset recovery rate and calculate the portfolio loss rate.

v. Generate the distribution of portfolio default rates, loss rates and loss expectations.

PENGYUAN estimates Scenario Default Rates (SDRs) and Scenario Loss Rates (SLRs) commensurate with various rating stress scenarios using the rating quantiles and simulated default and loss distribution.

Appendix 2: Foreign Exchange Stress

PENGYUAN uses foreign exchange rate stresses to assess unhedged or partially hedged currency risks in structured finance transactions where assets and liabilities are denominated in different currencies. The methodology is mainly based on historical analysis, and the general idea is to stress test the exchange rates by a depreciation stress level that can be derived from historical data and PENGYUAN's assumptions, and see if the structure of the securitized product is robust enough to withstand a certain level of losses caused by the currency depreciation.

Historical Exchange Rates and Depreciation Factors

PENGYUAN's exchange rate stress assumptions are developed for the commonly-used currencies in the structured finance markets, which mainly include the United States Dollar (USD), British Pound (GBP), Euro (EUR), Japanese Yen (JPY) and Chinese Yuan (CNY). When calibrating the assumptions, PENGYUAN collects the monthly exchange rate data in pairs, and the reversing pair is obtained by taking the inverse of the data point of the corresponding data series. We use USDCNY to refer to the CNY assets versus USD liabilities.

Most of the historical foreign exchange rates we obtained are from periods of over 25 years, but in some markets, we may allow for adjustments based on our analyses and views of the current market or the data quality. For instance, we use the USDGBP data from 1971 as we believe the fluctuating exchange rates of USDGBP before 1990s are relevant and could provide useful information on currency risks.

The depreciation of one currency may result in mismatching cash flows as the assets and liabilities in the structured finance transaction are held in different currencies, and therefore may lead to defaults of principal or interest payments. PENGYUAN believes that using the historical depreciation level is a reasonable way to connect our stress assumptions with real market conditions, and computes the depreciation stress percentages of currency pairs from historical data.

Foreign Exchange Rate Stresses

PENGYUAN generates exchange rate stresses commensurate with different rating levels. In our exchange rate model, we determine a few significant levels and then obtain the other levels by interpolation. The significant levels include 1) 'AAA' which is the highest rating category, 2) 'BBB' which is the minimum level for "investment grade" products, and 3) 'B' which is assumed to represent the current conditions in our rating system.

Exhibit 8: Sample Exchange Rate Stresses (for 60+ months)

	AAA	AA	A	BBB	BB	B
Currency Pairs						
USDGBP	64%	56%	47%	39%	27%	15%
USDJPY	49%	43%	36%	30%	19%	8%
USDCNY	33%	28%	24%	20%	10%	0%
GBPJPY	47%	41%	35%	29%	22%	15%
GBPCNY	48%	41%	35%	29%	15%	1%
EURUSD	51%	45%	38%	31%	20%	8%
EURGBP	38%	33%	28%	23%	17%	11%
EURJPY	46%	40%	34%	28%	19%	10%
EURCNY	48%	42%	35%	29%	15%	0%
JPYCNY	32%	27%	23%	19%	10%	1%
The Reversing Pairs						
GBPUSD	42%	36%	31%	25%	16%	7%
JPYUSD	57%	50%	42%	35%	23%	10%
CNYUSD	31%	27%	23%	19%	15%	11%
JPYGBP	78%	68%	57%	47%	33%	19%
CNYGBP	57%	50%	42%	35%	24%	14%
USDEUR	51%	45%	38%	31%	21%	11%
GBPEUR	44%	38%	33%	27%	17%	8%
JPYEUR	60%	53%	45%	37%	26%	16%
CNYEUR	49%	43%	36%	30%	24%	19%
CNYJPY	52%	45%	38%	31%	21%	11%

The above table (Exhibit 8) describes PENGYUAN's stressed exchange rates on different currency pairs for 60-plus months. The exchange rate stresses may tighten the cash inflows and therefore can be used to test whether the unhedged or partially hedged transaction is robust enough to survive the stress scenarios commensurate with various rating levels. For instance, PENGYUAN may stress the exchange rates by 64% under the 'AAA' stress scenario, if the assets and liabilities are held in GBP and USD respectively, and the exchange risks are not fully hedged. In some transactions, the structure might be designed to have financial tools such as swaps to hedge the risks of currency depreciation. In those situations, PENGYUAN may decide whether to apply exchange rate stresses based on our review of the specific transaction and residual exchange rate risks.

Appendix 3: Interest Rate Stress

PENGYUAN mainly uses a methodology of interest rate stresses to analyze the sensitivity of structured finance transactions to interest rate movements. Based on our review of historical data, PENGYUAN utilizes a simulation-based model to generate these stresses. A major assumption is the short-term interest rates follow a mean-reversion process, which can be described by the Cox-Ingersoll-Ross (CIR) model. The key parameters, combined with PENGYUAN's rating quantiles, help determine the stresses in the Monte Carlo simulation.

Step 1: Data Collection and Treatment

PENGYUAN collects the most common reference rates for currencies that are denominated in the US, Hong Kong and China markets. The interest rate benchmarks include the London Interbank Offered Rate (LIBOR), the Hong Kong Interbank Offered Rate (HIBOR) and the Shanghai Interbank Offered Rate (SHIBOR). The historical rates are typically available for over 30 years. But for rates with much shorter histories, PENGYUAN may modify the sample period based on PENGYUAN's analysis and data availability. For example, data on SHIBOR, which has been published since October 2006, have a history which is significantly shorter than those of other interest rate benchmarks.

Step 2: Derivation of Parameters

PENGYUAN regards the CIR interest rate model as appropriate for generating interest rate vectors, since it describes a path by which the interest rate moves towards a long-term value at a certain rate of adjustment; it also contains a stochastic factor for modelling the random market risks. PENGYUAN believes the interest rates tend to revert to an equilibrium level in the long run but are likely to be affected by market fluctuations in the short run. The mean-reversion process described in CIR Model is as follows,

$$dr = \alpha(\mu - r)dt + \sigma\sqrt{r}dW$$

where α denotes the speed of adjustment, μ denotes the long term mean, σ is the volatility and W is a Brownian motion.

Through the Maximum Likelihood Estimation (MLE) method, PENGYUAN estimates the key parameters in the CIR model, which are required for generating the interest rate stress vectors. The key parameters include

- the speed of adjustment α
- the long-term mean μ
- the volatility σ.

For calibrating the parameters, PENGYUAN typically divides the historical rates into in-sample and out-of-sample periods. The estimation described above is based on the in-sample period, and the out-of-sample data are mainly used for validation.

Step 3: Monte Carlo Simulation

Monte Carlo simulation is used in PENGYUAN's model to generate vectors of stressed spot rates, in both upward and downward scenarios. The simulation process is likely to be affected by the parameters of the CIR model, the quantiles for choosing the stress paths, the initial interest rate, and the time horizon and temporal frequency associated with the period of the interest rate vectors.

Step 4: Obtaining Stresses

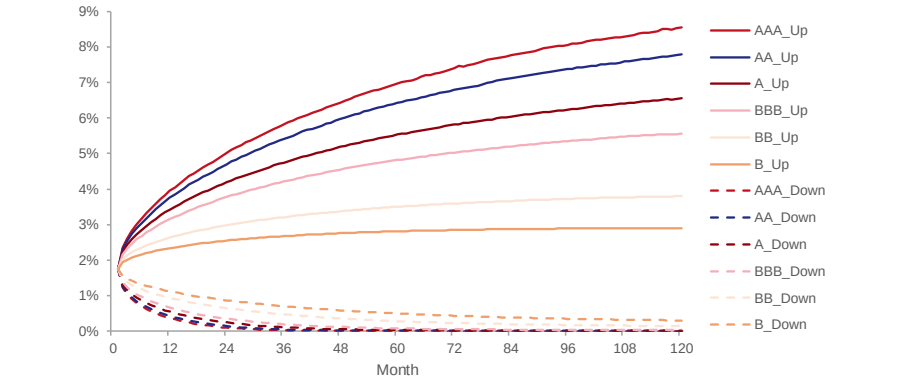
In each scenario, PENGYUAN's model generates stress curves that are differentiated according to rating levels (AAA, AA, A, BBB, BB and B). These levels are generally specified by different quantiles, and for each time step, a certain quantile determines a corresponding path. In this way, PENGYUAN could generate stresses for one rating level by two paths, one for the upward scenario and one for the downward scenario.

Sample Stress Results

The figure below describes PENGYUAN's stressed interest rates on the three-month LIBOR over 120 months, that is, 10 years. The rates are spotted at 1.7511%. In structural analysis, the cash flows are likely to be affected by the interest rates and the rates will be stressed according to PENGYUAN's assumptions if the interest rate risks are not fully hedged. For

instance, for the 120th month, PENGYUAN may stress the interest rate by around 8.55% in our cash flow analysis. If the transaction can withstand the 'AAA' stress scenarios and make principal and interest payments of a certain tranche in time, we believe the structure is strong enough to properly perform under the corresponding economic conditions.

Exhibit 9: Sample Interest Rate Stresses for 3-Month LIBOR – Spot at 1.7511% (in 10 years)



Related Criteria and Research

- Rating Symbols and Definitions, 7 May 2018
- General Principles of Credit Ratings, 21 November 2017
- Cox, J.C., Ingersoll, J.E and Ross, S.A. A Theory of the Term Structure of Interest Rates. Econometrica, Vol. 53, No. 2, March 1985

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