

## Structured finance: complexity, risk and the use of ratings<sup>1</sup>

*This article reviews the principal features of structured finance instruments. Key to understanding the risk properties of these products is the evaluation of the risks associated with their contractual structure, in addition to the modelling of the credit risk of the underlying asset pools. It is argued that structured finance ratings, though useful, have intrinsic limitations in fully gauging the risk of these products, even as their complexity creates incentives to rely more heavily on ratings than for other rated securities. Market participants and public authorities need to take account of this in their assessments of structured finance instruments and their markets.*

*JEL classification: G100, G200.*

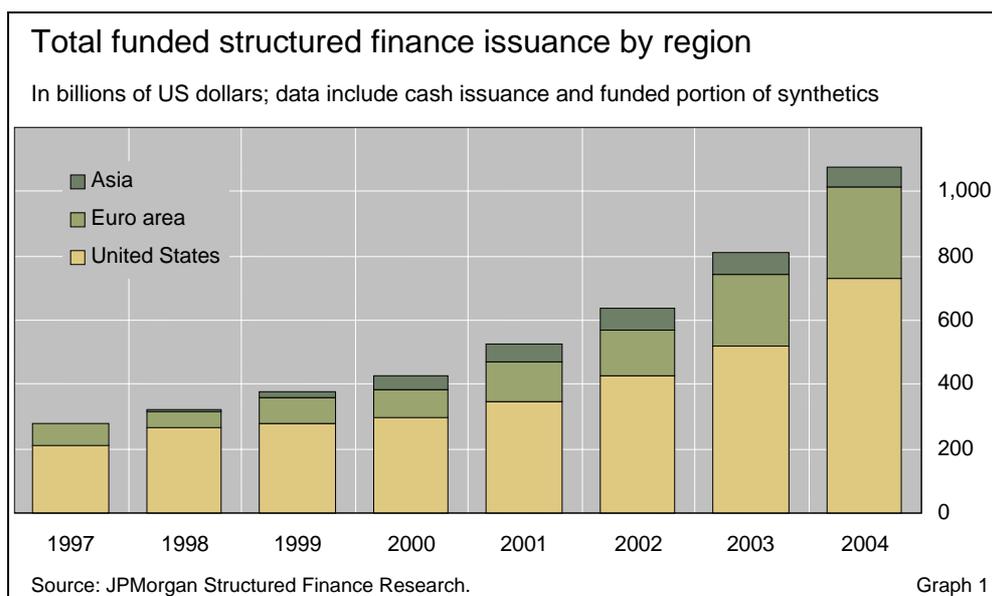
Structured finance involves the pooling of assets and the subsequent sale to investors of tranching claims on the cash flows backed by these pools. It has become an increasingly important tool for credit risk transfer. Issuance volumes have grown rapidly over recent years (see Graph 1), paralleling technical advances in credit risk modelling.

Like other forms of credit risk transfer – eg credit default swaps (CDSs) or pass-through securitisations – structured finance instruments can be used to shift credit risk across financial institutions and sectors. Yet, a key difference between structured finance and other risk transfer products is that, via the tranching of claims, structured instruments also transform risk by generating exposures to different “slices” of the underlying asset pool's loss distribution. As a result of this “slicing” and the contractual structures needed to achieve it, tranche risk-return characteristics may be particularly difficult to assess.

Ratings, which are based on the first moment of a security's loss distribution, have intrinsic limitations in fully gauging the risk of tranching securities. While this observation holds in principle for any security, it will be argued below that the tails of these loss distributions are likely to be more

---

<sup>1</sup> The views expressed in this article, which will also appear in a forthcoming issue of the National Bank of Belgium's *Financial Stability Report*, are those of the authors and do not necessarily reflect those of the BIS or the National Bank of Belgium; any errors and omissions are the authors'.



pronounced for structured products.<sup>2</sup> As a result, subordinated structured finance tranches in particular can be expected to be riskier than portfolios of like-rated bonds in that investors in the former are more heavily exposed to extreme loss events. Yet, the complexity of structured finance transactions may lead to situations where investors tend to rely more heavily on ratings than for other types of rated securities. On this basis, the transformation of risk involved in structured finance gives rise to a number of questions with important potential implications. One such question is whether tranching instruments might result in unanticipated concentrations of risk in institutions' portfolios.

For various reasons, some of which are discussed below, structured finance products may be more effective than other financial instruments at addressing problems of adverse selection and segmentation in financial markets. This has made these products attractive for a variety of market participants. Financial intermediaries' motivations for issuing structured finance instruments include access to new sources of funding, reduction of economic or regulatory capital, and arbitrage opportunities. Investor interest has been stimulated by portfolio diversification and the expectation of attractive risk-return profiles in an environment of low interest rates.

Recognising the potential of structured finance for risk transformation, the Committee on the Global Financial System (CGFS), which monitors financial market functioning for the central bank Governors of the G10 countries, established a working group to explore these instruments.<sup>3</sup> This article highlights some of the group's principal findings in the context of the "complexity" and "riskiness" of tranching products. Rating agencies and their

<sup>2</sup> It should be noted that ratings are not intended to be comprehensive measures of risk. This means that the stated limitations relate to their use, not to ratings as such.

<sup>3</sup> The working group on the role of ratings in structured finance was chaired by Peter Praet of the National Bank of Belgium. Its report, CGFS (2005), and a number of background papers authored by working group members are available online at [www.bis.org](http://www.bis.org). See also CGFS (2003).

evaluation approaches are important aspects of this discussion. Other aspects, such as potential conflicts of interest related to issuer fee-based ratings, are briefly mentioned below and covered in more detail in CGFS (2005).

The remainder of this article is organised as follows. The next section briefly discusses the economics of structured finance markets. This is followed by sections focusing on the complexity of structured finance instruments and their risk-return characteristics. The last section identifies some implications for policymakers, researchers and market participants.

## What is structured finance?

Structured finance involves the pooling of assets ...

Structured finance instruments can be defined through three distinct characteristics: (1) *pooling of assets* (either cash-based or synthetically created); (2) *delinking* of the credit risk of the collateral asset pool from the credit risk of the originator, usually through the transfer of the underlying assets to a finite-lived, standalone special purpose vehicle (SPV); and (3) *tranching of liabilities* that are backed by the asset pool. While the first two characteristics are also present with classical pass-through securitisations, the tranching of liabilities sets structured finance products apart.<sup>4</sup>

... backed by tranching liabilities with different risk-return profiles

A key aspect of the tranching process is the ability to create one or more classes of securities whose rating is higher than the average rating of the underlying collateral asset pool or to generate rated securities from a pool of unrated assets. This is accomplished through the use of credit support specified within the transaction structure to create securities with different risk-return profiles. The priority ordering of payments offers one example of credit support: the equity/first-loss tranche absorbs initial losses up to the level where it is depleted, followed by mezzanine tranches which absorb some additional losses, again followed by more senior tranches. The credit support resulting from the priority ordering means that the most senior claims are expected to be insulated – except in particularly adverse circumstances – from the default risk of the asset pool through the absorption of losses by subordinated claims.

Value creation is based on market imperfections ...

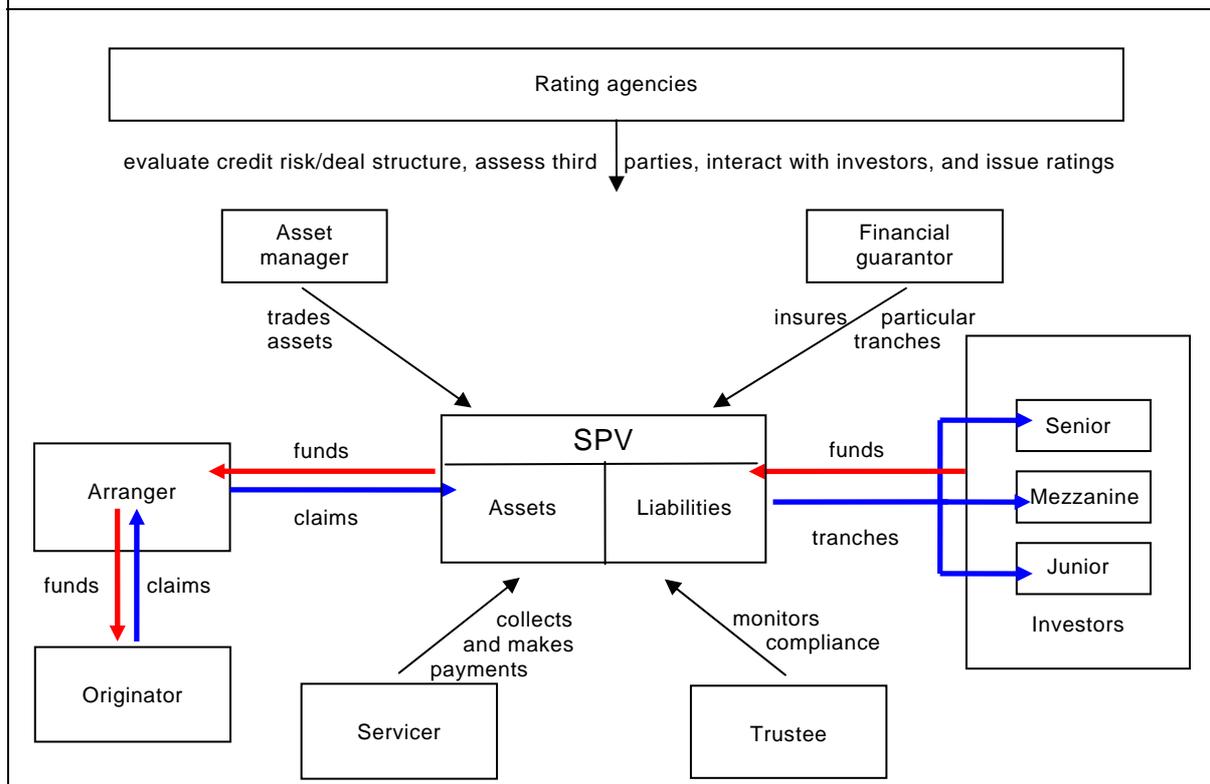
Each of the three key characteristics of structured finance contributes to “value creation” and to the attractiveness of structured finance markets for a variety of market participants. (Figure 1 illustrates the range of participants involved in a generic structured finance transaction.) In this context, delinking confers benefits similar to those of secured credit, with the additional feature that the income streams from the delinked assets will tend to be more predictable than those of the ongoing firm. An important question relating to the pooling and tranching characteristics of structured finance is under what circumstances the tranching of liabilities, which is costly, can create value above and beyond that of pooling only (eg through “pass-through”

---

<sup>4</sup> In the remainder of this article, the term “traditional ABS” will be used for structured finance securities backed by large homogeneous asset pools, such as credit card and auto loans. This contrasts with CDOs, themselves part of the ABS universe, which are backed by smaller pools of more heterogeneous assets, including assets such as bonds sourced in secondary markets and “unconventional” assets, such as tranches of other ABSs and CDOs.

## Structured finance: key market participants

Stylised overview of the “players” involved in (funded) structured finance transactions and of their roles



Source: CGFS (2005).

Figure 1

securitisation). Answers to this question relate to the nature of imperfections in financial markets. For example, the presence of adverse selection and/or market segmentation can lead to situations where tranching adds value. When the originating institution has more information about the potential cash flows from the asset pool than do outside investors, or when one group of investors has more information or ability to value the assets than others, it may be optimal to issue a senior tranche (ie debt), which is at least partially insulated from default and purchased by lesser informed investors, and a junior tranche (ie equity), to be acquired by more informed investors or retained by the originating institution.<sup>5</sup> Indeed, banks typically hold the equity tranches of the collateralised loan obligations they issue. Market information also suggests that the more junior tranches of structured products are often bought by specialist credit investors, while the senior tranches appear to be more attractive for a broader, less specialised investor community.

... such as asymmetric information ...

Similarly, segmented financial markets – due, for example, to the existence of investors with ratings-based investment mandates – may make it

... and market segmentation

<sup>5</sup> Gorton and Pennacchi (1990) show in a general context that it may be optimal for firms facing informed and uninformed investors to issue both debt and equity. For a review of literature relating more specifically to asymmetric information and market segmentation in structured finance markets, see Mitchell (2004). Ashcraft (2004) and Amato and Remolona (2003) present illustrations of value creation via arbitrage CDOs.

attractive for structured finance arrangers to create new assets with desired loss characteristics for particular investor classes. Investors benefit, as structuring helps to “complete” otherwise incomplete financial markets, for example by enabling investors constrained to invest in highly rated securities to gain exposure to asset classes, such as leveraged loans, whose performance across the business cycle may differ from that of other eligible assets.

Contractual structures ...

Whereas tranching claims may help to overcome certain market imperfections, it also introduces problems related to governance and to the question of who, if anyone, should take responsibility for restructuring the portfolio if some of the underlying assets become non-performing. As is discussed in the next section, equity tranche holders may have an incentive to increase risk and return, whereas senior tranche holders have an incentive to minimise defaults in the asset portfolio. In addition, if third-party asset managers are required to hold the equity tranche of a transaction in order to control problems of moral hazard, then their incentives will be in conflict with the senior investor classes. Indeed, much of the contractual structure of tranching products amounts to an exercise in “complete contracting”, detailing the rights and responsibilities of the asset manager, note holders and other third parties involved in the transaction. In practice, these provisions – which take the place of discretionary control rights granted to equity investors in ordinary, long-lived firms – have evolved substantially over time, often in response to poor transaction performance due to unanticipated, opportunistic behaviour by certain participants.

## The complexity of structured finance

### *Sources of complexity*

... add a layer of analytical complexity ...

Pooling and tranching, while being key sources of value in structured finance, are also the main factors behind what might be called the “complexity” of these instruments. As far as pooling is concerned, evaluation of risk and return of a structured finance security necessitates modelling the loss distribution of the underlying asset pool, which may be complicated when the pool consists of a small number of heterogeneous assets. However, as tranching adds an extra layer of analytical complexity, the evaluation of a structured finance instrument (in other words, a tranche) cannot be confined to analysing asset pool loss. It is also necessary to model the distribution of cash flows from the asset pool to the tranches; that is, to evaluate the deal’s specific structural features. These features, defined via covenants, may entail sets of rules for the allocation of principal and interest payments received from the collateral pool and for the redirection of these cash flows in the case of stress situations, in addition to specifying the rights and duties of various third parties involved in the transaction.<sup>6</sup>

---

<sup>6</sup> One might argue that evaluation of subordinated debt and related assets is similarly complex, given various covenants and differences across national bankruptcy laws. We argue that evaluation of structured finance instruments entails all of that complexity, plus additional

Consequently, structured finance instruments give rise to “non-default” risks – ie risks that are unrelated to defaults in the collateral pool, but which nevertheless affect the credit risk of issued tranches.<sup>7</sup> One source of non-default risk is the conflicts of interest among tranche holders. For example, senior note holders are promised interest during the life of the transaction and a principal payment at maturity. Equity holders have no promised principal payment; therefore, they have an interest in see(k)ing high up-front payouts before defaults begin to deplete their tranche holdings. By implication, to the extent that equity investors can influence initial portfolio selection, they may be willing to sacrifice credit quality in exchange for enhanced yield payments, eg by including credits with wide spreads for given rating levels.

... involving default and non-default risks ...

To try to control such conflicts, CDOs and other tranching products rely extensively on structural provisions based on loss triggers and threshold levels (eg overcollateralisation and interest rate coverage tests). These tests, when “failed”, divert cash flow to protect senior note holders. In this context, preservation of “excess spread”, which represents the difference between the income earned on the collateral assets in a given period and the contracted payments to the tranching liabilities, has become a key structural feature. As a result, the excess spread now tends to be held in a reserve fund rather than being distributed to equity tranche investors immediately. This serves to make payouts more back-loaded, cushioning the performance of senior notes.

Performance of third parties constitutes another source of non-default risk.<sup>8</sup> Servicer performance, in particular, is of fundamental interest for traditional ABS instruments – especially for structures containing assets from jurisdictions or market segments with a relatively small number of third-party servicers, where replacement servicers may be hard to find. The importance of servicer performance for the robustness of structured finance transactions, including possible interactions with legal and default risks, has been highlighted by the losses experienced on certain transactions in the US manufactured housing ABS markets in the late 1990s.<sup>9</sup>

... such as those arising from third-party involvement

### *Structured finance ratings*

Given the complexities described above, structured finance has, from the beginning, been largely a “rated” market. Issuers of structured instruments

Structured finance is a rated market ...

---

layers, due to the pooled nature of the underlying assets and the elaborate, often non-standardised contractual structures.

<sup>7</sup> See, for example, Cousseran et al (2004) for a comprehensive description of these issues.

<sup>8</sup> The underperformance of certain early CDO structures has at least partially been blamed on the actions of asset pool managers. The recent legal dispute over CDO structures named “Corvus” and “Nerva” involving HSH Nordbank and Barclays Capital, which was settled out of court in February, may be a case in point. HSH Nordbank sued Barclays Capital because of losses incurred in these CDO structures, which Barclays managed and in which the asset manager had included some tranches from other, poorly performing Barclays CDOs.

<sup>9</sup> A decline in underwriting standards, combined with the servicers’ delay of foreclosures, which allowed delinquencies to build, ultimately resulted in higher than anticipated loss severities. In the wake of the economic downturn starting in 2000, pool deterioration became increasingly apparent, triggering substantial downgrades. See CGFS (2005), Appendix 5, for more detailed coverage.

were keen to obtain ratings according to scales that were identical to those for bonds, so that investors would feel comfortable purchasing the new products. Investors, in turn, had an interest in delegating part of the assessment of these instruments to third parties.

The rating agencies, in their traditional role as “delegated monitors” of the riskiness of debt instruments, emerged as a natural source for such services. The complexity of structured finance instruments in all likelihood heightened the importance of this role.<sup>10</sup> Interestingly, structured finance ratings are now among the largest and fastest-growing business segments for the three leading credit rating agencies, and a principal revenue source. This has given rise to a number of concerns, including questions about potential conflicts of interest based on issuer-paid fees.<sup>11</sup>

While much of the expertise involved in rating traditional debt carries over to structured finance, the special features of structured products lead to differences in the nature of the agencies’ rating methodologies. Importantly, structured finance tranches are usually tailored by arrangers with target ratings in mind. This, in turn, requires the rating agencies to take part in the deal’s structuring process, with deal origination implicitly involving obtaining structuring opinions from the rating agencies.

In practice, arrangers will routinely use the agencies’ publicly available models to prestructure deals and subsequently engage in an iterative dialogue with the agencies to finalise their structures. This process and the confined, contractual nature of a structured finance transaction allows arrangers to adapt the profile of a tranche in response to pre-rating feedback, which implies that the process of rating these instruments has a pronounced “ex ante” nature. This contrasts with traditional “ex post” ratings, for which targeted ratings levels and pre-rating feedback play less of a role, owing to the limited ability of issuers to adjust their credit characteristics in response to such information.

... and instruments are structured in accordance with rating agency models

## The risks of structured finance

### *Analysing pool default risk*

Ratings, as indicators of the default risk embedded in debt instruments, are based on expected loss (EL) or probabilities of default (PDs).<sup>12</sup> The estimate of

Asset pool analysis relies on estimated loss distributions ...

---

<sup>10</sup> Indeed, work by Ammer and Clinton (2004) on pricing patterns for US ABSs suggests that reliance on ratings as a source of credit information seems to be somewhat higher in structured finance than in traditional bond markets. Specifically, ABS downgrades are found to have a stronger impact on prices than do downgrades for corporate bonds, with downgrades to speculative grade standing out in particular.

<sup>11</sup> Moody’s annual report for 2003 documents that structured finance, at \$460 million, accounted for more than 40% of its ratings revenues. Although separate public accounts for Fitch Ratings and Standard & Poor’s are unavailable, the annual reports of their respective parent companies suggest that structured finance is of comparable importance for them too.

<sup>12</sup> Ratings issued by Standard & Poor’s and Fitch are based on PDs, whereas Moody’s ratings are based on EL. These differences have a historical component – in order to enhance comparability between bond and structured finance ratings, each agency elected to base its structured finance ratings on the same measure used for its bond ratings.

EL or PD for a structured finance tranche will critically depend on the size (ie “thickness”) and position of that tranche in the loss distribution of the underlying asset pool. To obtain this assessment, as highlighted above, an estimate of the asset pool’s loss distribution (the result of *credit risk modelling*) has to be combined with information about the structural specifics of the deal and its tranches (the result of *structural analysis*).

The main factors driving the loss distribution of any portfolio and, hence, the three main inputs into each agency’s structured finance rating methodology are estimates of: *probabilities of default* of the individual obligors in the pool; *recovery rates*; and *default (time) correlations* among the obligors within the pool. The choice of the approach used in conjunction with these inputs to model losses will depend on collateral pool specifics, such as the number and homogeneity of assets, obligor classes, and historical performance. In this regard, a key differentiation can be made between the approaches used to rate traditional ABS instruments and those applied to CDOs.

... which are based on assumptions about default probabilities and recovery rates ...

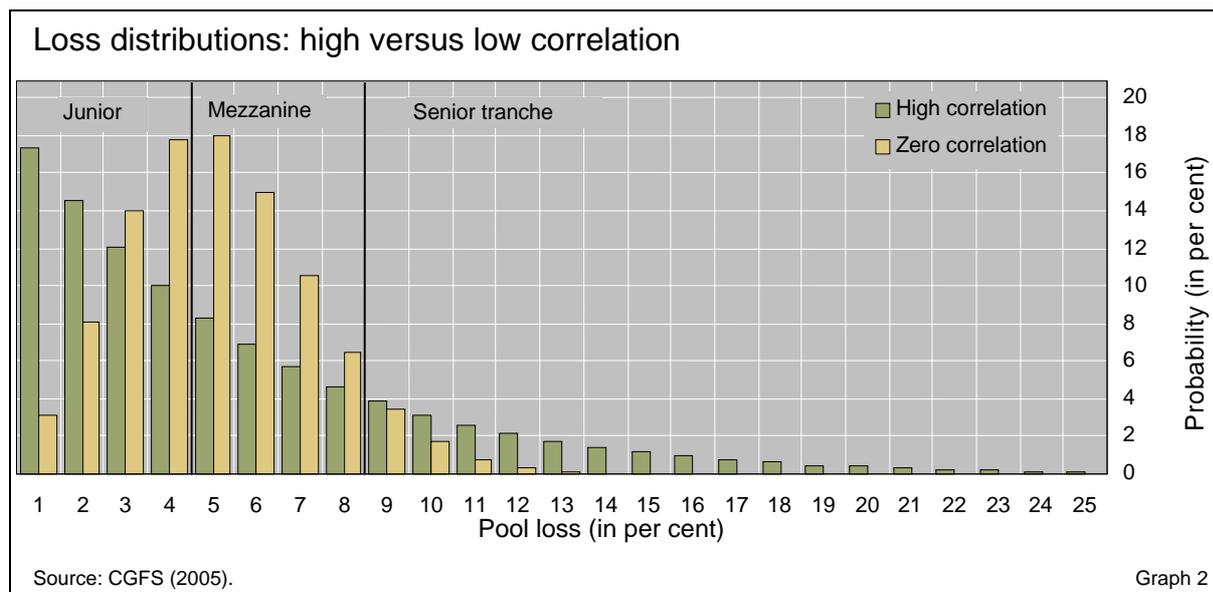
Traditional ABS portfolios are usually made up of large, well diversified, homogeneous pools of assets (eg residential mortgages or credit card receivables), with no significant individual exposures relative to overall pool size. Thus, idiosyncratic risk is much less important for ABSs than for instruments with less diversified and more heterogeneous collateral pools. As a result, ABSs are typically rated by use of so-called “actuarial approaches”, which rely on the assumption that each originator’s unique underwriting policy gives rise to characteristic loss and recovery patterns that are reasonably stable over time. Loss and dispersion measures can then be reliably inferred from the loss histories of static pools of assets originated by the same lender.

CDOs, on the other hand, are “lumpy” (ie less granular than traditional ABSs) and generally contain, or are referenced to, relatively small numbers of non-homogeneous assets. Consequently, both idiosyncratic and systematic risks are important for pool performance, and methods used for calculating loss distributions for traditional ABS portfolios are inappropriate for CDOs.

One of the key issues affecting the assessment of the loss distribution for CDO portfolios is the estimation of default correlations among the obligors. When correlation is close to zero, a typical CDO’s loss distribution will have a skewed bell shape that is best approximated by the binomial distribution. At higher correlation levels, however, the shape of the loss distribution changes, as probability mass is moved into the tails (see Graph 2). For a given level of expected loss, higher correlation among obligors in the pool thus leads to loss distributions such that the senior tranches bear greater risk and the most junior tranche benefits, as outcomes will be more dispersed.

... as well as default correlations

Estimates of tranche risk and return, therefore, are quite sensitive to assumptions regarding the default correlation of obligors in the underlying pool. Consequently, estimates of tranche EL and PD – ie ratings – may differ across rating agencies due to differences in methodologies and/or assumptions. This, in turn, gives rise to “model risk”, ie the risk that the specific model used to size the credit enhancement for a given tranche and rating may inaccurately reflect



the “true” risk of the tranche. Investors, finally, need to understand the model risk they are taking in order to demand appropriate risk-adjusted returns.<sup>13</sup>

#### *Ratings and tranche risk properties*

Ratings are based on expected loss or probability of default ...

A related question is whether ratings, to the extent that they accurately reflect EL or PD, are a good guide to the risk properties of tranced instruments. For instance, depending on their position in the seniority structure, tranches of structured finance instruments can be more leveraged than the portfolio of underlying assets: ie the more subordinated a given tranche and the “thinner” that tranche, the greater the probability that the holder of the tranche will lose a significant portion of its investment.

... but not “risk” more generally

As explained in the box on page 76, the variety of possible risk profiles generated through tranching can lead to substantial differences, in terms of unexpected loss and the timing of losses, among tranches as well as between tranches and ordinary bond portfolios. Importantly, these differences apply even when the two instruments have the same EL or PD. As a result, tranced products can have risk properties that differ substantially from those of equally rated bond portfolio exposures. An important implication is that, due to the joint effects of pooling and tranching, ratings of structured finance products can be expected to provide only an incomplete description of their riskiness relative to traditional instruments. In particular, as “tail events” tend to be more likely than for like-rated traditional instruments, undue reliance on the part of structured finance investors on ratings can thus lead to unintended exposures to unexpected loss.

<sup>13</sup> See Fender and Kiff (2004) for a comparison of the rating agencies’ approaches for CDO modelling and a description of the key role played by default correlation in understanding model risk; Amato and Gyntelberg (2005) show how the price sensitivities of tranced instruments depend on default correlations.

## Ratings and the risk properties of structured finance products<sup>①</sup>

Ratings are assessments of *expected loss (EL)* or *probability of default (PD)* and thus reflect an actuarial notion of credit risk that depends only on the first moment of the distribution of possible outcomes. Holding EL constant, however, an investment will tend to be riskier if its loss distribution is more dispersed. Risk profiles of financial instruments are, therefore, more fully described when estimates of EL or PD are combined with information on the *ex ante uncertainty of losses* as reflected, for example, in the variance and higher moments of the loss distribution. Ex ante credit loss uncertainty, in turn, has come to be commonly referred to as *unexpected loss (UL)*. With regard to structured finance, two considerations merit mention in this context:

### 1. Risk comparisons among structured finance tranches

Due to the additivity of EL, the process of tranching will distribute the EL of the underlying portfolio across the various classes of securities issued against the pool. The equity tranche, although typically the smallest tranche in terms of notional size, will end up bearing much of the pool's EL. In contrast, the senior tranche, being highly rated, will bear only a small portion of the EL, despite laying claim to most of the structure's principal. Tranche UL will exhibit similar patterns across tranches: measured against tranche notionals, the UL of a tranche will tend to be higher for more junior tranches. The risk profile of a structured finance tranche, in fact, depends largely on two factors: its *seniority* (as determined by the lower boundary of the tranche) and its *thickness* (ie the distance between the upper and lower tranche boundaries; see Graph 2). The lower the seniority, the lower the level of loss protection and the higher the risk of a given tranche. The narrower the tranche, the more the loss distribution will tend to differ from the distribution for the entire portfolio in that it is likely to be more bimodal and, thus, riskier.

### 2. Risk comparisons with like-rated assets

Another aspect of structured finance is that tranching can lead to risk profiles that are substantially different from those of ordinary bond portfolios with the same (weighted average) rating. One factor behind this observation is the possibility of zero tranche recoveries for subordinated tranches. As a result, if defaults are severe enough, investors in all but the most senior tranches may lose the entire value of their investment even in the case of non-zero recoveries. The narrower the tranche, the riskier it will be, as it takes fewer defaults for the tranche to be wiped out once its lower loss boundary has been breached. Subordinated tranches, therefore, have a wider distribution of outcomes than like-rated bond portfolios and will thus need to pay a higher spread than traditional debt instruments to compensate for the added risk.

---

<sup>①</sup> See CGFS (2005), Gibson (2004) and Meli and Rappoport (2003).

Structured finance and bond ratings differ not only in the conceptual dimensions highlighted above, but also in terms of the empirically observed rating stability over time. Given the pooled nature of structured finance products, and resulting diversification, they might be expected to – and indeed do – exhibit greater average ratings stability. Empirical studies suggest, in particular, that the volatility of structured finance ratings is significantly lower than for corporate bonds, although the average number of notches per structured finance rating change appears to be higher – perhaps reflecting their higher inherent leverage described earlier. The likelihood of a rating change, therefore, is smaller in structured finance, while the magnitude of the change, when it occurs, is larger. At the same time, the results for structured finance products taken as a whole mask significant differences across different types of

structured instruments, and particular asset classes seem to exhibit a markedly higher rate of downgrades than bonds.<sup>14</sup>

## Some implications

While structured finance instruments can contribute to market completion and a better dispersion of credit risk, they also give rise to a number of questions with potential financial stability implications. One of these is whether adding structured instruments to an institution's portfolio might lead to unanticipated risk concentrations. A closely associated question is whether ratings-related investment mandates and similar constraints are effective in defining maximum levels of risk when structured finance is an eligible asset class.

Undue reliance on ratings ...

The discussion above suggests that tranching securities pose unique challenges to the application of ratings-based constraints in that a greater likelihood of "tail events" is not captured by ratings ranking expected loss or probability of default. Transaction-specific documentation makes the task of assessing the riskiness of tranching instruments even more difficult, which in turn may increase investors' reliance on ratings for "due diligence" purposes. And, even when asset managers do fully understand the risks they are taking, they may still be tempted to employ structured securities to increase portfolio risk to levels that are higher than was intended by those who designed their investment mandates. By implication, market participants and supervisors should not rely exclusively on ratings when setting risk limits for credit portfolios.<sup>15</sup>

... and model risk ...

Model risk is another important concern, being tightly linked to the complexity of structured products and to the sensitivity of tranche risk to differing assumptions embodied in estimates of the asset pool loss distribution.<sup>16</sup> Importantly, any effect of misspecified model inputs, such as default correlation, may be magnified by governance issues, as equity tranche holders favour asset pools composed of obligors with high default correlations, at the expense of senior note holders.

In addition, it should be noted that model risk is a feature also of the pricing models used by deal arrangers and other market participants. As these models have to date been largely untested by a truly major stress event, even

---

<sup>14</sup> One such example is CDOs, for which Moody's reports a downgrade-to-upgrade ratio of 19.0 for 1991–2002, as compared with long-term ratios of 1.2 for all structured finance products and 2.3 for corporate bonds. According to market sources, this record was primarily driven by an extraordinarily high rate of defaults and downgrades for bonds included in CDO pools and by shared concentrations in particular obligors. See also Violi (2004).

<sup>15</sup> The new regulatory capital requirements for banks' holdings of securitisations, as specified in the new Basel II framework, may be seen as a reflection of these considerations. They not only take account of the rating assigned to a tranche, but also explicitly incorporate factors such as the level of subordination of the tranche and the granularity of the underlying asset pool. For more detail on the different approaches for computing regulatory capital for securitisations, see CGFS (2005), Box 6.

<sup>16</sup> Note that model risk is also present in bond ratings. However, given the less quantitative nature of the bond rating process, model risk is arguably more pronounced and its sources more easily identifiable in structured finance ratings.

the most sophisticated market participants may thus need to be careful when trading structured instruments, given the resulting scope for mispriced or mismanaged exposures. A related point is that adding tranching products to existing exposures in a portfolio raises issues regarding the management of correlations on the portfolio level – particularly for “correlation-intensive” instruments, such as CDOs based on tranches of other CDOs.

Fortunately, these issues appear to be reasonably well understood by many, if not most, market participants. Market surveys suggest that investors do not rely exclusively on ratings for their structured finance investment decisions; rather, they tend to see ratings as only one element of a broader process of risk management. In addition, those investors who lack the capacity to analyse complex structured finance instruments, such as CDOs, claim to avoid using them (see CGFS (2005) and ECB (2004)). However, to the extent that structured finance markets are broadening to include less sophisticated institutions and retail investors, the risk of unanticipated losses is real.

... pose the risk of unanticipated losses

The rapid evolution of structured finance markets implies that new structures and asset classes are continually being introduced. As a result, unfamiliar structures create new opportunities for unanticipated behaviour by note holders or third parties, while the scarcity of data on the historical performance of new asset classes generates additional model risk. Given the issues highlighted in this article and the fact that the structured finance market remains largely untested, policymakers and market participants alike have an interest in following closely the developments in these markets and in attempting to understand the core challenges faced.

## References

Amato, J and J Gyntelberg (2005): “CDS index tranches and the pricing of credit risk correlations”, *BIS Quarterly Review*, March, pp 73–87.

Amato, J and E Remolona (2003): “The credit spread puzzle”, *BIS Quarterly Review*, December, pp 51–63.

Ammer, J M and N Clinton (2004): “Good news is no news? The impact of credit rating changes on the pricing of asset-backed securities”, *International Finance Discussion Paper*, no 809, Federal Reserve Board, July (available from [www.bis.org](http://www.bis.org) along with CGFS (2005)).

Ashcraft, A (2004): *How does tranching add economic value?*, Federal Reserve Bank of New York, mimeo (available from [www.bis.org](http://www.bis.org) along with CGFS (2005)).

Committee on the Global Financial System (2003): *Credit risk transfer*, Bank for International Settlements, Basel, January (available from [www.bis.org](http://www.bis.org)).

——— (2005): *The role of ratings in structured finance: issues and implications*, Bank for International Settlements, Basel, January (available from [www.bis.org](http://www.bis.org)).

Cousseran, P O, K Hall, I von Koeppen-Mertes and Y Nakata (2004): *Non-credit risks in structured finance*, mimeo (available from [www.bis.org](http://www.bis.org) along with CGFS (2005)).

European Central Bank (2004): *Credit risk transfer by EU banks: activities, risks and risk management*, May.

Fender, I and J Kiff (2004): "CDO rating methodology: some thoughts on model risk and its implications", *BIS Working Papers*, no 163, November (available from [www.bis.org](http://www.bis.org)), forthcoming in *Journal of Credit Risk*.

Gibson, M (2004): "Understanding the risk of synthetic CDOs", *Finance and Economics Discussion Series*, no 36, Federal Reserve Board, Washington DC.

Gorton, G and G Pennacchi (1990): "Financial intermediaries and liquidity creation", *Journal of Finance*, vol 45(1), pp 49–71.

Meli, J and P Rappoport (2003): *Tranched credit relative value*, JPMorgan Fixed Income Quantitative Strategy, December.

Mitchell, J (2004): *Financial intermediation theory and structured finance markets*, National Bank of Belgium, mimeo (available from [www.bis.org](http://www.bis.org) along with CGFS (2005)).

Violi, R (2004): *Credit ratings transitions in structured finance*, Banca d'Italia, mimeo (available from [www.bis.org](http://www.bis.org) along with CGFS (2005)).

