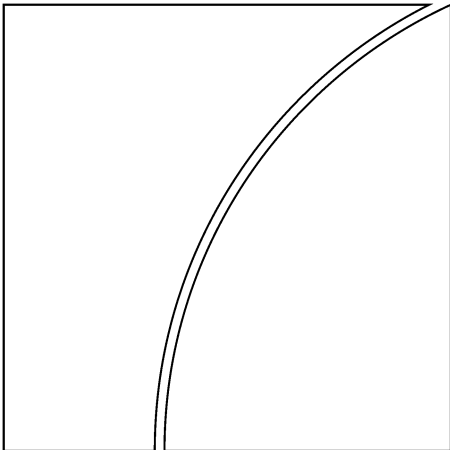


# Committee on the Global Financial System



## Credit risk transfer

Report submitted by a Working Group established by the  
Committee on the Global Financial System

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# Working Group on Credit Risk Transfer

## I. Executive summary

Techniques for transferring credit risk, such as financial guarantees and credit insurance, have been a long-standing feature of financial markets. In the past few years, however, the range of credit risk transfer (CRT) instruments and the circumstances in which they are used have widened considerably.

A number of factors have contributed to this growth, including: greater focus by banks and other financial institutions on risk management; a more rigorous approach to risk/return judgments by lenders and investors and an increasing tendency on the part of banks to look at their credit risk exposures on a portfolio-wide basis; efforts by market intermediaries to generate fee income; a generally low interest rate environment, which has encouraged firms to search for yield pickup through broadening the range of instruments they are prepared to hold; and arbitrage opportunities arising from different regulatory capital requirements applied to different kinds of financial firm. The significance of CRT seems to vary appreciably across firms and market segments. Thus, for example, the intermediation of credit default swaps seems to be a major business line for a small, but only a small, number of firms; and CRT markets are particularly active for major company credits, much less so for SMEs. Given these differences, it may be misleading to talk about the overall impact of CRT. However, while CRT flows have been substantial, and despite recent growth, CRT activity seems still to be relatively small compared with the outstanding stocks, and even the current flows, of credit-risk-related instruments.

After setting out some of the broader background (Section II), this Report reviews the recent development of CRT markets, describing the characteristics of the instruments used, the nature of the market participants and the reasons for their involvement (Section III). It then discusses some of the principal features of the markets themselves, focusing on the questions of transparency and data availability, on how CRT instruments of different kinds are priced and on how far the existence of CRT markets has affected the process of price discovery (Section IV).

The remainder of the Report (Sections V, VI and VII) identifies and analyses some possible implications of the evolution of CRT markets for the overall functioning of the financial system and discusses some of the concerns which have been expressed about the impact of CRT on financial stability.

CRT instruments typically change the relationship between borrowers and lenders and establish new relationships between lenders and those to whom they may pass on credit risk (Section V). This implies in particular changes in the incentives which the different parties to a credit transaction face. The Report analyses these changes in terms of potential market failures, for example asymmetric information, principal/agent problems and incomplete contracts. It concludes that most of these problems have been recognised by market participants and market authorities and have been addressed in one way or another. In some cases, however, it has proved difficult or impossible to arrive at an entirely satisfactory solution. One common approach is to ensure that the risk shedder retains some interest in the performance of the borrower and therefore some incentive to monitor the borrower's performance carefully. Such retention can, however, diminish the attraction of CRT transactions in so far as regulators may not recognise the risk transfer for capital requirement purposes unless it is complete. A further problem has proved to be the formulation of contracts in a way which is unambiguous in all plausible circumstances. In a number of cases a situation has arisen which was not anticipated at the time a contract was drawn up and in which the interests of the parties to the contract have diverged. At one level this is a legal/documentation issue, and some worthwhile progress has been made, in this and in other areas, by developing the standard ISDA contract. Further improvements could no doubt be introduced. Some especially difficult issues arise, however, in relation to the definition of "restructurings" and their inclusion as credit events. At present it is not clear how far these are capable of being resolved by legal drafting and how far they reflect deeper problems of contract design. In any case, there remains a concern that those who believe they have shed risk could sometimes find that they have not, and that those who believe they are not at risk may find that they are.

The Report considers (in Section VI) some structural implications of the wider use of CRT. In particular, it notes that rating agencies play a central role in some CRT markets. To an extent this is no different from the role which they already play in the rating of corporate debt (and indeed the market in single name credit derivatives is, broadly speaking, confined to names which are already rated). But the rating agencies arguably have an even more important role in relation to portfolio instruments, and their models have set market standards for credit risk assessment of such instruments. While the analytical basis for these assessments has been advancing, there are still some significant unresolved questions, notably about the way diversification effects should be handled. This in turn implies some uncertainty about the pricing of the instruments themselves. CRT also has a potentially major impact on the way that banks go about their business. Increasingly, they are acting as credit originators rather than long-term funders, shifting loans off their balance sheet either individually or as part of a package through loan transfers and securitisation. In some cases, however, they continue to act in an agency capacity in terms of monitoring and servicing the loans. While these trends now seem firmly established, they have so far had only a relatively small impact on the profile of business for the banking sector as a whole, with a possible exception in the area of credit card receivables and mortgages in some countries.

Innovation in financial markets, and within that the development of new financial instruments such as credit derivatives, is generally to be welcomed as increasing market efficiency, enabling better diversification of portfolios and providing a wider range of techniques for risk management. However, there are a number of aspects of CRT which raise policy issues and which, at least in some cases, might point to the need for a policy response (Section VII). Some of the main ones are as follows:

- **Transparency** - financial firms' disclosure of their CRT activities is patchy at best. In a fast-developing market with a potentially significant effect on the distribution of risks this lack of disclosure is a concern. The Report suggests that the issue might best be addressed by lending support to existing initiatives on disclosure (eg Fisher II) and by flagging the specific concerns in relation to CRT.
- **Aggregate data** - the relative dearth of information at the level of the individual firm is paralleled by an incomplete picture of how CRT markets are developing in aggregate. Central banks and others are currently exploring how to improve their database related to CRT instruments without imposing an undue reporting burden on market practitioners.
- **Rating agencies** - the Report notes the critical role of rating agencies in various CRT markets and the implicit reliance on the risk assessment techniques which they use. Although the Report does not formulate any view on the desirability or otherwise of this state of affairs, the CRT dimension should be taken into account in the various reviews of the rating agencies' activities which are at present in progress.
- **Diversification and concentration** - one of the principal potential benefits of CRT is that it facilitates the wider dispersion of risk and allows risk profiles to be adjusted more flexibly. At the same time, some elements of the CRT market appear to be highly concentrated, which might give rise to market disruption if the firms concerned were to come under pressure.
- **Contract design** - as previously noted, the formulation of restructuring clauses in credit derivatives contracts has proved to be particularly problematic. It remains to be seen whether the difficulties can be resolved; if not, it could act as a significant brake on the further development of this part of the CRT market.
- **Risk management** - although in many respects CRT involves familiar risk management issues, it does sharpen questions about counterparty risk in relation to unfunded risk transfers, given the speed and scale of possible changes in exposures, and also raises technical questions about the reliability of pricing of portfolio instruments. In addition, there are a number of issues related to documentation on which further work is needed. More fundamentally, there has been concern that CRT could lead to a weakening in overall credit risk monitoring if those who end up holding the credit risk have less information about the borrower than the original lender. Market practice has, however, evolved in a number of ways to mitigate this risk.

- **Accounting** - divergences in accounting rules have had a restraining effect on certain parts of the CRT market. As credit risk (at least vis-à-vis larger borrowers) becomes more readily tradable, it may also increase the tension between book value and mark to market valuation. Although the Report did not explore this (contentious) issue it is clear that it is attracting increasing attention from practitioners.
- **Regulation** - CRT has the potential to highlight more clearly differences in the regulatory treatment of credit risk as between different kinds of institution and is, therefore, likely to work towards a more integrated approach to regulatory capital standards. The International Association of Insurance Supervisors and the UK Financial Services Authority have recently reviewed the regulatory implications of CRT.

## II. Background

Although new instruments such as credit derivatives and collateralised debt obligations (CDOs) have attracted a lot of attention, CRT is not a new phenomenon. Syndication of bank loans in the primary market began in the 1970s and secondary markets in bank loans developed in the United States in the 1980s. Loan portfolios were first packaged into tranching securities (securitisation) in the 1970s in order to fund residential mortgage portfolios. Some contractual transfers of credit risk such as bank guarantees and credit insurance have, of course, a much longer history still.

However, recent developments seem to represent something of a step change. [REDACTED]

[REDACTED], whether singly or packaged together. Although funding costs and regulatory arbitrage remain as motives for CRT, the main driver is increasingly credit risk and risk/return management. Just as the development of market risk derivatives went alongside better management of banks' market risks, so the development of CRT markets seems to be linked to developments in bank credit risk management, where emphasis is shifting from the management of single exposures to having a more dynamic view of the bank-wide credit portfolio.<sup>1</sup> Innovations in credit risk transfer have widened the options available to credit risk managers and have allowed banks to think about shaping their risk profile independently of their origination business. In the first instance, this has often meant seeking to reduce concentrations of credit risk to particular borrowers or market segments.

At the same time, demand for credit risk outside the banking system has also been an important factor in the development of CRT markets. At a macroeconomic level, a sustained period of low interest rates has induced financial institutions to try to improve their returns by acquiring higher-yielding, if riskier, assets. In some countries, the demand for credit risk has coincided with a scarce supply of tradable credit risk bearing instruments. On the liabilities side of the balance sheet, banks in some countries have faced increasing difficulties in attracting low-cost retail deposits because of competition from a growing range of savings products, which has in turn made securitisation an attractive funding device. Anecdotal information suggests, however, that with recent sharp falls in equity prices and increased losses, for example from CDO downgrades, the risk appetite of some investors, including insurance companies, may be waning.

CRT has the potential to facilitate important and helpful changes in financial institutions' risk profiles and in the way they manage their risk. These changes could in turn significantly influence the way in which risk transfers are intermediated. The key roles banks play, and are likely to continue to play, as lenders and liquidity providers, and their consequent importance for financial stability, make these developments of particular interest for central banks. For that reason the CGFS decided in September 2001 that they should be reviewed by a Working Group (see Appendix 1 for the terms of reference). This Report is based on analysis carried out by members of that Group, on interviews with banks, insurance companies, investment funds and rating agencies and on discussions with market practitioners arranged in conjunction with Working Group meetings.

CRT has its own special vocabulary. In this Report, institutions transferring credit risk out are generally referred to as *risk shedders* (also known as protection buyers, risk sellers and insureds) and institutions taking on credit risk are referred to as *risk takers* (also known as protection sellers, risk buyers, insurers and guarantors). Appendix 2 gives a short description of CRT instruments and explains the terminology.

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<sup>1</sup> Although there is a tendency towards a portfolio view of credit risk, it should be noted that the aggregation of credit exposures to a specific counterparty across business lines, countries and legal entities is in itself a demanding task for large complex institutions.



### III. Instruments and institutions

#### III.1 Instruments

A variety of instruments and techniques can be used for CRT. Recently, the development of credit derivatives has given CRT an additional impetus. Trading in single name credit default swaps (CDSs) has developed to the point where there is a fair degree of liquidity, which has contributed to the transparency of credit risk pricing. CDSs have also given additional flexibility to the transfer of credit risk through portfolio transactions, for example enabling non-banks to take on credit risk in unfunded form.<sup>2</sup>

Although there has been a proliferation of new instruments and structures, especially in the area of portfolio transactions, CRT instruments can be classified according to a relatively small number of key features. One distinction is whether they transfer credit risk associated with an individual borrower (single name) or a number of borrowers (portfolio). Another relates to funding. The sale of a loan in the secondary market is a funded risk transfer whereas some other CRT instruments, such as insurance contracts, transfer credit risk but do not provide funds at the time the risk is transferred. Finally, risk can be transferred directly between risk shedder and risk taker or indirectly through a special purpose vehicle (SPV). Table 1 shows some of the instruments in each category.

Table 1

**Characteristics of credit risk transfer instruments**

	Funded	Unfunded
Single name	Loan trading	Guarantees and letters of credit. Insurance policies such as surety bonds, credit insurance and financial guarantee insurance  Derivatives such as CDSs and total return swaps
Portfolio		
“Direct” risk transfer (ie liability of risk shedder)	Credit-linked notes	Portfolio credit default swaps, baskets
Risk transfer via SPV	Asset-backed securities (ABSs), cash CDOs	Synthetic CDOs

This categorisation does not, however, cover all the features distinguishing one CRT instrument from another. Another important characteristic, which differs between insurance-based instruments and the rest, is speed of payment. For insurance-based contracts, loss verification and compliance checks are typically carried out before any payment is made, whereas other markets normally work under the convention of “pay first, sue later”. This difference can obviously impose cash flow strains, which the

<sup>2</sup> The distinction between funded and unfunded instruments can be drawn either from the perspective of the risk shedder, ie whether the risk shedder receives funds in the transaction, or from the perspective of the risk taker, ie whether the risk taker has to provide upfront funding in the transaction. For some instruments such as CDSs (unfunded according to both definitions) and ABSs (funded under both definitions) both criteria coincide. Other transactions such as synthetic CDOs involve an upfront payment by the risk taker although the funds are not transferred to the risk shedder but invested in securities held by an SPV. For the purpose of this Report the notion of funded risk transfer is from the risk shedder's perspective.

market has begun to address.<sup>3</sup> Appendix 3 gives an overview of the other distinguishing features of different CRT instruments.

### III.2 Institutions

Although the scale of their current involvement in CRT differed greatly across the banks interviewed by the Working Group, almost all stressed its importance and expressed their intention to step up their activities in this area. Furthermore, the participation of non-banks in the CRT market also seems to be growing. Despite all this, it is important to note that the number of institutions actively involved across the range of CRT markets remains quite limited at present. While, for example, the use of ABSs has become more widespread within the banking industry of some countries, the number of institutions using CDSs on any scale is still relatively small.

There are various motivations for banks to engage in CRT business and it is difficult to assess their relative importance. Some of the main driving forces - regulatory arbitrage, funding costs and, increasingly, management of credit risk on a portfolio basis - were noted in Section II.

Investor demand for CRT products reflects several factors. For some it is a natural extension of their existing businesses; for others it is the lack of relationship with their existing business, ie the low correlation between credit risk and the risk in their core business, that is the attraction. For investors already involved in credit risk business, the value may lie in the access to risk/return profiles not available in more familiar instruments such as corporate bonds. For institutions with little cash and high funding costs, CDSs open up the possibility of receiving fee income in an unfunded transaction.

The following paragraphs indicate typical motivations for different kinds of institutions in a stylised way. In practice, more than one motivation will often be relevant and the emphasis may shift over time.

A small number of *universal banks* (commercial banks with significant investment banking operations) are the main intermediaries and arrangers of portfolio transactions in CRT markets. They have a key role as repackagers of credit risk. Increasingly these institutions are also involved in writing portfolio CDSs. In their role as intermediaries they run a largely matched book - although they might be mismatched in particular instruments, for example, shedding credit risk via portfolio transactions and taking it on via single name CDSs, bonds or loans. Although their primary reason for engaging in CRT business at present is to generate fee income from financial engineering, universal banks are also important shedders of risk from their corporate and household loan books, eg using ABSs and CDOs.

*Commercial banks* assume and shed credit risk in CRT transactions. Originally, the main motivation for commercial banks to use portfolio transactions (ABSs and CDOs) appears to have been to reduce required regulatory capital or (in the case of ABSs) to lower funding costs. But as markets have developed, banks are increasingly using CRT to manage credit risk at both the individual and portfolio level. Commercial banks are also important risk takers: for example, by providing protection through CDSs, purchasing loans and investing in tranches of CDOs and ABSs, motivated by the desire to diversify their credit portfolios and in some cases, to receive fee income.

*Securities dealers* are important intermediaries, running mostly a matched book. The services they provide and their business motivation are comparable to those of universal banks active as intermediaries and repackagers.

*Insurance companies* seem to have been the biggest takers of credit risk outside the banking system, but the magnitude of their overall exposure to credit risk is difficult to judge from existing data.<sup>4</sup> Moreover, different kinds of insurance companies seem to be involved in different ways. Life insurance companies are important (funded) investors in tranches of portfolio transactions (eg ABSs, CDOs,

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<sup>3</sup> In 2000 S&P introduced Financial Enhancement Ratings (FERs) that give an indication of an insurer's willingness to pay claims on a timely basis. Before being assigned an FER an insurer must indicate in writing that claims arising from an insurance policy used as credit substitution in a structured transaction rated by S&P will be paid immediately, regardless of any legal or commercial disputes. According to S&P, so far none of the 28 multiline insurance companies to which an FER has been assigned has failed to perform.

<sup>4</sup> Some information is available on insurers' involvement in synthetic credit portfolio transactions. According to a survey carried out by *Risk Magazine* the majority of investors in this market segment were insurers taking between 55% and 71% of the notional amounts ("Credit derivatives survey: the vanilla explosion", *Risk Magazine*, February 2002).

asset-backed commercial paper (ABCP), including the more risky, junior tranches. Life insurers have, of course, always been major investors in financial assets, although there are important differences from country to country in the typical portfolio composition.<sup>5</sup> This may also imply varying degrees of familiarity with credit risk and its management although differences across different types of institutions, ie monolines/property and casualty insurers, may be more relevant in this respect.

**Box 1**  
**Monolines and transformers**

**Monoline bond insurers** emerged in the 1970s in the US market. Their initial core business was to provide municipal bond investors with a guarantee of timely payment of interest and principal in the event of issuer default. Most US state insurance regulations require the separation of bond credit insurance from all other business. In the 1980s monolines entered the ABS market and in the 1990s they expanded their business to the CDO market. Today the amount insured in these areas is larger than in the initial core business. Most monolines have AAA ratings and rating agencies apply a “shadow” rating and a capital charge to virtually every transaction. Since these charges are sensitive to the rating of the obligor, monolines have a strong disincentive to insure sub-investment grade risk or take large exposures, which expose them to “event risk”. In structured finance, they typically sell protection using financial guarantees or portfolio credit derivatives on the most senior (so-called “super-senior”) AAA-rated tranches. Since insurance of these tranches only becomes effective if the junior equity, mezzanine and senior tranches are exhausted, monolines should not be exposed to idiosyncratic credit risk on companies within their portfolio. The risk profile of their exposure can be compared to a written out-of-the-money put option to protect investors against extreme market events.<sup>6</sup>

In some countries insurance firms are prohibited from entering into derivative transactions directly. They have, however, found ways to circumvent this restriction. (The restriction derives from legal and/or regulatory requirements for those purchasing insurance to have an “insurable interest” in the risk and is designed to mitigate the moral hazard underlying insurance contracts).<sup>7</sup> Major insurance firms and (investment) banks have established companies, so-called **transformers**, often in Bermuda, where the prohibition does not apply. The transformers sell protection to the risk shedder in a derivative transaction and buy insurance from an insurance company via a conventional insurance policy. There is some legal risk that courts might look through these structures and classify them as exceeding the scope of permitted business for the risk-taking insurance company. This would leave the transformer with the ultimate loss and the risk shedder with the risk that the transformer is unable to meet its obligations. Recent changes in the United Kingdom are thought to mean that insurance contracts are still enforceable even if the insurers are found to have taken on risks outside those permitted by regulation. The Working Group is not aware of similar changes in other jurisdictions. Some market participants say that they are aware of these legal risks and have taken legal advice to design their transactions with transformers in ways that minimise them.

Although it seems clear that low interest rates induced insurance companies to move to higher-yielding assets, it is not clear whether their involvement in CRT markets has increased their overall investment risk or how it has changed their credit risk profile. Some large general insurers and reinsurers have taken on unfunded credit risk in the belief that it will help to diversify risks arising from their insurance portfolios and offer higher returns than some lines of traditional insurance business. How far this presents insurance companies with new risk management challenges depends very much on the nature of their “traditional business” and on the composition of the associated asset portfolio.

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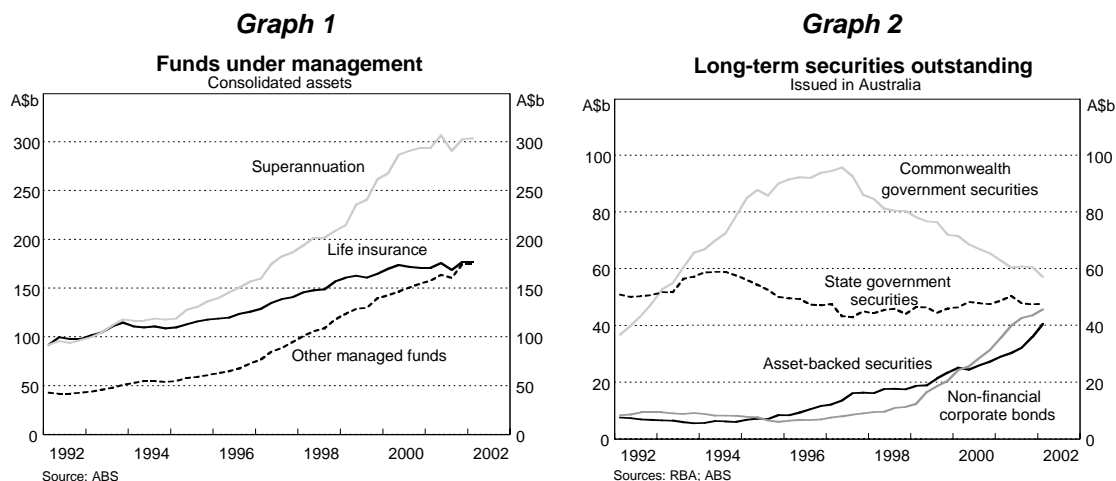
<sup>5</sup> Asset composition of insurance firms differs substantially across countries (see the OECD *Insurance Statistics Yearbook 2002*). Moreover it has significantly changed over the last 10 years. For a comparison see the IMF *Global Financial Stability Report*, June 2002, Chapter III.

<sup>6</sup> For further details see David Rule, “Risk transfer between banks, insurance companies and capital markets: an overview”, *Bank of England Financial Stability Review*, December 2001.

<sup>7</sup> See Section V.1.

## Box 2 Managed funds as drivers of CRT markets: the Australian example

The financial system in Australia has a number of characteristics conducive to the development of CRT markets: on the demand side, there is a rapidly expanding managed funds sector with a growing appetite for suitably rated paper, while on the supply side there is an innovative banking sector keen to participate in the securitisation process from both a funding and distribution perspective. The supply of credit risk is also highly concentrated with the four largest banks accounting for 75% of banking sector assets. This growth in managed funds was fuelled by the Australian government's reform of retirement income arrangements, which introduced compulsory contributions to superannuation (pension or retirement) schemes for all employees in 1992. The rate was set initially at 3% of earnings, climbing progressively to 9% by 2002. Reflecting both mandatory contributions and accumulated earnings, assets of managed funds have been growing rapidly, at around AUD 40 billion or 10% per annum over the last 10 years (see Graph 1). This expansion has had important implications for Australian financial markets. **Since managed funds are highly competitive, with the performance of individual funds measured against industry benchmarks, the search for high returns has ensured strong demand for equities**, both domestic and foreign. However, capital preservation is also important, particularly for retirees and employees approaching retirement who place a premium on stable, rather than high but volatile returns (a premium likely to assume wider investor appeal as the impact of falling equity markets on funds' performance unfolds and over the longer term as the population ages). As a result, managed funds need a good supply of suitably rated securities. In Australia, however, this demand has coincided with a decline in the size of the government bond market and a corporate bond market that while now growing rapidly remains relatively underdeveloped (see Graph 2).



For banks, the challenge has been to find some way of tapping into this surge in superannuation savings. Some initially responded by offering retirement savings accounts - term deposits that would attract concessional tax rates if held until retirement age. These failed to catch on, however, largely because the rates of interest on offer failed to match the exceptional returns that were available from managed funds investing even a proportion of their assets in the buoyant stock markets of the 1990s. Neither were managed funds burdened with the higher regulatory capital charges attached to banking business. So banks subsequently pursued two strategies: they established "wealth" management arms to obtain a direct slice of the (lucrative) fees and charges associated with fund management; and at the same time, they applied securitisation techniques to their own balance sheets, and to assets sourced from the market, to produce the securities in demand from managed funds.

Managed investment funds (eg pension and superannuation funds, mutual funds, hedge funds) are also important risk takers through investment in loans and (funded) tranches of portfolio ABSs, ABCP and CDOs. Distressed debt funds (including hedge funds) specialise in acquiring sub-par loans. The flexibility of CDOs and portfolio CDSs in allowing portfolios to be designed according to investors' preferences has become an important consideration. In some countries, **the growth of a managed**

funds market resulting from the introduction of private pension schemes may further promote the growth of CRT (see Box 2). Convertible bond hedge funds are also important shedders of credit risk, using CDSs to isolate the embedded equity options. Some of these funds are also said to be increasing their trading activities in credit markets - for example trading the basis between CDSs and corporate bond prices or arbitraging CDSs against out-of-the-money equity put options.

*Non-financial companies* seem to make little use of CRT markets at present. The most common involvement is perhaps through the securitisation of receivables using ABCP or ABSs, either through their own SPV (single seller programme) or by selling the receivables to an SPV managed by a financial institution (multi-seller programme). A few companies have also purchased CDSs or structured CDOs to transfer credit risk on exposures to customers, for example, following the provision of trade credit or vendor finance. However, since techniques used in CRT markets to repackage and transfer risk from banks' balance sheets can in principle be applied directly to the receivables of non-financial firms, involvement of non-financial firms in CRT markets may increase.

## IV. Markets

### IV.1 Data availability

Data on CRT markets are dispersed and sources often use different definitions and have different coverage, which makes it difficult to compare or aggregate data and also casts some doubt on the completeness of the picture which the available data provide.

So far as central banks are concerned, regular and timely information seems to be most often available on funded CRT through flow of funds or securities issuance data, which in many cases identify ABSs, ABCP and mortgage-backed securities (MBSs). Even for these instruments, however, data availability differs considerably. Data on ABSs, ABCP and MBSs are not available in all central banks and ABS data may not distinguish ABCP or CDOs. Only one central bank collects data specifically on CDOs. Data typically cover domestic markets in domestic currency, but data on foreign currency instruments are also available in some countries. Frequency of data collection is quarterly or even monthly, sometimes annually. Much less data is collected on unfunded CRT. No central banks collect data on credit insurance. Central banks' involvement in the *Triennial central bank survey of foreign exchange and derivatives market activity* means that they have data on outstanding amounts for credit derivatives with fairly high market coverage. But the infrequency with which these data are collected does not allow timely assessment of market developments, especially in the rapidly developing CRT market. Some central banks have therefore shortened the reporting intervals; others are considering this.

For banking regulators, information on CRT instruments can, in principle, be extracted from three separate prudential reports: those relating to capital adequacy, to large exposures and to overall credit exposures. Some regulators have information on individual transactions because securitisations have to be reported or vetted for capital adequacy purposes; or because they have carried out surveys aimed at enhancing their understanding of the CRT market. Others have implemented specific reporting requirements for credit derivatives. In general, bank regulators typically do not aggregate the data they receive so as to address issues such as risk concentrations at financial system level, or to assess overall risk transfer within the banking system. An exception is the Office of the Comptroller of the Currency (OCC), which publishes quarterly statistics on credit derivatives business of US banks. Although there may be differences across countries, insurance regulators appear to have less information on firms' CRT activities than banking regulators.<sup>8</sup>

Rating agencies collect data on rated deals and issuers. The focus is more on issuance than on the outstanding stock. Aggregation of rating agencies' data to give an indication of the size of different markets is difficult because of rating overlap. It can probably be used to determine growth rates and to

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<sup>8</sup> The UK Financial Services Authority stated in its report that it was difficult to identify insurance companies that have significant CRT activities from statutory reporting forms (*Cross-sector risk transfer*, May 2002).

identify trends in particular market segments (eg synthetic CDOs) assuming the biases are reasonably stable over time; but even then it is not always clear whether rating agencies' statistics include private deals, which could introduce another source of bias.

Table 2  
**Size of credit risk transfer markets**  
in billions of US dollars

Instrument	1995	1996	1997	1998	1999	2000	2001	2002
<b>Loan trading (turnover)</b>								
– US market (Loan Pricing Corporation)	34	40	61	78	79	102	118	117 <sup>1</sup>
<b>Credit derivatives (outstanding)</b>								
– BIS triennial survey				108			693	
– US OCC <sup>2</sup>				144	287	426	395	492 <sup>3</sup>
– British Bankers' Ass'n			180	350	586	893	1,189	1,952 <sup>4</sup>
– <i>Risk Magazine</i>						810	1,398	
– ISDA							919	1,600 <sup>4</sup>
<b>Asset-backed securities</b>								
– US market (outstanding) (Bond Market Ass'n) <sup>5</sup>	315	403	517	684	816	947	1,114	1,258 <sup>6</sup>
– European market (issuance) (Moody's) <sup>7</sup>					68	80	134	50 <sup>8</sup>
– Australian market (outstanding) (Australian Bureau of Statistics)	7	10	15	19	27	33	38	54 <sup>9</sup>
<b>Collateralised debt obligations</b>								
– US market (outstanding) (Bond Market Ass'n)	1	1	19	48	85	125	167	232 <sup>6</sup>
– European market (issuance) (Moody's)					42	71	114	70 <sup>8</sup>
<i>Memo: Total bank credit (outstanding)</i> <sup>10</sup>	23,424	23,576	23,309	26,018	26,904	27,221	27,442	29,435 <sup>9</sup>
– IMF								
<i>Memo: Corporate debt securities</i> <sup>11</sup> (outstanding)	3,241	3,373	3,444	4,042	4,584	4,939	5,233	5,505 <sup>9</sup>
– BIS								

<sup>1</sup> First three quarters of 2002, annualised. <sup>2</sup> Holdings of US commercial banks. <sup>3</sup> Second quarter of 2002. <sup>4</sup> Forecast for 2002. <sup>5</sup> Excluding CBOs/CDOs. <sup>6</sup> September 2002. <sup>7</sup> ABSs and MBSs. <sup>8</sup> First half of 2002. <sup>9</sup> June 2002. <sup>10</sup> Domestic and international credit to non-bank borrowers (United States, United Kingdom, Japan, Canada, euro area). <sup>11</sup> Debt securities issued in international and domestic markets, non-financial corporates.

In recent years there have been several private sector surveys on credit derivatives markets carried out by *Risk Magazine* and the British Bankers' Association. They give an idea of the average of market participants' estimates of overall market size and market shares of various instruments, together with information on structural questions such as maturities, concentration and country of underlying credit, etc. Since some markets are highly concentrated, the results are probably fairly reliable in these cases, despite the limited number of reporting institutions. However, the figures are only estimates -



based on informal survey responses rather than formal statistical returns - and they are probably exposed to double-counting problems and changes in the sample of reporting institutions. In the light of these considerations, the numbers in Table 2 should be treated with caution. The broad picture is nevertheless one of rapid growth in CRT markets, and in particular credit derivatives and CDOs. The outstanding volumes of CDOs and CDSs remain, however, relatively small compared with bank loans and debt securities. The same conclusion holds for loan trading turnover in relation to the value of outstanding loans.

## IV.2 Market concentrations

Market concentrations vary across instruments and from country to country. Some parts of the CRT market are concentrated in a few institutions. This is true, for example, of portfolio CDSs and investment in the most senior tranches of CDOs, where a small number of monoline credit insurers dominate in providing protection. The AAA status required for these activities is an important factor for this concentrated activity.

Again, in countries with a longer tradition in securitisation, such as the United States, the number of institutions using ABSs tends to be fairly large; whereas in countries in which securitisation techniques have developed only recently their use is limited to larger institutions and some pioneering smaller ones. The use of CDSs tends to be even more limited. To give an example, according to the OCC only 17 (19) banks have sold (bought) credit protection using credit derivatives, and only 391 out of more than 2,200 institutions supervised by the OCC hold some form of credit derivatives.<sup>9</sup>

Concentration is reportedly highest in credit risk intermediation. Evidence from the group's interviews is consistent with the results of surveys carried out by *Risk Magazine*, which found last year that 13 institutions saw 80% of transactions in the credit derivatives market; and that in synthetic securitisations the two largest players accounted for 76% of notional outstandings. Its recent survey confirmed the persistence of high concentration in the area of "plain vanilla" CDSs with market shares of the leading firm varying between 20% and 61% depending on maturity and underlying credit. However, the market share of the two dominant firms in the overall credit derivatives business has dropped from 44% to 38%.<sup>10</sup>

## IV.3 Regional variations

As noted in Section IV.2, securitisation is more developed in the United States than elsewhere. But equally, the greater reliance by companies outside the United States on bank credit rather than bond issuance may mean that there is more scope for the expansion of CRT outside the United States in future, reflecting both the interest of banks in shedding and investors' desire to take on credit risk. The shedding of credit risk by some European banks through ABSs and CDOs seems to have grown rapidly in the past few years, albeit from a low base. In particular synthetic CDOs, which now account for 92% of European CDO volume, have gained in importance.<sup>11</sup> There are also, however, considerable differences among European countries and between financial firms. For example, amongst those interviewed in the course of the Group's survey, Swedish banks were little involved, Luxembourg banks were principally risk takers (investing in investment grade ABS and senior CDO tranches), Dutch banks were mostly intermediaries and UK, Belgian and Italian banks were principally risk shedders, whereas German and French banks operated as both intermediaries and risk shedders. So far, Japanese banks have been less involved in CRT, although shedding and assuming of credit risk through ABSs and CDOs are expected to increase. In Australia, there is a well-established ABS market. In Europe and Japan and, perhaps to a lesser extent, the United States, institutional investors appear to have taken on more credit risk through CRT markets in recent years.

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<sup>9</sup> OCC bank derivatives report, second quarter 2002.

<sup>10</sup> "Credit derivatives: vanilla volumes challenged", *Risk Magazine*, February 2001, and "Credit derivatives survey: the vanilla explosion", *Risk Magazine*, February 2002.

<sup>11</sup> "European collateralised debt obligations: sustained growth to continue", *First half 2002 review and Second half 2002 outlook*, Moody's Investors Service.

In emerging market economies, CRT is less developed.<sup>12</sup> In two of the three countries analysed (Brazil and Mexico) there are no credit derivatives markets (although CDS markets for their sovereign risk exist in London and New York). In Korea, banks have started to use securitisations to transfer risk. In Brazil some legal constraints to the development of securitisation were lifted recently. CDSs and total return swaps have been allowed since April 2002 but so far the only market has been in MBSs. In Mexico, efforts by foreign banks to establish an ABS market only started in 2001. In addition to legal impediments, the lack of a well established investor base and the difficulty of pricing CRT instruments have been restraining factors.

The development of national markets depends greatly on the legal, accounting, tax and regulatory frameworks, for example in relation to capital requirements, rules on real estate ownership, market access rules (eg for mutual funds) and permitted market practices (eg short selling). Divergences in the accounting treatment of exposures between different types of institution and instrument (eg historical cost versus accrual or mark to market, derivatives versus insurance) can also affect the direction of risk transfer and the choice of instrument. Different regulatory capital requirements for what are essentially the same risks held by different kinds of institution can also influence the design of transactions.

Despite these differences between countries, the desire for diversification by investors, for example to avoid risk concentration in a domestic market, and the higher credit ratings assigned to diversified portfolios by rating agencies have encouraged the transfer of credit risk across borders. The fact that most institutions involved in CRT business are large international players also facilitates cross border transactions.<sup>13</sup>

#### IV.4 Latest trends

CDOs in 1999 and 2000 were typically either transfers of static loan portfolios from bank balance sheets (CLOs) or repackaging of high-yield bonds into managed portfolios (CBOs).<sup>14</sup> Since 2001, however, many CDOs have been based on portfolios of investment grade credits put together by intermediaries according to investor preferences, often using CDSs. Many of these transactions seem to have been designed to meet investor preferences in the "mezzanine" tranches (see Appendix 2). Intermediaries have also repackaged a wider range of assets into CDOs, including existing ABS and CDO tranches, leveraged loans, hedge fund participations and real estate. These impressions derived from the Group's survey are consistent with evidence from CDO market reports. Arbitrage CDOs initiated by investment banks, not necessarily the originators of the underlying exposures, have been growing faster than balance sheet CDOs sponsored by loan-originating banks. This suggests that market activity today is being driven increasingly by investors' demand for credit risk exposures and by intermediaries seeking fee income.

At the time interviews were carried out in late 2001 and early 2002, most practitioners expected CRT markets to continue to grow. Interviews suggested, however, that there could be a slowdown in the rate of growth if property and casualty insurers and reinsurers reduced their appetite for credit risk in the face of unexpected credit losses and in the light of higher returns in traditional insurance markets. Some of their involvement in CRT in the late 1990s may have been a temporary, "bull market" phenomenon, based partly on the availability of new instruments, such as CDOs, and on finding new applications for more traditional instruments, such as credit insurance and surety bonds. With equity and credit losses occurring at the same time some insurers may have revised their ideas about optimal portfolio composition.

In practice, however, there are no unambiguous signs of a slowdown in CRT markets. Some property and casualty insurers have reportedly withdrawn from the market, but mainly those that had only

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<sup>12</sup> See Appendix 4.

<sup>13</sup> The Working Group did not carry out an in-depth analysis of the regulatory treatment of CRT because the topic is covered by the FSA study and the current work of a Working Group of the International Association of Insurance Supervisors (IAIS). In addition, the Joint Forum has carried out a more general analysis and comparison of capital regulation for banks, insurance companies and securities firms.

<sup>14</sup> See Appendix 2.



dabbled in the first place.<sup>15</sup> In addition, very recently, one or more monolines are said to have withdrawn, at least temporarily, from selling protection on super-senior tranches of CDOs. It is unclear to what extent this reflects concerns about credit exposures or, on the other hand, the design of CDS contracts (see Section V). Intermediaries say that fewer investors are willing to take on the equity tranches of CDOs. But purchases of securities with embedded portfolio credit risk (eg CDOs) by life insurance companies and other institutional investors seem to have been sustained, especially in Europe. Shedding of risk by large European banks using CDOs and ABSs has also continued. According to Moody's, the growth rate of the European CDO market in the first half of 2002 matched that of previous years.<sup>16</sup> This is in line with the results of the recent study by the British Bankers' Association. Growth of the global credit derivatives market has surpassed previous expectations, with nominal values outstanding at end-2001 put at around \$1.2 trillion after \$0.9 trillion at end-2000 and further substantial growth projected for 2002, to \$2 trillion. Recent large corporate failures have provided a "stress test" of whether CRT instruments work in practice. For example, contracts written on Enron and WorldCom were commonly negotiated in the single name CDS market. Moreover, Enron and WorldCom were included as names in many CDOs and Enron had some involvement as a counterparty in CRT markets. While CDSs written on Enron and WorldCom settled without much disturbance, Enron's failure also tested the use of surety bonds to transfer counterparty credit risk from a bank to a group of insurance companies.

#### IV.5 Pricing of CRT instruments<sup>17</sup>

##### **Single name instruments**

The prices of some CRT instruments are directly observable in the market. Indeed, unlike previous single name instruments such as credit insurance and bank guarantees, CDSs have been designed as a standardised instrument in order to encourage trading and price discovery. In other cases, however, no market exists and prices have to be derived indirectly by "replication", based on a decomposition of the CRT instrument into components for which prices do exist, or by application of a model.

The closest replication of a single name CDS premium is typically the spread over Libor for which the yield on a fixed rate bond can be exchanged in an asset swap. Detailed design features of CDS contracts mean, however, that asset swap spreads and CDS premia are likely to differ somewhat, although arbitrage should ensure that any large price discrepancies are corrected fairly quickly.<sup>18</sup> A number of theoretical models have been developed for use when replication is not possible, the most popular of which are based on the Merton (1974) "structural" approach. RiskMetrics Group's CreditGrades, for example, generates theoretical single name corporate CDS spreads from underlying equity prices. However, empirical tests of such models are scarce, and tests of their assumptions in the underlying cash markets have not been entirely conclusive (although the cross-check where replication is possible provides some degree of reassurance). They seem to be used more often as early warning indicators for risk management rather than for pricing purposes.

##### **Portfolio instruments**

In contrast to single name products such as CDSs, for which moderately liquid markets have developed, portfolio instruments are more typically acquired by buy-and-hold investors. Although

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<sup>15</sup> According to a study carried out by the UK Financial Services Authority, a few insurance firms that have "burnt their fingers" have left the market. The study talks about "naïve capacity" in this context, which suggests that these exits might be more beneficial than harmful for further market development (*Cross-sector risk transfers*, May 2002).

<sup>16</sup> "European collateralised debt obligations: sustained growth to continue", *First half 2002 review and Second half 2002 outlook*, Moody's Investors Service.

<sup>17</sup> Appendix 5 summarises the recent CRT price modelling literature.

<sup>18</sup> For instance, CDSs are unfunded, bilateral over-the-counter transactions and risk shedders face counterparty risk, which means that CDS premiums tend to be below credit spreads. Another factor is the value of the delivery option embedded in CDSs (see Box 4). Finally, the existence of transaction costs tends to limit the possibilities to arbitrage credit risk between cash and derivative markets. For a detailed discussion of these factors see Blanco et al (2002).

traded market prices are available for “commodity” ABS tranches, credit risk modelling plays a major role in the pricing of tranches of many portfolio CRT instruments such as more exotic ABSs and CDOs. Three factors need to be addressed in the modelling of portfolio credit risk: for each credit in the portfolio the probability of default and how this varies over the life of the transaction; expected recovery rates on each credit following a default; and the correlation of defaults within the portfolio.

These factors are key in the relative pricing of the various tranches in portfolio instruments. More specifically, the less correlated defaults are on the underlying claims in a portfolio, the lower the expected losses (and therefore the required yields) on senior tranches relative to junior tranches. This is because low correlation implies a lower likelihood that losses will be sufficiently high over the life of the transaction to exhaust the more junior tranches. As the assumed correlation increases, the probabilities of loss and yields on the senior and junior tranches move closer together. While the correlations determine the relative pricing of the tranches, the yield on the various tranches in aggregate clearly depends on the average risk of loss across the portfolio. The pricing of the more senior tranches obviously also depends on the size of the more junior tranches that protect them.

The CDO pricing literature is developing rapidly and focuses on this problem of valuing portfolio tranches, given different ways of modelling the term structure of expected default correlation and recovery rates. For example, recent papers investigate the use of equity price correlations in order to derive implied default correlations. Many market participants appear, however, to rely either directly on public ratings of portfolio tranches or on their own credit assessments based on variants of the credit risk models used by the rating agencies.

Although the agencies differ in the way they measure correlations and assess diversification, overall the techniques are relatively crude (see Box 3). They are based on the idea that default correlation is lower for entities in different regions or different industry sectors. The practical implication is that senior tranches of highly leveraged portfolios can be highly rated provided the portfolios are well diversified across “regions” and “industry sectors”, as defined by rating agencies for the purpose of their modelling.

Although these techniques may reflect the state of the art in this area - and perhaps no superior and practical methodologies are available - it nevertheless suggests some caution is in order in relation to the reliability of the results, especially when some markets, such as the CDO market, depend crucially on the assessment of diversification effects.

### ***Market dynamics***

The degree of price discovery in CRT markets is an important question for market participants. For example, if valuations of portfolio tranches are based on modelled prices this highlights the importance of the assumptions on which the models are based. To the extent that CRT markets do yield new price information, this is likely to be valuable to those exposed to credit risk more generally, as well as others - including central banks - with an interest in assessing credit conditions.

The single name CDS market presents ample opportunities to test empirically lead-lag relationships between CRT and cash markets, when there is enough “raw material” to apply the “replication” pricing approach. That is, when replication is feasible, it is possible to compare movements in CDS premia on the one hand and underlying bond yields relative to the fixed leg of the Libor swap curve on the other to see where price discovery takes place.

News will normally be incorporated first in the market where trading is easiest and cheapest. Such lead-lag relationships are often observed in markets which trade related instruments (eg cash and futures) or identical instruments under different regimes (eg on different exchanges). One possible reason to expect price discovery to take place in the CDS market, especially when the creditworthiness of an entity is deteriorating, is that illiquidity in corporate bond lending and repo markets can hamper short selling of bonds. By contrast, taking a short position using a CDS is straightforward provided that counterparties are willing to sell protection. Another reason is that bond market liquidity may be limited by the stock of outstanding bonds that a borrower has issued, whereas CDSs are subject to no such limits, at least until settlement. Especially in circumstances where a company has a large value of bank loans but few liquid bonds in issue, CDS markets may be the only option available for lenders to shed credit risk.

Acting in the other direction, however, the range of participants in the CDS market might be limited by various barriers to entry, such as the need for a more sophisticated operational infrastructure and for a high credit standing, given the counterparty risk involved. In practice, the relative liquidity of cash and CDS markets will depend on a wide range of factors, including the underlying issuer.

### **Box 3** **Assessing correlations in CDOs**

In *Moody's* ratings, the assessment of diversification is based on the concept of diversity scores. These are a fairly crude measure of the degree of diversification in a portfolio of credits. The basic assumption is that assets in the same industry categories and/or regions are positively correlated but otherwise assets are uncorrelated. *Moody's* lists 33 different industry categories. The actual portfolio of credits is mapped into a "virtual" portfolio of uncorrelated and homogeneous credits assumed to mimic the default behaviour of the actual portfolio, ie it has the same mean and variance of expected loss. For example, a credit portfolio might have 100 names, but the virtual portfolio, based on the diversity score, might only have 30. The less diversified the portfolio across regions and sectors, the lower the diversity score and the lower the ratio of credits in the virtual compared to the actual portfolio. *Moody's* calculates an expected loss distribution on the virtual portfolio across different stress scenarios, given default probabilities for each obligor in each period and various loss-given-default possibilities. Assuming that defaults are uncorrelated makes the calculations, using a binomial expansion method, more straightforward. The loss distribution is used to assign expected losses, and associated ratings, to tranches depending on their seniority in the capital structure.

In *S&P's* ratings, the effect of diversification is modelled using assumptions about asset value correlation, which feed into Monte Carlo simulations used to build a portfolio default distribution. The results from this Monte Carlo analysis are combined with asset-specific recovery assumptions in a cash flow analysis involving many different possible stress scenarios. Correlation in the *S&P* framework is again based on predefined industry sectors with assumed asset value correlation of 0.3 between firms within the same sector and zero between firms in different sectors. Asset-backed securities are also assumed to have an asset value correlation of 0.1 between different sectors. Correlation of default risk with the general state of the economy is also taken into account.

Unlike *Moody's* and *S&P*, *Fitch* does not model default correlation. Rather, *Fitch* puts separate limits on concentration in the portfolios it rates. To achieve a desired rating, portfolio tranches have to pass a number of tests. First, a tranche needs to be protected by more junior tranches that exceed a defined size, depending on the weighted average rating of the underlying asset portfolio. For example, in order to achieve a AAA rating, a tranche of a portfolio of credits with a weighted average rating of BBB would need more junior tranches amounting to 14% of the portfolio. Second, *Fitch* sets limits on concentration. Usually at least 10 industries ought to be represented in the portfolio. The industries are listed by *Fitch*; at present there are 27 industries on the list. The definition of "industry" differs between the agencies, in that there are different assumed correlations between companies and rating outcomes; for example, *Fitch* treats both banking and insurance companies as "finance" whereas *Moody's* treats them as separate industries (implying no default correlations). *Fitch* also acknowledges diversification between different countries. Combining the two elements, *Fitch* would generally allow a single global industry to reach a maximum of 20% of total portfolio balance or two global industries to reach 15% each and all others to reach 10%. At no time can the three top industries exceed 45%. Third, *Fitch* sets limits on exposures to single obligors, normally between 1% and 2.5% of the total positions. The obligor test is designed to test whether a tranche can withstand simultaneous defaults of the larger obligors without experiencing losses.

Although the framework described here is the basis of rating agencies' risk assessments, it should be noted that the results of quantitative analysis are in practice complemented by judgment reflecting, for example, the nature of individual names and overall credit conditions.

In a recent study, staff from the Bank of England and the Bank of Spain examined daily movements in CDS premia and bond yield spreads relative to Libor for a group of 10 large US and European banks and securities houses in 2001.<sup>19</sup> They found that the pricing discrepancies between the two markets were, in most of the cases studied, corrected by movements in bond spreads, suggesting that price discovery might be taking place in the CDS market. Further analysis would nevertheless be useful in order to obtain results for a less homogeneous sample.

Market participants also note that CDS market liquidity can dry up when an entity becomes distressed. In a study covering a number of distressed issuers (six sovereigns and four corporates) carried out by the Group members from the European Central Bank and the Bank of France, the authors find a mixed pattern.<sup>20</sup> One observation was that different issuers were traded in different ways on the CDS market: some credits remained relatively liquid whereas for others the trading pattern was irregular.<sup>21</sup> The study found a noticeable increase in the quantity of quoted CDS prices in periods of general market stress, such as following 11 September 2001, and in periods of weakening in specific issuers' credit quality. The number of risk takers tended to be greater than that of risk shedders for almost all issuers reviewed. Although increases in the number of quotes and trades were accompanied by significantly larger spreads and volatility, the population of risk takers remained large. On the other hand, at a certain level, distressed issuers were no longer quoted on the CDS market. One interpretation of these results is that banks and other market participants use CDS markets to shed risk when the creditworthiness of an entity deteriorates, but that, beyond a certain threshold, risk takers become unwilling to trade. Another is that, beyond a certain credit threshold, CDSs trade on the basis of a single upfront premium rather than an annual premium over the life of the transaction.

Further work is clearly needed to better understand the operation of the CDS market, especially in relation to pricing and liquidity, and its relationship with cash markets.

## V. Incentive issues

### V.1 The nature of incentive problems

It is well known that incentives for borrowers and lenders can differ. CRT may alter incentives in these relationships and, by creating a new set of relationships amongst borrowers, lenders/risk shedders and risk takers, potentially give rise to moral hazard and/or conflicts of interest (see Diagram 1). Risk takers have a clear interest in minimising credit losses on the exposures they assume to the underlying borrowers but, depending on the extent of CRT and the design of the CRT mechanism, risk shedders may have a lesser interest in minimising these losses or may even benefit from certain credit events. Many of the features of CRT instruments have been designed to limit these conflicts and better align the incentives of risk shedders and takers.<sup>22</sup> The first part of this section discusses the risk shedder - risk taker relationship.

If a relationship remains between the original lender (and subsequent risk shedder) and the original borrower following CRT, its terms may have a knock-on effect on lender and borrower behaviour. The risk exposures of both risk takers and risk shedders may also alter, with consequences for shareholders and other creditors, particularly if the change is not fully disclosed. The second and third parts of this section consider the effects on these relationships.

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<sup>19</sup> See Blanco et al (2002).

<sup>20</sup> See Brousseau and Michaud (2002).

<sup>21</sup> Liquidity seems not only to be an issue for distressed issuers. CDS pricing data can be obtained from various providers. GFInet covers 1,700 reference entities, Creditex 1,400 and CreditTrade 1,500 but an average trading day only yields 300 to 500 data points, which suggests that not all issuers are actively traded each day. Only 150 to 200 names are said to be traded or quoted frequently in a month. See "CDS: the quest for neutral pricing data", *Risk Magazine*, October 2002.

<sup>22</sup> Appendix 3 highlights some of the characteristics of CRT instruments. Appendix 5 reviews existing literature on CRT and incentives. For a more detailed discussion of the issues in terms of relationship between borrowers, risk shedders and risk takers, see Kiff et al (2002).

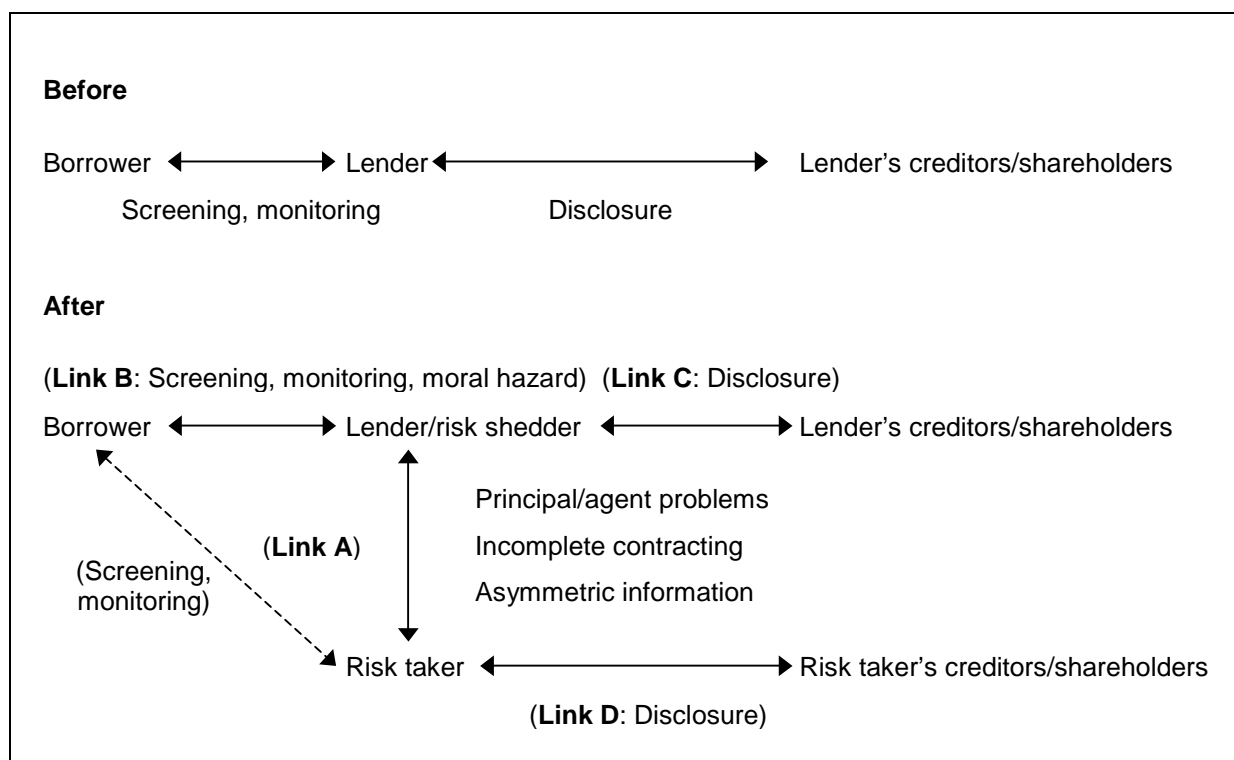
## V.2 Risk shedder - risk taker relationship (Link A)

Issues relating to the risk shedder - risk taker relationship can be divided into three types:

- the risk shedder may have better information about the creditworthiness of the underlying borrower than the risk taker - *an asymmetric information problem*;
- the risk shedder may retain a relationship with the borrower following CRT as an agent of the risk taker, giving rise to *principal/agent problems*; and
- the terms of the risk transfer may expose the risk taker or risk shedder to opportunistic behaviour by the other party: for example, if the risk shedder is able to demand payments under the agreement that exceed any credit losses actually suffered or, on the other hand, if the risk taker is able to avoid payment following a genuine credit event. This is an *incomplete contracting problem*.

Diagram 1

### Stylised summary of relationships affected by CRT



### Asymmetric information

In theory, if the risk shedder has better information about the creditworthiness of its borrowers, it may exploit this at the time of the risk transfer to overstate the credit quality of the transferred exposures. The risk taker may be faced with the familiar adverse selection problem.

CRT markets have evolved to protect risk takers against adverse selection in a number of ways. First, traded single name CRT instruments have remained limited to corporate and sovereign names about which a significant amount of public financial information is available. In most cases they are rated so that risk takers can also refer to a third party credit opinion. The same holds for assets used to back CDOs, where rated debt is the dominant asset class. Second, where portfolio CRT transfers risk on retail loans (eg mortgage- or credit card-backed ABSs), the risk shedder will typically select the loans randomly from its portfolio. Rating agencies or auditors monitor this selection. Third, in portfolio CRT, risk takers will often require risk shedders to retain some proportion of the first-loss tranche.

Sometimes the risk shedder may also retain a small proportion of the risk of more senior tranches to preserve monitoring incentives should losses exceed the equity tranche (see below). The retention also provides an initial signal of credit quality. Fourth, in the case of credit insurance, the risk taker (insurer) will typically require the risk shedder (insured) to disclose any material facts about the creditworthiness of the borrowers, with the insurance voided if it subsequently emerges that such disclosures were incomplete or inaccurate. Fifth, reputational risk and the desire to shed further credit risk in the future may mean that it is not in the long-term interests of risk shedders to exaggerate the credit quality of transferred assets. This aspect is particularly relevant for ABSs used as a regular funding device.

According to market participants, while adverse selection has sometimes been observed in CRT portfolio products, market mechanisms have generally proved effective in aligning the incentives of risk shedders and takers. The extension of CRT to certain types of credit exposure about which less public information is available (eg small business loans) may still, however, prove difficult. Some questions were also raised about the effectiveness of rating agency scrutiny. For example, risk shedders via CDOs seem often to have selected the highest-yielding credits in each rating category in order to maximise the arbitrage between the ratings of the individual credits and those of the CDO tranches. But risk takers are said to have become more aware of such strategies; and most purchasers of junior and mezzanine tranches of CDOs are now likely to perform their own detailed credit review of each name in a portfolio.

### ***Principal/agent problems***

In the simplest case of a loan sale, the risk taker has no continuing relationship with the lender/risk shedder and steps into the lender's position vis-à-vis the borrower on unchanged terms. Often, however, the lender/risk shedder does retain some involvement in the relationship between the risk taker and the borrower, even where CRT is achieved by a sale of the underlying claim. For example, in ABS transactions, the lender/risk shedder will often continue to service the underlying loans (ie collect payments and manage the relationship with the borrower) and the borrower may not even be aware that the loan has been sold. Familiar principal/agent problems arise. The most important is maintaining incentives for the risk shedder to monitor the creditworthiness of the borrower and to take prompt and effective action to collect any arrears of payments.<sup>23</sup>

As with asymmetric information, market mechanisms to limit shirking by risk shedders include requiring them to retain some exposure to the borrowers as principal, such as first-loss tranches in CDOs, contractual requirements in insurance and guarantee contracts, and the possibility of replacement by specialist third party servicing firms. A further technique often found in ABSs is to split risk shedding from loan administration. The selection of assets to be included in the asset pool is made by a centralised (risk management) unit. The lending staff does not know which assets are securitised and which loans are kept on the bank's balance sheet. Again, market participants suggested that such mechanisms to align the incentives of risk takers and shedders have generally been effective.

### ***Incomplete contracting***

Incomplete contracting is defined here as the failure of a CRT agreement to define the rights and obligations of the parties in all possible circumstances, so that one or both parties find the agreement unsatisfactory after an event - in particular if it leaves one party open to opportunistic actions by the other to take advantage of an unanticipated situation.<sup>24</sup> In CRT, incomplete contracting issues can be

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<sup>23</sup> Since the risk shedder's monitoring efforts cannot be observed by the risk taker without a cost the principal/agent problem is also related to information asymmetries. Because lenders may have an incentive to reduce their monitoring it also involves moral hazard.

<sup>24</sup> Contracts can be incomplete for different reasons. First, counterparties may not envisage the full range of possible circumstances when drafting the contract. This may have been the case in the litigation related to the City of Moscow's delayed payments (see Box 4) and the "gap" was closed in the revised documentation. In other cases, counterparties may be aware of a possible situation in which their interests might conflict but be unable to agree on a contractual solution ex ante. An example may be the restructuring clause in CDS documentation. Its inclusion in the list of credit events gives the risk shedder a possible incentive to trigger a credit event prematurely, but its exclusion leaves the risk shedder

a particular problem when the risk transfer is achieved through a separate agreement (such as a credit derivative or credit insurance policy) between risk shedder and risk taker rather than by sale of the underlying loan. One reason is the difficulty of defining “credit events” as against more familiar triggers based on, say, asset prices or interest rates. A further complication is that risk shedders and, less often, risk takers may have some influence over the occurrence of a future credit event, so that the agreement needs to protect both parties (but particularly the risk taker) against the moral hazard of actions vis-à-vis the borrower that might affect whether a “credit event” (as defined) occurs or not.

As noted above, there can be tension between the interests of risk takers in having an agreement that protects them against opportunistic claims by risk shedders, and those of risk shedders, in having an agreement that covers them against all legitimate credit losses and assures them of prompt payment. In principle, there are two ways of dealing with this issue, either through bilateral negotiations between risk shedders and risk takers, or the use of standardised documentation. The former has the advantage that contracts can be fine-tuned to reflect the particular preferences of both parties. The downside is that it is likely to inhibit the development of a liquid market. To foster market liquidity in traded instruments a fair degree of standardisation in contracts is needed.

Credit derivatives are increasingly based on such standardised definitions, developed by ISDA, which attempt fully to define the rights and obligations of the parties. Credit events and mechanisms for determining settlement amounts are clearly defined at the outset. The risk shedder is not obliged to have an exposure to the underlying borrower and settlement must occur promptly, on the same basis as other derivatives governed by ISDA Master Agreements. However, risk shedders appear sometimes to have been able to exploit the terms of credit derivative agreements at the expense of risk takers, insofar as payments under CDS contracts are not conditional on actual losses. Broadly, this has been done either by claiming a “technical” credit event when no genuine credit event has occurred (eg City of Moscow), by, allegedly, triggering a credit event deliberately (eg debt restructurings of Consec and Xerox) or by delivering claims on the borrower with a lower market value than the underlying exposure - the so-called “delivery option” (eg delivering long-term bonds following restructuring of Consec’s debt and delivering convertible bonds following Railtrack’s going into administration). These examples are discussed further in Box 4. Another potential area for opportunistic behaviour by risk takers arises in CDOs, for which cash settlement is typically based on the difference between the face value of a credit and its recovery value following a credit event as determined by a poll of dealers. Often, if a large financial firm is the risk shedder, it will also be the calculation agent and the terms of the CDO may give it considerable freedom over when to hold the dealer poll, how many and which dealers to ask, etc.

Although it is difficult to generalise, credit insurance tends to emphasise the interests of risk takers (insurers).<sup>25</sup> Typically, it defines credit events relatively narrowly. A clear price differential has emerged between credit insurance and credit derivatives, with insurance/reinsurance companies writing insurance at lower cost, given the narrower definition. Risk shedders are required to have an exposure to the borrower (an “insurable interest”) and can only claim up to their actual losses on the exposure. There is also no attempt to write a complete contract at the outset. Rather, claims are investigated before payment, with risk shedders liable if they have withheld material information from the risk taker (insurer). Market participants referred to cases where insurance companies had refused to pay on credit insurance contracts, claiming breach of contract. Two celebrated examples are (i) the so-called Hollywood Funding case, in which insurance companies refused payment on insurance policies designed to protect investors in a series of films, on the grounds of misrepresentation and breach of contract terms, requiring a certain number of films to be made; and (ii) the surety bonds provided to JP Morgan Chase by insurance companies on behalf of Enron to back its obligation to deliver on prepaid natural gas contracts, where the insurers claimed misrepresentation on the grounds that the underlying transaction was essentially provision of credit rather than commodities delivery.

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unprotected against restructuring and perhaps more likely to seek to enforce insolvency proceedings. It is a matter of definition whether this is an incomplete contracting or a moral hazard problem.

<sup>25</sup> Credit insurance contracts are not standardised. Financial guaranty insurance (“wraps”) provided by the monolines (see Box 1) is typically an unconditional and irrevocable commitment to pay interest and principal on a bond according to the original payment schedule (no acceleration) if the borrower fails to make payments when due.

**Box 4**  
**Evolution of the standard ISDA credit derivatives definitions**

Some recent credit events have revealed imperfections in CDS agreements and encouraged ISDA to revise its standard definitions:

- In 1998, a delay of payments by the City of Moscow revealed shortcomings in CDS contracts because some contracts did not include provision for grace periods. Courts ruled that delayed payments were credit events under these contracts and protection sellers had to pay.
- In 2000, Consec's bank debt was restructured. While the restructuring included a deferral of maturities by three months, it also included an increased coupon, a new corporate guarantee and additional covenants in favour of the lenders, making it unclear whether lenders were disadvantaged overall. While Moody's did not consider this restructuring as a "distressed exchange" within its definition of default it was considered a credit event under the ISDA documentation and triggered payments under the CDSs written on Consec. Even assuming that lenders incurred losses in the restructuring, the case revealed the significance of the delivery option included in CDSs. Some banks delivered the company's long-dated bonds to protection sellers, making a profit from buying the lower-priced bonds in the market and receiving their par value from the protection sellers under the CDSs.
- The administration of Railtrack further highlighted the importance of the delivery option. Railtrack had issued convertible bonds and these were trading at a significantly lower value than its other debt, reflecting the low coupon. ISDA concluded, following legal advice, that the convertible bonds were deliverable.

These cases highlight the scope for opportunistic behaviour by protection buyers either seeking payments for credit events without having incurred a loss or seeking payments exceeding actual losses. The scope for such opportunistic behaviour seems to be greater in the case of restructuring than other credit events. Most credit events lead to insolvency proceedings so that all obligations of the borrower become due and payable (acceleration) and long-dated senior debt becomes no different to short-dated senior debt. But restructuring does not involve insolvency proceedings or lead from debt acceleration. As a result, significant differences in the value of long- and short-dated debt can persist.

Following the Consec case, ISDA published a modified restructuring clause in spring 2001, which limited the maturity of obligations that could be delivered following a restructuring and were excluded from the definition of credit event restructurings that had not been agreed by a minimum number of creditor institutions. Most North American market participants adopted the changed definition but European banks, perhaps influenced by lower regulatory capital requirements, continued to use the previous restructuring clause. ISDA committees have been working on a further modification to attempt to meet the concern of risk takers about the influence creditor banks can have over a restructuring and the delivery option, while maintaining the protection available to risk shedders following a restructuring. In a recent letter to ISDA, however, some monoline insurers asked to eliminate restructuring from the list of credit events altogether, reacting to a credit event claimed in relation to Xerox following an extension of the maturity of its bank loans. The Group understands that the insurers have modified this position to accept restructurings which lead to a reduction in interest or principal or subordination of the lenders, but want extensions of maturity excluded. In the meantime, at least one monoline is said to have suspended any further involvement in the CDS market. In August, JP Morgan Chase announced that it would drop the use of restructuring clauses in the standard non-sovereign CDSs it uses to hedge its own portfolio. Trading desks will, however, continue to offer CDSs with restructuring clauses to their customers.

At present, it seems the market is some distance from an agreed definition that would satisfy risk shedders and takers in North America, Europe and Asia. A further consideration is that the treatment of CDSs currently being considered by the Basel Committee does not give any capital relief for hedges based on contracts that exclude restructuring as a credit event.

The terms of agreements between risk shedders and risk takers emerged from the Working Group's discussions with market participants as probably the most controversial current area for market participants.



The scope of credit events captured by CDS contracts also matters from another perspective. Rating agencies have tracked credit events for decades. The loss history in the databases underlying their ratings reflects their own definition of credit events, which is narrower than the definition currently adopted for ISDA-based CDSs. If the CDSs used to transfer risk in synthetic CDOs have a broader range of credit events than used by the rating agencies, adjustments to reflect this will be needed.

### **V.3 Lender/risk shedder - borrower relationship (Link B)**

The transfer of credit risk from a lender to another institution can have a knock-on effect on the borrower. Even if the lender-borrower relationship remains formally intact - for example, if the lender has used credit derivatives or insurance, rather than selling the claim outright - the lender's behaviour towards the borrower may nevertheless be affected by the fact that it has reduced its exposure and by the precise terms on which it has transferred the risk.

#### ***Credit monitoring***

In theory, a lender will invest in monitoring the credit risk on an exposure up to the point where the marginal cost equals the marginal benefit in terms of lower expected credit losses. If a lender has transferred some or all of the credit risk on an exposure, it might therefore be expected to reduce its credit risk monitoring. However, according to market participants, in practice risk shedders see portfolio management of credit risk more as a complement to, rather than a substitute for, traditional credit assessment and the monitoring of individual borrowers. Moreover, at this stage at least, even the most active users of CRT amongst banks retain the greater part of their credit risk. More generally, the greater availability of market prices for corporate credit risk - directly for CDSs, bonds and loans and indirectly via the use of equity prices and Merton-type models such as KMV - is seen to have aided credit risk monitoring.

#### ***Credit signalling***

On the one hand, the use of CRT instruments should free additional credit lines and thus benefit borrowers. On the other, some corporate borrowers have been reluctant to accept the transfer of their loans, and this reluctance has impeded the development of secondary loan markets. One reason may be a concern that market participants may interpret the transfer of risk as a negative signal about a borrower's creditworthiness. The potential signalling effect, however, depends on the visibility of the transaction to third parties, which is not the same for all instruments. While it is often clear in secondary loan trading that the risk shedder is the loan originator, this is not necessarily visible in CDS contracts. This may be one reason why sovereign borrowers stressed the positive aspects of particular forms of CRT in interviews (see Box 5). At a more general level, however, the mere knowledge that banks are able to purchase credit risk protection might imply that market participants no longer view a long-term lending relationship or a credit rollover ("bank certification") as such a positive quality signal.

#### ***Behaviour towards distressed borrowers***

Finally, the existence of credit risk protection might influence a lender's behaviour with respect to distressed borrowers, because loss protection changes the risk/return profiles of various alternative actions. On the one hand, the existence of credit risk protection could encourage forbearance because there is no longer an incentive to try to reduce losses by early action. On the other hand, lenders who have shed credit risk using credit derivatives which include restructuring as a credit event may be encouraged to agree to a debt restructuring, provided that it falls within the particular definition used, while if they have used instruments which exclude restructuring they may prefer to take a hard line in the hope that the borrower will enter insolvency proceedings or default. If lenders with varying clauses are involved in the same case, this could naturally complicate negotiations. Moreover, credit derivatives' maturities do not always match those of the underlying exposure and there might be an increased incentive to trigger credit events close to the maturity of a derivative contract. This appears to have been an issue for some market participants in relation to Argentine exposures in late 2001,

with at least one dispute arising over whether a restructuring, within the terms of a contract, occurred in the weeks before the debt moratorium.

**Box 5**  
**Sovereign issuers<sup>26</sup>**

Sovereign issuers from Brazil, Korea, Mexico and (indirectly) Uruguay believed that the development of CRT instruments had been helpful for markets in their foreign debt. In particular, it had allowed credit risk to be spread amongst a wider spectrum of investors. Credit-linked notes were sometimes seen as a competitor to sovereign bond issues. But overall, as with other derivatives, they thought the existence of these instruments had increased the liquidity of sovereign bond markets to the general benefit. One qualification was that most of these countries relied on domestic debt markets for the majority of their public funding, and none has yet a developed CRT market, so that the impact of CRT on public funding as a whole has been limited.

With regard to the perceived risks posed by credit derivatives, the main one was that it might become easier for, say, an aggressive hedge fund to speculate against a particular country. However, none of the issuers identified examples of this happening in practice.

Sovereigns themselves rarely use bank credit as a means of funding. Nonetheless, a few government-owned companies in the countries represented in the Working Group did use foreign currency bank credit. These companies had in some cases perceived a change in their relationship with those banks that were active users of CRT, with expanded credit lines apparently being made available to them.

Finally, none of the sovereign issuers covered had ever traded credit derivatives. But Mexico had recently been approached by investment banks with various structured deals, in which the government would implicitly trade its own credit using credit derivatives. So far, however, no such deal had been concluded.

**V.4 Risk shedders and takers: creditors/shareholders  
(Links C and D)**

Because CRT instruments can alter institutions' risk profiles, their shareholders and creditors have an interest in such changes being properly reflected in disclosure statements. Since CRT may involve substantial counterparty, legal, operational and liquidity risk for risk shedders, the relevance of adequate disclosure is not limited to risk takers.

An analysis of the disclosure statements of a number of North American, European and Asian banks and insurance companies involved in CRT (Box 6) presented a rather disappointing picture. In general, disclosure statements do not provide much sense of the impact of CRT activities on banks' risk profiles. With further growth in CRT activities, the transparency of individual firms' overall risk profiles would be materially compromised if disclosure practices did not improve. Effective disclosure seems to have lagged market development; for example, more is disclosed about securitisation via ABSs, one of the longer-standing CRT techniques, than about the use of credit derivatives.

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<sup>26</sup> The Working Group members from Brazil, Korea and Mexico conducted interviews with authorities in their countries and in Uruguay.

**Box 6**  
**Summary of CRT disclosures in annual accounts**

*Banks*

The Working Group reviewed the annual reports of 30 banks from 10 countries.<sup>27</sup> These banks were those which might be expected to engage in some form of CRT. None of the banks made comprehensive disclosures, although all disclosed some information about CRT in their annual reports. Very few (two) provided information about how CRT affected their overall credit risk profiles.

Although most banks disclosed at least some quantitative data, only nine provided some information about the amount of credit risk shed by CRT, and even fewer (six) gave information on risk taken on by CRT. Three banks disclosed their total amount of CRT activity. Some information about the types of credit exposures for which CRT is employed were provided by 12 banks, but few institutions disclosed breakdowns of CRT activity by type of credit exposure.

More detailed disclosures were made about securitisation than about credit derivatives activity. Most institutions with securitisation programmes disclosed some information about that activity, but fewer disclosed the amount of exposure retained. The disclosures relating to securitisation in many instances did not provide a clear view of the risks that remained with the bank. For instance, only one institution disclosed contingent liquidity demands related to securitisations.

A number of banks surveyed were involved in CRT as intermediaries. While two banks disclosed some information about their intermediation activity, only one provided comprehensive data about it.

*Insurance companies*

The Working Group reviewed the annual reports of nine insurance firms from three countries. Of these, five were multiline insurance firms, three were monoline insurers, and one was a reinsurance firm. Most of the institutions disclosed some information about CRT activity, but none provided information about how CRT affected their overall credit risk profiles.

At least some quantitative data about CRT were disclosed by five of the firms. Only two, however, disclosed the amount of credit exposure acquired through CRT, while only one disclosed information about credit exposures shed through CRT.

## **VI. Structural implications**

### **VI.1 Rating agencies and CRT markets**

One consequence of the greater dispersion of credit risk through CRT instruments could be that risk takers will come to rely more on third-party monitors of credit risk, notably rating agencies, because fewer holders of credit risk will have a direct relationship with the borrowers. Another reason is that CRT (eg through tranching portfolio instruments) may encourage the breaking up of credit exposures into more diversified portfolios, so that risk takers have less incentive as well as less capacity themselves to monitor the creditworthiness of individual borrowers.

Although market participants do not rely exclusively on ratings when assessing the credit quality of individual companies or the tranches of portfolio CRT instruments, almost all make some use of ratings in arriving at their own judgments. The use of ratings in determining regulatory capital requirements will also expand with Basel II.

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<sup>27</sup> Australia, Canada, Germany, Italy, Japan, Korea, Mexico, Netherlands, the United Kingdom and the United States.

In many ways, the use of ratings to determine a borrower's creditworthiness in the CRT markets simply parallels their use in the market for traded debt. The market for single name CDSs is limited to institutions which carry a rating, and the assets used in CDOs are typically confined to rated debt instruments. In two areas, however, the role of the rating agencies in CRT markets is rather different from their traditional franchise in corporate bond markets.

The first is the rating of portfolio CRT instruments. The rating agencies' approach to rating tranches of portfolio CRT instruments is usually model-based. In the case of CDOs, the model inputs are the ratings of the underlying credits in the portfolios and assumptions about recovery rates and default correlation within the portfolio (see Box 3). The more senior tranches of CDOs are typically rated higher than the underlying credits in the portfolio.

The second area where rating agencies have increased the scope of their role beyond simply assessing the probability of default is also related to the rating of portfolio instruments. Ratings of synthetic CDOs, for example, often also include an assessment of the extent to which the legal terms protect risk takers against opportunistic behaviour by risk shedders. Ratings of managed CDOs include an assessment of the investment track record and systems and controls of the portfolio manager. In 2000, as noted in Section III, S&P introduced financial enhancement ratings, which are intended to give an indication of an insurer's willingness to pay claims on a timely basis.

## **VI.2 Impact on the banking sector**

As noted in Section II, the enhanced transferability of credit risk has encouraged some banks to manage their credit book on a portfolio basis or to move in this direction, although it emerged from the interviews that this process is generally still at an early stage. First, in some CRT markets, such as CDSs and CDOs, the number of institutions involved is relatively small. Second, CRT is currently limited to certain names and asset classes, with the implication that the greater flexibility in the management of credit risk is also confined to these assets. Finally, even in those institutions where credit risk is managed at portfolio level, lending decisions still tend to be based on an assessment of single exposures on a standalone basis. IT system problems in aggregating exposures across different products and legal entities appear to be a frequent hindrance. None of the institutions interviewed indicated that they carried out CRT between different companies in the same group on a large scale.<sup>28</sup>

Integration of credit risk management seems to be most developed in banks which trade credit risk actively. In some European universal banks, involvement in CRT started with credit risk trading and arbitrage between bonds and CDSs. Some of these institutions, with important activities in both trading and intermediation, have combined their different credit-related operations (bonds, loans, derivatives) to exploit arbitrage opportunities. Portfolio structuring (ABSs, CDOs, ABCP) seems to be usually, but not always, separated from credit risk trading.

Although some institutions indicated that they might shift from their traditional "originating and holding" approach to an "originating and distributing" approach, there are few signs yet that this is a general pattern. Most banks involved in CRT business are still in the process of evaluating the strategic implications of CRT for their lending business and risk profiles.

Currently, CRT activity is mostly confined to larger institutions (although in some countries ABSs are used by smaller institutions as well), but the potential diversification benefits arising from CRT may be greater for smaller institutions. The business of smaller banks is more often confined to a certain region with little "natural" diversification. At the same time, smaller institutions often have a greater proportion of their exposures to small and medium-sized enterprises (SMEs), for which liquid single name protection markets have not yet developed. Although the revision of the Basel Capital Accord might encourage the market entry of more rating agencies and an increasing use of ratings in this area, the modest size of outstanding credit per name will probably continue to limit instruments' liquidity. Risk transfer in these particular exposures therefore seems more likely in the form of portfolio transactions. As the examples in Appendix 6 show, projects to securitise assets typically held by

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<sup>28</sup> This is consistent with the findings of the study of the UK FSA. It did not uncover evidence of cross-sector intragroup arbitrage among firms. See Financial Services Authority, *Cross-sector risk transfers*, May 2002, page 24.

smaller banks are being developed, including in countries where securitisation has not played a major role so far. The viability of such transactions clearly depends on the arrangement and monitoring costs, which could be high. The limited ability of third parties to monitor credit events involving numerous small borrowers may also be a limiting factor. The extent to which CRT might affect the role of banks in the financial system will clearly depend on the number and size of institutions involved and the nature of the exposures transferred. An important question is how far CRT will be used to reallocate credit risk within the banking system and how far to transfer risk to non-banks. Currently, the first seems to be dominant, despite the growth of risk transfer to the non-bank sector, in particular to insurance companies.

Insurance firms have become important participants in CRT markets and the International Association of Insurance Supervisors (IAIS) set up a Working Group to look at insurance companies' involvement in CRT. The findings of this Group are consistent with those of this Report although its focus is somewhat different. It highlights the importance of adequate risk management skills and systems, and emphasises the need for a more holistic risk management approach to cope with the problem that CRT instruments do not fit neatly into the categories of "investment" and "underwriting" business traditionally used in risk assessment by insurance companies and their regulators.

## **VII. Policy issues**

The development of CRT has a potentially important impact on the functioning of the financial system. It provides opportunities for more effective risk management, promises the relaxation of some constraints on credit availability and allows more efficient allocation of risk to a wider range of entities. The pricing information provided by new CRT markets is also leading to enhanced transparency and liquidity in credit markets. At the same time, concerns have sometimes been expressed that CRT instruments, while capable of improving the dispersion of risk, equally have the capacity to concentrate it. Similar concerns have been expressed in relation to other new instruments in the past. Although information about the redistribution of credit risk by CRT is limited, there are no obvious signs that CRT has in fact led to a concentration of risk. One view expressed in the Group was that the experience of financial institutions in recent years illustrated that CRT mechanisms had worked successfully to disperse credit risk more widely. Most members, however, thought that, although the general signals were positive, it was too early and there was insufficient information to reach firm conclusions on the financial stability impact of CRT. Regardless of this difference in view, Working Group members believe that there are a number of issues related to CRT worth highlighting, without implying that a policy response is necessarily indicated for all of them.

### **VII.1 Transparency**

The analysis of various private and public data sources showed that the information available at present is adequate neither to track the redistribution of credit risk through the use of CRT instruments nor to identify any resulting risk concentrations.

#### ***Disclosure***

Since CRT can have a material impact on institutions' risk profiles, it seems important that the effect should be properly captured by disclosure. Adequate disclosure is all the more important because unfunded instruments such as CDSs, like other derivatives, can be used to build up leverage. However, CRT instruments affect more than the credit risk profile of users. CRT business also involves operational, legal and documentation risk and may have implications for liquidity. These risks tend to be less easily quantifiable than credit and market risks and their disclosure in a meaningful way is particularly challenging. Against this background, the Report's findings on disclosure by banks and insurance firms may give grounds for concern. In general, firms' balance sheets and financial statements do not at present provide a clear picture of the impact of their CRT activities. Market discipline will have only a rather uncertain effect unless institutions substantially improve their disclosure practices. In this context, initiatives to enhance disclosure more generally, such as the work being conducted in the Joint Forum Working Group on Disclosure, which is following up on the Report by the Multidisciplinary Working Group on Enhanced Disclosure (Fisher II), could contribute to improvements of disclosure practices in the area of CRT.

### ***Data availability***

To track in detail the overall distribution of credit risk within the financial system and the changes brought about by the use of CRT would be an enormous task. The starting point would be existing data on traditional credit risky assets such as bonds and loans; but even these have some significant gaps. It would be a major further extension to try to establish a comprehensive picture of how CRT has altered the picture. And the difficulties would be compounded in respect of unfunded (off-balance sheet) instruments, insurance as well as derivatives.

Although it may be unrealistic to try to track the overall distribution of credit risk, existing data sources clearly fall short of what is needed for even a rather rudimentary assessment of CRT. Central banks are exploring how to enhance existing arrangements under the triennial and/or six-monthly BIS surveys of derivatives by updating and expanding the reporting instructions to take more explicit account of CRT. Given the rapid evolution of the CRT market there may also be a question of whether supplementary surveys between the main triennial exercises would be helpful. These relatively modest steps could probably be achieved without significant costs either to the data suppliers or to those processing the data.

## **VII.2 Credit monitoring and rating agencies**

CRT instruments may reduce banks' incentives to monitor their borrowers and alter their treatment of distressed borrowers. This effect is not limited to more recent CRT instruments. However, while traditional CRT instruments such as guarantees and insurance deal with the resulting moral hazard issues through the contractual requirements which risk takers place on risk shedders, risk takers in the CDS and CDO markets tend to rely more on third-party monitoring, notably by rating agencies. The role of rating agencies in financial markets is being discussed in various national and international groups. Although no conclusion has been reached in this broader debate, several aspects of rating agencies' activities are relevant to CRT.

The agencies, which have traditionally had an important role in corporate and sovereign bond markets, have now expanded their franchise to the CDO, ABS and ABCP markets. This involvement has been accompanied by a qualitative expansion in the scope of their assessments: for example, rating agencies will now also give opinions on portfolio managers' systems and controls, the contractual rights of risk takers vis-à-vis risk shedders and the perceived willingness of risk takers to perform on insurance policies. They have also in effect become standard setters for the tranching of portfolio credit risk. Against this background, the limited number of agencies may raise issues, including but going beyond questions of competition. Whereas corporate and sovereign ratings are credit opinions, ratings of portfolio CRT tranches are close to being model outputs. Even if market participants are clear about the meaning of ratings in these different contexts - and prices of different types of bonds do vary even if they have the same rating - there are nonetheless questions about how ratings can provide a consistent measure of risk, with possible implications for the way they are used, including in the design of regulatory regimes.

## **VII.3 Diversification and concentration**

### ***Risk exposures***

With transferability of credit risk becoming easier, there is greater scope for institutions to adjust their risk profiles without damaging customer relationships. They need no longer accept passively the credit risk profile arising from their customers' credit demands. In this respect, CRT should help to reinforce financial stability. The systemic relevance of such effects will obviously be greater the larger the number of institutions involved in CRT activities and the broader the range of assets for which credit risk can be transferred. Diversification benefits would arise even if credit risk were simply redistributed within the banking system. Spreading credit risk to other financial or non-financial firms could further enhance the effect. Moreover, to the extent that credit risk is borne outside the banking system, this could increase the overall level of credit available; and if credit risk is also spread across countries, it may reduce banks' vulnerability to domestic business cycles.

## **Concentration**

As pointed out in Section IV.2, some parts of the CRT market are concentrated in a few institutions. In particular, intermediation of CDSs is dominated by a handful of large universal banks and securities dealers; and risk taking on the most senior ("super senior") unfunded tranches of CDOs is limited to the monolines and a few banks.

Although most intermediaries claim to have balanced books or only small structural positions, concentration in the intermediation of credit risk could itself be a problem. Even with a matched book - and achieving full matching may be difficult for a variety of reasons - institutions are still exposed to basis risks if contractual terms are not identical. It is, moreover, questionable whether a large number of contracts is effective in diversifying such risk. Market risks can also be difficult to hedge in this area given patchy market liquidity. If intermediation remains highly concentrated, operational failings in dominant firms could disrupt markets. Any deterioration in the creditworthiness of large intermediaries - for example, as reflected in rating downgrades - could also reduce market liquidity by making counterparties less willing to trade without collateralisation. It is hard to know whether the current concentration in intermediation reflects temporary first-mover effects or whether economies of scale imply that this degree of concentration will be maintained in the longer run. But it is worth recalling that consolidation and concentration seem to have become widespread features of financial markets.<sup>29</sup>

## **VII.4 Contract design**

### ***Restructuring***

The CDS market is based on the idea that it is possible to transfer credit risk contractually rather than by the sale of an underlying claim on the borrower. The viability of the market therefore depends on the ability of risk shedders and risk takers to agree to a fair contract. CDS documentation and market practice have evolved to address the various incentive problems described in Section V. But it is still unclear whether this has been successful. The restructuring question, in particular, remains unresolved. Indeed, risk takers and risk shedders seem at present to be moving further apart. Some risk takers (insurance companies) appear to have concluded that including restructuring leaves them too exposed to opportunistic behaviour on the part of banks shedding risk. On the other hand, many - though certainly not all - banks regard credit protection as incomplete without cover against restructuring. Importantly, most bank regulators - including the Basel Committee in its recent proposals - also take the view that CDSs must include restructuring in order to qualify as a credit risk mitigant for regulatory capital purposes. It is unclear whether ISDA will be able to find an amendment to its contract terms that satisfies everyone. If not, the development of the CDS market may slow.

### ***Credit insurance***

The recent unwillingness of some banks to shed risk using certain forms of credit insurance, such as surety bonds, has also highlighted the difficulty of designing effective CRT contracts. In this case, though, it is the risk shedders that regard the contracts as leaving them vulnerable to opportunistic behaviour by the risk takers (the insurers). But the underlying issue is the same: the difficulty of designing fair CRT contracts.

## **VII.5 Risk management issues**

Historically, instruments whose characteristics have not been fully understood by their users have created problems for institutions and markets. In relation to CRT instruments, the challenge is probably greater for those institutions which have not previously been involved in credit risk business. Nonetheless, CRT also creates challenges for institutions familiar with credit risk, either because of the novel features of the instruments involved or through the overall scale of CRT usage.

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<sup>29</sup> To give an example: in 2001 three banks held 89% of the notional outstanding stock of foreign exchange derivatives booked by US banks and the three largest banks accounted for 86% of total notional amounts outstanding in the US interest rate derivatives market (BIS, *72nd Annual Report*, July 2002).

### **Counterparty risk**

First, unfunded risk transfer instruments give rise to counterparty risk. This risk is not limited to credit derivatives and market participants have addressed it, for example through the use of collateral. For single name CDSs, the larger intermediaries have credit support annexes (CSAs) as part of their ISDA master agreements. There are, however, some limitations on the provision of collateral; for example, some important counterparties such as insurance firms (monolines) and mutual funds may be debarred by regulatory rules from providing collateral in some countries. Moreover, counterparty exposures linked to credit can increase sharply, so that sudden shortfalls in collateral coverage of positions may occur. In addition, counterparty risk against the risk taker and credit risk on the assets transferred can be correlated.

### **Portfolio credit risk assessment**

In portfolio transactions, evaluation of credit risk correlations amongst the underlying assets presents a major technical challenge even for sophisticated institutions. Rating agencies have assumed a role as quasi-standard setters in this area. In their methodologies, as in other credit risk modelling approaches, the assumptions on default correlations are key for the evaluation of risk. It is crucial that institutions which rely on them know what these assumptions are and understand the limitations of these techniques.

### **Documentation**

Finally, despite significant improvements in documentation which have supported recent market growth, documentation risk (going beyond any issues related to restructuring) is still an important issue. Although market participants can be expected to further fine-tune documentation, there may be limits to contract completeness in capital market CRT instruments. Credit risk is more heterogeneous in its nature than market risk, leading to a larger list of issues to be addressed in CRT contracts and documentation than in many other transactions. Constant evolution of documentation also creates problems of mismatches between transactions agreed at different times.

## **VII.6 Accounting**

According to market participants, divergences in accounting rules (cross-sectoral differences, different treatment of instruments, eg insurance/CDSs, differences between the banking and trading book, etc) are having an impact on CRT market development. Market participants told the Group that this was particularly the case where they were seeking to hedge credit risk exposures using CRT instruments and wish the underlying exposure and the hedge to be accounted for using the same methodology. The development of CRT markets is also shifting the fuzzy boundary between traded and non-traded risk; therefore a greater amount of assets will be classified in the trading book. For the time being, however, the trading of single name CDSs is largely confined to issuers who already have traded debt, so that CRT instruments do not in practice extend the range of credits for which market prices are available. Whether and, if so, how it would be desirable to reflect market valuations in published accounts is a controversial issue, which this Report does not address. But it is an issue firmly in the minds of practitioners.

## **VII.7 Regulation**

CRT has the potential significantly to change institutions' risk profiles and their role in the financial system. From a financial stability perspective, it is important that these changes be addressed in regulation and disclosure standards, as well as in the behaviour of individual firms. Banks may in the future have less credit but more legal and operational risk. Liquidity risk might also become more important, created either by contingent liabilities within securitisation structures or by increased dependence on these transactions as a funding device. These risks are more difficult to measure than credit and market risk, and it may be difficult to deal with them in quantitative capital rules and disclosure standards. A more qualitative approach, focusing on risk management, may be needed.

For some insurance firms, credit risk management may become more important than in the past. As the study by the International Association of Insurance Supervisors (IAIS) points out, insurance companies with significant credit risk have to ensure that this risk is properly managed and that



correlations with other parts of their business are well understood.<sup>30</sup> Moreover, greater consistency in the treatment of credit risk taken on through investment business on the one hand and underwriting business on the other might be needed at firm level and in regulation. And all regulators are confronted with the challenge that enhanced risk transfer capability in conjunction with financial engineering techniques can generate financial instruments, such as certain CDO tranches, with novel risk characteristics which do not easily fit into conventional instrument classes.

Although CRT market activity may no longer be driven predominantly by regulatory arbitrage, CRT certainly exposes more sharply differences in regulatory treatment. This means that regulators' degrees of freedom in setting capital standards which deviate from the market's perception of risk are likely to be smaller in the future and that increasing attention needs to be paid to the cross-sectoral incentives generated by capital rules.

The enhanced risk sensitivity of capital rules introduced in the Basel II framework, together with increased emphasis on supervisory review and disclosure, should be helpful in this regard. But the monitoring of financial markets to identify arbitrage activities will continue to be an important source of information for bank and insurance regulators in detecting remaining incentive incompatibilities.

## VIII. Concluding comments

This Report has described recent development in CRT markets and has reviewed some possible implications for financial institutions' behaviour and financial risk. It has not, however, been possible to provide a definitive answer to the question "How much does all this matter from the point of view of overall financial stability?" This is partly because of the currently incomplete statistical coverage of CRT; it is also because many CRT markets are still young and are evolving rapidly. In the light of the dynamic nature of these markets and changes in the surrounding financial and economic environment, central banks will continue to monitor developments closely. This Report provides a starting point for such monitoring.

Although beyond the scope of this Report, CRT clearly has monetary and macroeconomic as well as financial stability implications. CRT may, for example, help to ameliorate capital constraints on bank lending, thereby modifying the monetary transmission mechanism. Appendix 6 of this Report provides a glimpse of such possible structural impacts. Central banks will want to consider how far they merit further study.

## List of appendices

Appendix 1	Terms of reference
Appendix 2	CRT instruments and techniques
Appendix 3	CRT instrument characteristics
Appendix 4	CRT in emerging markets
Appendix 5	Literature review
Appendix 6	Credit risk transfer of loans to SMEs: some case studies

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<sup>30</sup> "Credit risk transfer between insurance, banking and other financial sectors", *Issues Paper*, IAIS Investment Sub Committee, forthcoming.

## **Appendix 1: Terms of reference of the CGFS Working Group on Credit Risk Transfer**

Global credit risk transfer markets have emerged in recent years. These markets are being used to transfer credit risk within the banking system and from banks to non-banks, such as insurance companies and investment funds. They represent a significant development in financial markets and warrant heightened interest by central banks because of the possible implications for the functioning of the international financial system and for financial stability. The Working Group should review these developments in techniques for credit risk transfer and make a preliminary assessment of the financial stability implications. Specifically it should:

- provide a brief description of the various instruments and techniques used for credit risk transfer - including loan trading, conventional and synthetic securitisation and credit derivatives - assess the driving forces behind recent market developments and identify the major participants in the markets for these instruments;
- assess in qualitative and, as far as available, quantitative terms the extent and direction of risk transfer and the impact on risk distribution in the financial sector effected through use of these instruments;
- identify areas in which currently available information is inadequate to give a reliable picture of market developments and consider options for addressing any such gaps;
- make a preliminary assessment of the potential implications of recent developments in credit risk transfer techniques for financial stability and consider, as necessary, possible policy responses.

It is envisaged that, in order to review the current position, members of the Working Group should each conduct a series of coordinated discussions with market practitioners, including banks, insurance companies and institutional investors. The coordination will be achieved by basing the discussions on a common list of questions, although the questions may differ somewhat for different types of firms depending on their position in the market and level of sophistication. These discussions may identify additional questions or issues so that the process of dialogue with the private sector is likely to be iterative. It is not envisaged that this information gathering should extend to the collection of statistics, although it is possible that the Group may wish to make recommendations in its report relating to the collection of market data.

The Group is asked to begin its work immediately with a view to producing an interim report, which can be considered by the CGFS in early 2002. The Group should produce a final report in late 2002 for consideration by the CGFS at its last meeting in 2002.

## Appendix 2: Credit risk transfer instruments and techniques

### I. Single name instruments

#### I.1 Unfunded risk transfer<sup>31</sup>

##### ***Credit default swaps (CDSs)***

A credit default swap is a bilateral financial contract in which the risk shedder pays a fixed periodic fee in return for a contingent payment by the risk taker triggered by a credit event on a *reference asset*. Credit events can be the failure by the reference entity (corporations, banks and sovereigns from the developed countries or emerging markets) to pay, bankruptcy, obligation default or restructuring. Repudiation/moratorium is an additional credit event included where sovereigns are the reference entity. The spectrum of deliverable assets is specified in the CDS contract and may include bonds and loans in the investment or high-yield category.

The credit default structure is very close to that of a guarantee. Nevertheless, there are three important differences: the range of credit events that trigger payment is much broader under derivative contracts; the risk shedder is not required to prove that it itself has suffered a loss in order to receive payment; and CDSs are based on standardised documentation to encourage trading. In 1999, ISDA published revised standard credit derivatives definitions for use with its Master Agreement.

##### ***Guarantees***

A guarantee is a bilateral contract under which the risk taker (guarantor) has an obligation to perform for the benefit of the risk shedder (obligee). Performance is typically triggered by the non-performance of a third party (obligor) under a specified contract between the obligor and the obligee. Usually the guarantor is obliged to fulfil the obligor's obligations if the latter cannot perform, with amounts payable limited to losses on the underlying exposure. Guarantees follow closely the nature and content of the contract between the obligee and the obligor. Guarantees are flexible instruments to transfer risk because they can be tailored to cover specific exposures or transactions. On the other hand there is currently no internationally agreed documentation or confirmation framework and guarantees are not traded.

##### ***Insurance products (surety bonds, credit insurance and financial guarantee insurance)***

Surety bonds have typically been provided by US insurance companies to back the beneficiary's performance of an obligation, including financial obligations to banks, subject to certain conditions. Credit insurance is typically provided by specialist insurance companies to support trade credit and often used by the beneficiaries to obtain bank financing of the receivables. Financial guarantee insurance developed as an unconditional guarantee of payments to bondholders provided by one of the US *monoline credit insurers*.

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<sup>31</sup> The distinction between funded and unfunded instruments can be drawn either from the perspective of the risk shedder, ie whether the risk shedder receives funds in the transaction, or from the perspective of the risk taker, ie whether the risk taker has to provide upfront funding in the transaction. For some instruments, such as CDSs (which are unfunded according to both definitions) and ABSs (which are funded under both definitions), both criteria coincide. Other transactions, such as synthetic CDOs, involve an upfront payment by the risk taker although the funds are not transferred to the risk shedder but invested in securities held by an SPV. For the purpose of this Report the notion of funded risk transfer is from the perspective of the risk shedder.

## I.2 Funded risk transfer

### ***Loan trading***

In secondary loan markets single loans are sold. This may require the consent of the borrower. For this reason loans are often assigned in the form of participation where the original lender remains the only direct lender to the borrower and contracts with another institution to lay off the undesired part of the exposure.

## II. Portfolio risk transfer

### II.1 Unfunded risk transfer

#### ***Unfunded synthetic securitisation (portfolio credit default swaps)***

Synthetic securitisations combine securitisation techniques with credit derivatives. In portfolio credit default swaps the risk transfer is achieved without any change in the legal ownership of the underlying assets either via a series of single name CDSs or a single CDS referenced to all the credits in the portfolio.

#### ***Unfunded synthetic securitisation (basket credit default swaps)***

A basket default swap is similar to a default swap in which the credit event is the default of some combination of the credits in a specified basket of credits. In the particular case of a first-to-default basket it is the first credit in the basket of reference credits whose default triggers payments. Other forms are second or third-to-default baskets but more combinations are possible to shape the risk profile according to risk takers' and shedders' needs.

### II.2 Funded risk transfer

#### ***Funded synthetic securitisation (credit-linked notes)***

Credit-linked notes (CLNs) are funded balance sheet assets that offer (synthetic) credit exposure to a portfolio of reference assets. CLNs embed credit derivatives in a security issued by the risk shedder. The performance of the note is linked directly to the performance of the reference pool. The investor receives coupon payments that include a risk premium and par redemption at maturity. The risk taker has a counterparty risk on the risk shedder but not vice versa as the proceeds of the note issuance are passed on directly to the risk shedder. If the risk taker wants to avoid counterparty risk an SPV may be used and the structure becomes a synthetic CDO (see below).

#### ***Asset-backed securities***

In traditional securitisation structures, loans, bonds or receivables are transferred from the originator's portfolio to a special purpose vehicle (SPV) that holds them as collateral to back the securities issued to investors. The credit risk of the assets is transferred from the originator to the investor and the protection is funded up-front with the proceeds from the securities issuance being transferred to the originator. The structural features of asset-backed securities (ABS) are similar to cash CDOs but the underlying pool of assets such as mortgages or credit card receivables is more homogeneous.

To obtain higher ratings for the securities issued most securitisation structures have credit and liquidity enhancements. External *credit enhancements* include letters of credits or guarantees from highly rated banks or insurance companies. *Liquidity enhancements* are used to cover cash flow mismatches to compensate for the incomplete synchronisation of interest payments or to cover rollover risk when maturities of the underlying assets and maturity of the securities issued do not coincide.

### ***Collateralised debt obligations (CDOs)***<sup>32</sup>

In CDOs credit risk is transferred from the risk shedder to an SPV either in a transfer of the assets or synthetically using credit derivatives. Although there is no common agreed definition in the literature, CDOs backed by loans are often referred to as collateralised loan obligations (CLOs) whereas CDOs backed by bonds are labelled collateralised bond obligations (CBOs). CDO exposure to assets can be achieved by cash purchase of the assets (cash CDOs) or using credit derivatives (synthetic CDOs). A further distinction is the purpose they serve. *Balance sheet* CDOs are initiated by the holders of assets to shrink the balance sheet or to manage economic or regulatory capital. *Arbitrage* CDOs are driven by asset managers and investors who hope to achieve a leveraged return on the equity tranche (see below). CDOs can be structured as static portfolios or as managed pools where the portfolio manager can alter portfolio composition subject to limitations on concentration and rules on rating composition set out in the documentation. Finally, a distinction can be made between market value and cash flow credit structures reflecting the way shortfalls are calculated and allocated. According to JP Morgan, cash balance sheet CDOs with a cash flow structure and cash arbitrage CDOs with a cash flow structure are the most important structures accounting for 41% and 36% respectively of overall CDO volume.

A common feature of all these CDOs is that multiple classes of equity and debt are tranching with respect to seniority in bankruptcy and timing of default into equity, mezzanine and senior tranches (see below).

### **III. Portfolio risk transfer and tranching**

*Tranching* describes the process used in portfolio instruments and transactions such as CDOs and CLNs to re-engineer the risk/return profile of a pool of assets or credit risk exposures into multiple risk classes with different degrees of seniority in bankruptcy and timing of default.

The *equity tranche* is the lowest tranche (with the highest risk) in the capital structure. It carries the risk of payment delays and defaults first, and reduces the risk of the other tranches. Depending on the credit quality and diversity of assets the size of the equity tranche ranges from 2% to 15% of the capital structure. The next more senior tranche is often called the “*mezzanine*” tranche. Mezzanine tranche investors are protected by the equity tranche and will incur losses only if the equity tranche is exhausted. On the other hand, their claims are subordinated to claims of the *senior tranche* that in turn will only be affected if the equity and mezzanine tranches are exhausted. The equity tranche is typically unrated, most mezzanine tranches carry an investment grade rating and senior tranches often even achieve a AAA rating.

The seniority structure is reflected in the way income or liquidation proceeds are allocated. Since allocation starts with the most senior tranche these arrangements are often referred to as “waterfall structures”. In cash CDOs, income from collateral is paid as interest on the notes first to the most senior tranches. The remaining income is then paid on the mezzanine tranche notes. Any income remaining after payments to the debt tranches is paid to the equity tranche. In market value structures the CDOs’ assets are marked to market periodically and a haircut is applied to take into account future market value fluctuations. If the haircut value of assets falls below the par value of the debt tranches CDO assets have to be sold and debt tranches repaid until haircut asset value again exceeds the debt tranches’ par value.

The tranching of risk is one way to engineer risk/return profiles according to investors’ preferences. The equity tranche gives investors access to a non-recourse term financing of the CDOs’ underlying assets. Equity investors hope to achieve a leveraged return between the after-default yield on assets and the financing cost of debt tranches.<sup>33</sup> The mezzanine tranche may generate risk/return profiles

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<sup>32</sup> CDOs can be either funded or unfunded. Their treatment in one section has the advantage that their description in the broader context of existing variants provides a better overview and avoids duplication.

<sup>33</sup> This potential spread is often used to explain the term “arbitrage” CDO. This is somewhat misleading because equity investors’ risk/return profiles look the same in balance sheet CDOs.

that differ from the profiles of other assets and instruments. Even if investors were able to acquire the same assets that back a CDO they would not be able to avoid having the first-loss position on this portfolio. Varying the size of the equity tranche, risk/return profiles can be shaped to match investors' needs or preferences.

An alternative way to engineer risk/return profiles is used in baskets, where the ranking in loss absorption is specified in the default swaps by first/second-to-default provisions. While tranching is used in structures in which risk is first transferred to an SPV, basket structures are used in transactions where the risk is transferred directly between risk shedder and taker.

### Appendix 3: Instrument characteristics

	Single name credit default swap	Single name total return swap
Cash flows	Risk shedder pays regular premiums over life of swap; risk taker pays amount (depending on agreed settlement procedures) following credit event	Risk shedder pays cash flows on a reference asset; risk taker pays cash flows linked to a market interest rate eg Libor; periodic cash adjustment to reflect change in market value of reference asset
Any other risks bundled?	No (except risk shedder may be long a delivery option, which may have value if the borrower's liabilities differ in value following a credit event eg restructuring)	Credit risk bundled with any other risks associated with the underlying instrument to which the swap is linked eg interest rate, fx or equity risk
Funded or unfunded?	Unfunded	Unfunded
Trigger events (if applicable)	ISDA standard credit events (bankruptcy, obligation default, failure to pay, restructuring - may also include repudiation for sovereigns and obligation acceleration in trades based on previous versions of the ISDA credit derivative definitions)	Not applicable
Settlement following trigger events	Typically through delivery of an obligation of the borrower by the risk shedder to the risk taker in exchange for its face value in cash; occasionally through establishment of a market price for the borrower's debt following the credit event (eg by polling dealers) and cash payment of the difference between this value and the face value of the debt	Not applicable
Associated counterparty risks	Risk shedder exposed to risk taker up to potential settlement amount; risk taker exposed to risk shedder for replacement cost of transaction	Risk shedder exposed to risk taker up to potential settlement amount but risk mitigated by periodic payments to reflect changes in market value; risk taker exposed to risk shedder for replacement cost of transaction
How these are typically managed?	Collateral support agreement often used	Collateral support agreement often used
Typical context in which used	Traded market between risk shedders and risk takers; also in structured transactions between risk shedders and risk takers	Structured transactions between risk shedders and risk takers
Is risk shedder able to go short?	Yes	Yes
Requirement to notify borrower	No	No
Standardised/tradable	Yes [ISDA credit derivative definitions]	Partly
Legal form of credit risk transfer	Contractual - based on ISDA Master Agreements	Contractual - (based on ISDA Master Agreements)

<b>Single name credit-linked note</b>	<b>Credit insurance</b>	<b>Financial guaranty insurance</b>
Risk taker pays principal upfront; risk shedder pays a rate linked to a market interest rate plus a credit premium and repays principal at maturity; interest and/or principal reduce following a credit event, as agreed	Risk shedder pays regular insurance premiums; risk taker pays amount (depending on agreed policy documentation) following a loss event	Risk shedder pays regular insurance premiums; risk taker pays interest and principal on original schedule following non-payment
The note may pay a fixed or floating interest rate in addition to the cash flows on the embedded single name default swap	No	No
Funded	Unfunded	Unfunded
Typically ISDA standard credit events but documentation less standardised than CDS eg MTN documentation may use 'old' ISDA language	Loss events to insured as defined in policy	Non payment of interest or principal
Typically through establishment of a market price for the borrower's debt following the credit event (eg by polling dealers) and payment of the difference between this value and the face value of the debt. This amount is deducted from the nominal principal value of the note and interest payments reduce accordingly	Insurer pays out the insured's losses less any excess (deductible) and up to any limit. Losses usually claimed by the insured and investigated by the insurer before payment is made (loss adjustment)	Interest and principal paid to risk shedder on original schedule; risk taker takes over claim on borrower
Risk shedder cash collateralised; risk taker exposed to risk shedder for value of note	Risk shedder exposed to risk taker up to potential settlement amount; risk taker exposed to risk shedder for replacement cost of transaction	Risk shedder exposed to risk taker up to potential settlement amount; risk taker exposed to risk shedder for replacement cost of transaction
Not managed	Not managed	
Structured transactions between risk shedders and risk takers	Borrower seeks credit insurance to protect its creditors, structured transactions between risk shedders and risk takers	Borrower seeks financial guaranty insurance to protect its creditors
Yes	No	No
No	Borrower often involved	Not applicable
No	No	Partly (monoline standard)
Contractual - terms of bond issue	Contract of insurance	Contract of insurance



<b>Surety bond</b>	<b>Bank guarantee/ letter of credit</b>	<b>Loan participation</b>	<b>Loan sale</b>
Risk shedder pays regular insurance premiums; risk taker pays amount (depending on agreed policy documentation) following a loss event	Risk shedder pays regular or one-off fee; risk taker pays amount following a failure to pay by the borrower	Risk taker pays market value of asset upfront; risk shedder passes through all cash flows on an agreed underlying asset	Risk taker pays market value of loan upfront; risk shedder receives all subsequent cash flows on the loan directly from the borrower
No	No	Credit risk bundled with any other risks associated with the underlying instrument to which the participation relates eg interest rate, fx or equity risk	Credit risk bundled with any other risks associated with the sold loan eg interest rate, fx or equity risk
Unfunded	Unfunded	Funded	Funded
Loss events to insured as defined in policy	Failure to pay by borrower	Not applicable	Not applicable
Insurer pays out the insured's losses less any excess (deductible) and up to any limit. Losses usually claimed by the insured and investigated by the insurer before payment is made (loss adjustment)	Bank repays lender face value of debt and takes over claim on underlying borrower	Not applicable	Not applicable
Risk shedder exposed to risk taker up to potential settlement amount; risk taker exposed to risk shedder for replacement cost of transaction	Risk shedder exposed to risk taker up to potential settlement amount; risk taker exposed to risk shedder for replacement cost of transaction	Risk taker exposed to risk shedder up to value of participation amount deposited upfront	None
Not managed	Not managed	Not managed	Not applicable
Borrower seeks surety bond to protect its creditors	Borrower seeks bank letter of credit or guarantee to raise third-party financing	Initial transfer of risk on new loans from risk shedder to risk taker	Trading between risk shedders and risk takers
No	No	No	No
Not applicable	Not applicable	No	Maybe
No	No	Yes, in some countries	Yes, in some countries
Contract of insurance	Contractual	Contractual	Novation

## **Appendix 4: Credit risk transfer in emerging markets**

This annex reviews the credit risk transfer mechanisms and markets of three of the major emerging market countries, Brazil, Korea and Mexico. The document is structured as follows: Section I describes the securitisation market, while Section II explains the credit derivatives market.

### **I. The securitisation market**

Securitisation and the issuance of asset-backed securities (ABSs) are well developed in Korea, where in 2001 such securities represented more than 50% of total rated bonds. In Brazil and Mexico no securitisation market has been fully developed as yet.

Since the financial crisis of 1997, Korean authorities have encouraged the use of ABSs as a means of writing off bad loans and raising the required amount of money. Most of these transactions have been structured in the form of traditional collateralised debt obligations (CDOs). These CDOs include between 10 and 100 corporate names. Recently, several consumer-financed obligation operations in the form of mortgage loans and credit card receivables have been structured. The operations generally include more than 10,000 debtors. In Korea, all contracts to securitise assets are made public, which has led to the standardisation of such documents. At the moment, securitisations cannot be conducted through blind pools since - by law - the asset shed by its originator must be registered by the Financial Supervisory Service. Although until recently securitisation worked mainly as a vehicle to write off bad loans and raise money, it is shortly expected to operate as a vehicle for credit risk transfer.

In Brazil, the development of such a market has been inhibited by legal constraints. Recently approved legislation changes are expected to improve the legal framework for creditor rights and corporate insolvency and to facilitate market development. Moreover, a constitutional amendment approved in July has suspended the application of a transaction tax that has had an impact on the cost of securitisations. There have been fewer legal impediments in the area of mortgage-backed securities (MBSs), and the MBS market has developed at a faster pace since 1999. At the moment the most restraining factor for this market is that the lack of a liquid long-term bond market makes it very difficult to project a long-term yield curve, which in turn makes the securitisation of operations requiring long term securities difficult to price.

In Mexico, the main factor that has inhibited the development of a securitisation market has been the sharp downsizing of the loan market since 1995. Credit to the private sector has fallen by 32% in real terms in the past five years. Nonetheless, in 2001 there were several efforts by foreign banks to issue ABSs backed by top-tier corporations. However, the current fiscal regime for corporate bonds makes the issuance of these securities expensive, as government debt is cheaper. The lack of a well established institutional investor base also makes it very difficult to place these securities. Currently, issuers rely mainly on investment pension fund managers as their main clients for these securities. By law, these managers can only purchase top-tier rated paper (AAA, AA and A).

### **II. Credit derivatives market**

There is no local, developed credit derivatives market in any of the three emerging markets. However, a fairly liquid credit default swaps market for the three sovereign risks does exist, and it mainly trades in New York and London.

In Korea, no local credit derivatives market has developed, mainly due to the difficulty in pricing such transactions. In fact, some efforts have been made to structure particular deals, but they have all failed, partly due to managers' reluctance to participate in them, but also due to a failure to agree on pricing. Another factor inhibiting the development of such a market has been the lack of any clear regulation for these transactions. However, a credit derivatives market between foreign and local institutions has existed since 1995, and it expanded very rapidly up to 1997, where credit default

swaps reached a volume of \$1.3 billion. After the financial crisis of 1997, the volume traded in credit-derivatives fell sharply due to the rapid fall in Korean credit ratings. Recently, however, local institutions, mainly insurance companies, started to participate in this market by purchasing credit linked notes (CLNs). The majority of these were issued by three or four foreign banks, established in the euro area and seeking credit protection. These notes are mostly based on a basket composed of four or five underlying assets. There are only a few cases where the CLNs are issued based on a single asset. ISDA master agreements are used in the majority of these transactions.

In Brazil, credit derivatives have been allowed since February 2002. For the moment only credit default swaps and total return swaps are allowed and some limitations have been imposed to allow for a cautious market development: at this stage, investment funds and pension funds cannot act as risk takers and risk shedders must own the asset for which they buy protection. An exception applies to assets that are traded in organised markets. In all cases the amount of protection must not exceed the value of the position to be protected. Finally, reflecting discussions in the international community of central banks and regulators, great emphasis has been placed on disclosure and reporting rules related to credit derivatives. These include the registration of all derivative transactions in an authorised registration system and reporting of large exposures to the Central Bank. Further rules apply to the disclosure of credit derivatives business in financial statements.

In Mexico, there are several reasons why no local credit derivatives market has developed. In the first place, the lack of any new banking credit since 1995 has stultified any incentive for banks to develop such a market. In addition, the lack of a liquid domestic corporate bond market makes it very difficult to price bonds. Finally, there is no regulation for credit derivatives in Mexico at the moment, although the Bank of Mexico is working on a project to include them in the regulations governing the rest of the local derivatives market. Nonetheless, there is a fairly liquid market for credit default swaps of Mexican sovereign risk in US dollars, as well as for single name top-tier Mexican corporations which have issued liquid bonds in international markets. Recently, there has been a certain amount of effort by some foreign banks situated in Mexico to trade credit derivatives with domestic investors in the form of CLNs. In particular, some long-term notes have been issued by these foreign banks and purchased by insurance companies. Notwithstanding, the issuance of these products has been only sporadic, since the major potential holder of these securities, Pension Investment Funds, is not allowed to trade in them at present. As in Korea, these transactions have been structured using ISDA master agreements.

## Appendix 5: Literature review<sup>34</sup>

### I. Asymmetric information

According to traditional literature, in the absence of CRT markets, the borrower-lender relationship suffers from adverse selection and moral hazard problems, which screening and monitoring by banks help to mitigate. The introduction of CRT instruments affects these problems,<sup>35</sup> as well as the risk management concerns of lenders, and creates new problems in both of these areas. The following table summarises the asymmetric information problems created by CRT markets and identifies which problems have been analysed in the literature.

Table 1  
**Asymmetric information problems created by CRT markets**

<b>Adverse selection</b>	<b>Potential problem</b>	<b>Affected relationship</b>	<b>Relevant papers</b>
	Reduced incentives for lender to screen out low-quality assets	Borrower-lender Lender-protection seller	
	Lemons problem: lender buys protection on low-quality assets, drives up cost of protection on high-quality assets	Lender-protection seller	<ul style="list-style-type: none"> <li>• Duffee and Zhou (2001)</li> </ul>
	Incentives for lender to select low-quality assets (managed securitisations)	Lender-protection seller	<ul style="list-style-type: none"> <li>• DeMarzo and Duffie (1999) Pennacchi</li> </ul>
<b>Moral hazard</b>	Reduced incentives for lender to monitor borrower	Borrower-lender Lender-protection seller	<ul style="list-style-type: none"> <li>• Gorton and Penacchi (1995)</li> <li>• Morrison (2002)</li> </ul>
	Lender's purchase of credit protection against borrower's wishes	Borrower-lender	<ul style="list-style-type: none"> <li>• Morrison (2002)</li> </ul>
	Increased incentives for lender to prematurely trigger defaults	Lender-protection seller Borrower-lender	
	Protection seller reneges (partially or fully) on contingent payouts	Lender-protection seller	

<sup>34</sup> Whereas this appendix is limited to a review of the relatively scarce literature dealing with problems arising in CRT markets, more detailed discussion of issues that have not yet been addressed by the literature, as well as discussion of the relevance of CRT instrument characteristics, appears in Kiff et al (2002).

<sup>35</sup> The impact of CRT instruments on asymmetric information problems between borrowers and lenders applies only to the loan market and not to the bond market, as information in the latter market is more of a public nature.

## II. Borrower-lender relationship

### II.1 Moral hazard by borrower

A lender who has purchased credit protection through CRT instruments may have less incentive to monitor its borrower.

Gorton and Pennacchi (1995) analyse this problem in the loan sales market. For a bank to continue providing credit evaluation services once it has sold a loan, loan sale contracts need to be made incentive compatible: either the originating bank provides an implicit guarantee, or it retains a portion of the loan. Empirical tests confirm that banks selling loans must convince loan buyers of the commitment to monitor borrowers and that the best way to achieve this is to retain a portion of the loans. In addition, the riskier the loan, the higher is the observed portion of retained loans.

Morrison (2002) analyses the problem of weakened lender monitoring in the presence of markets for credit default swaps. In the absence of a CRT market, borrowers benefit from “bank certification”, as banks will monitor them and force them to choose “first-best” projects.<sup>36</sup> This allows borrowers to combine cheaper bond finance with bank finance. The introduction of a CRT market, which allows banks to buy credit protection, may weaken banks’ incentives to monitor borrowers. Thus, borrowers’ bank certification benefits will be lost. Assuming that there is no substitute for bank monitoring, borrowers may choose in this case to avoid bank finance altogether, to issue junk bonds, and to run “second-best” projects. Thus, welfare may be reduced.<sup>37</sup> Part of that problem may be solved by using CRT instruments with particular characteristics (Kiff et al (2002)).

### II.2 Moral hazard by lender

When occurring against the borrower’s wishes or without informing him, purchases of credit protection by a lender may send a negative signal about the borrower’s quality or may prevent him from obtaining bank certification benefits.<sup>38</sup> If the bank’s purchase of protection is observable, the borrower may avoid these problems by including a clause in the loan contract which prohibits the bank from purchasing protection. When the purchase of protection is not observable (as in the case of a credit derivative), reporting requirements may be needed in order for borrowers to prevent the problem from occurring (Morrison (2002)).

A second form of lender moral hazard arises in cases where it may be in the interest of the lender, once he has purchased protection, to prematurely trigger a credit event (see Section III.2 below).

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<sup>36</sup> Firms have access to two types of projects: “first-best” projects, which have high profitability and yield low private benefits to the manager; and “second-best” projects, which have low profitability and yield high private benefits.

One caveat must be added. In certain circumstances lenders may benefit enough from the higher expected return generated by monitoring the borrower that they would choose to purchase only partial protection in the CRT market and to continue monitoring the borrower. In this case the existence of CRT markets would not aggravate the moral hazard problem.

<sup>38</sup> It is however worth noting that the certification effect may not be the only relevant consideration. Professionals generally cite two main reasons for borrowers to be opposed to the transfer of their loans: i) borrowers traditionally think of their loans as private transactions and do not wish to give too much publicity to their financing structure and indebtedness; ii) in the case of a restructuring, borrowers prefer to deal with an identified counterparty than with a large number of unknown holders of their debt. Such an attitude is also reported in Caouette et al (1998) and cited in Morrison (2002). This widespread belief of practitioners might well be wrong. Alternatively, the certification effect may be of less importance than academics traditionally think.

### III. Lender-protection seller relationship

#### III.1 Lemons problem

CRT markets may give lenders an incentive to buy credit protection for their low-quality assets. Assuming that the pricing of CRT instruments accurately reflects the low asset quality, high prices might prohibit lenders with good-quality assets from purchasing protection for those assets.

To the extent that there exists a time period (early in the life of a loan contract) during which no asymmetric information exists between the lender and outsiders regarding the borrower's probability of default, then the lender's purchase of credit protection during this period would not create a lemons problem (Duffee and Zhou (2001)). Any CRT instrument for which coverage could be limited to this time period could be used. However, instruments which remove the asset from the lender's balance sheet implicitly represent a purchase of protection up to maturity of the asset.

Pooling and tranching through portfolio structures may be optimal when the shedder has superior information (DeMarzo and Duffie (1999)). The tranching process allows the shedder to concentrate the "lemon's premium" in the small first-loss or equity tranches and create relatively large, low-risk senior tranches. Also, the shedder's retention of the subordinate tranches reduces the total lemon's premium by creating an incentive to align the interests of the shedder and the investors.

#### III.2 Moral hazard by lender

Once its exposure is fully hedged/transferred, the lender may stop monitoring the borrower, as the protection seller cannot costlessly observe whether the lender still monitors or not. The severity of this problem depends on whether the lender retains a first-loss position, on the maturity of the credit derivative relative to the underlying loan, and, finally, on whether the instrument is standardised/tradable.

Table 2

Potential CRT risk management issues

Potential problem	Potential solutions	Relevant papers
Counterparty risk: protection seller defaults on contingent payouts or buyer defaults on premiums	<ul style="list-style-type: none"><li>• Embedded mitigants like downgrade clauses, reserve/trust accounts and collateralisation</li><li>• Use of funded CRTs</li></ul>	<ul style="list-style-type: none"><li>• N/a</li></ul>
Documentation risk: "credit event" definitions do not completely cover all potential risks	<ul style="list-style-type: none"><li>• Careful documentation and solid understanding of CRT dynamics</li></ul>	<ul style="list-style-type: none"><li>• Merritt et al (2001) and Tolk (2001)</li><li>• Kessler and Levenstein (2001)</li><li>• O'Kane and McAdie (2001)</li></ul>
Market risk: bundled interest rate and currency risks (only on CLNs and funded CDOs)	<ul style="list-style-type: none"><li>• Use other derivatives (IRS and CCS) to unbundle other risks</li></ul>	<ul style="list-style-type: none"><li>• N/a</li></ul>

Depending on the way trigger events are defined in the CRT contract, the lender who has purchased credit protection on a loan may have an incentive to prematurely trigger a credit event (eg the Conseco case).

### **III.3 Risk management**

“Risk management” here represents situations where returns are uncertain but where there are no information asymmetries between the participants in a transaction as regards the probability distribution of uncertain returns. Potential issues arising from CRT instruments as regards risk management are summarised in Table 2.

#### ***Counterparty risk***

The timing of payments from CRT instruments can have an impact on the liquidity of the protection buyer. Whether CRT instruments are funded or unfunded obviously plays a role, as does the nature of the trigger events. CDSs may have broader definitions of credit events than some other instruments, and payments may be triggered prior to the point at which the borrower defaults. Settlement following trigger events also influences the timing of payments. Instruments that allow the protection seller to investigate losses will imply slower repayment than those that do not.

The amount of payment is determined both by settlement following trigger events and associated counterparty risks. Unfunded instruments leave open the possibility of counterparty default. Among unfunded instruments, those which provide more freedom for the protection seller to contest the claim embody a greater risk than those which require payment upon the trigger of the credit event.

#### ***Documentation and basis risk***

CRT instrument documentation may entail differences in the degree of credit risk exposure from that embodied in the underlying asset (Tolk (2001), Merritt et al (2001)). The nature of trigger events will have an influence on the severity of this problem. CDSs often involve “soft” default clauses, which are much broader than “the common understanding of default”. In contrast, financial guarantees have narrowly defined default events. Documentation risk can be particularly severe when financial guarantees are hedged with CDSs (Kessler and Levenstein (2001)). However, these risks can be mitigated by tight documentation and objective mechanisms for verifying loss determinations and calculations.

Other more fundamental reasons can cause the price behaviour of CRT instruments to diverge from that of the underlying assets. O’Kane and McAdie (2001) show how such factors as funding cost differentials, delivery options and regulations can cause cash market and CDS spreads to diverge.

### **III.4 Pricing CRT instruments**

Although in many cases the prices of various CRT instruments are observable in the market, it is important that there be fallback pricing methodologies for risk management purposes. For risk measurement purposes, it may also be useful to be able to simulate CRT instrument prices for various stress levels of the underlying variables. As shown in Table 3, although the theoretical pricing work is voluminous enough, there is a serious paucity of empirical work.

#### ***Pricing single-name CRT instruments***

Duffie (1999) and Bomfim (2001) show that, in a market in which all participants borrow and lend at Libor-flat, the spread on an n-period single name CDS is equal to the spread (over Libor) on an n-period floating rate note issued by the underlying entity. Even in the absence of an underlying n-period floating-rate note, an n-period fixed rate bond issued by the same entity can be swapped into a synthetic n-year floating rate note for pricing purposes. This methodology is sometimes called the asset swap or replication approach.

Houweling and Vorst (2001), Blanco et al (2002) and Brousseau and Michaud (2002) show that the replication approach works reasonably well. However, Houweling and Vorst (2002) found that CDS premiums tended to be wider than asset swap spreads for credits rated below “A”. Also, both Blanco et al (2002) and Brousseau and Michaud (2002) found that CDS premiums react more quickly than bond prices to credit quality weakening. In addition, Brousseau and Michaud (2002) found that CDS markets became very illiquid during periods of stress.

Table 3

**Modelling CRT prices (representative theoretical and empirical work)**

	Theoretical work	Empirical tests
CDS	<ul style="list-style-type: none"> <li>• Acharya et al (2002)</li> <li>• Duffie (1999) and Bonfim (2001)</li> <li>• Hull and White (2000 &amp; 2001)</li> <li>• Pan (2001) and Finger (2002)</li> </ul>	<ul style="list-style-type: none"> <li>• Houweling and Vorst (2001)</li> <li>• Blanco et al (2002)</li> <li>• Brousseau and Michaud (2002)</li> </ul>
ABS	<ul style="list-style-type: none"> <li>• Hayre (2001)</li> </ul>	<ul style="list-style-type: none"> <li>• N/a</li> </ul>
CDO	<ul style="list-style-type: none"> <li>• Cifuentes and O'Connor (1996)</li> <li>• Cifuentes et al (2000)</li> <li>• Duffie and Garleanu (2001)</li> <li>• Mashal (2002)</li> </ul>	
Baskets	<ul style="list-style-type: none"> <li>• Schmidt and Ward (2002)</li> <li>• Mashal and Naldi (2002a,b)</li> </ul>	

O'Kane and McAdie (2001) run through some of the factors that might lead to divergences between CDS and asset swap spreads:

- Factors that increase default swap spreads include counterparty risk, "technical default" risks caused by the swap's typically broader default definitions and the delivery option usually held by the protection buyer. (Typically, the protection buyer can choose from a basket of deliverables in the event of a "default".)
- Factors that decrease default swap spreads include the fact that most market participants fund themselves above Libor, and the protection buyer's exposure to counterparty risk. Also, default swap spreads tend to be wider in the less liquid parts of the curve. (According to O'Kane and McAdie, liquidity in the default swap market tends to be focused in the three- to five-year maturities.)
- Market factors that have no particular bias like supply and demand. In addition, default swap spreads tend to be wider if the cheapest-to-deliver bond is trading below par, and vice versa.

Although numerous more "fundamental" models have been developed for situations where replication does not work, the differences between "defaults" and "technical defaults" are worth emphasising (see Tolk (2001) and Merritt et al (2001)).

Theoretical models can be called on to replace or augment the prices generated by replication. The theoretical single name models can be segregated into two distinct groups:

- Structural models based on ideas presented by Merton (1974) and operationalised by KMV and CreditMetrics. In these models, credit risk is modelled in terms of the firm's assets relative to its liabilities. Pan (2001) and Finger (2002) have applied this approach to default swap pricing and presented some promising preliminary empirical results. However, structural models have only limited applicability to the pricing of credit risk on sovereign bonds, and they seem to have difficulties with modelling financial institution credit risk. Also, empirical tests of structural model bond pricing have not been overly promising.<sup>39</sup>

<sup>39</sup> See Eom et al (2002) for a recent empirical test of various structural bond pricing models, and a summary of other empirical work. They conclude that some models are more accurate than others, but accuracy is still lacking. Nevertheless, Campbell and Taksler (2002) show that the structural model idea of linking the price of credit risk to equity values is not altogether without merit, particularly for highly leveraged firms.



- Reduced-form models which associate credit risk with exogenous events that can be modelled with statistical tools most often associated with actuarial science. Essentially, they relate credit derivative prices to distributions of default probabilities and recovery amounts. The theoretical underpinnings of this approach have been laid out in Jarrow et al (1997) and Duffie and Singleton (1999). The approach has been applied to credit derivatives by (among others) Acharya et al (2002), Cheng (2001) and Hull and White (2000, 2001). Promising empirical tests have been done by Houweling and Vorst (2001) on both corporate and sovereign investment grade credits.

Anecdotal evidence would suggest that structural models have the upper hand for pricing single-name default swaps on trading desks, given the important role that KMV and CreditMetrics play on the risk management side. However, the only empirical test of a theoretical model that has been published to date (Houweling and Vorst (2001)) focuses on a reduced-form model. Several recent papers (Altman et al (2001) and Delianedis and Lagnado (2002)) have called attention to the sensitivity of reduced-form credit derivative pricing models to the base used for the recovery value. Three different assumptions are popular: 1) the market value of the risky debt prior to default (RMV), 2) the market value of an otherwise similar riskless debt instrument (RT), and 3) the risky debt's face value (RFV). Delianedis and Lagnado (2002) show that the RMV and RT assumptions produce similar risk neutral default probabilities and default swap prices, whereas the RFV assumption tends to underestimate probabilities and overestimate swap prices, particularly on longer-dated speculative grade credits. Indeed, this was confirmed by Houweling and Vorst (2001), who use the RFV assumption.

### **Pricing multi-name portfolio CRT instruments**

There is not really an ABS theoretical pricing literature,<sup>40</sup> but the CDO pricing literature is growing rapidly. However, in either case, the empirical literature is very lean. Several key conclusions stand out in almost all the multi-name literature:

- Default risk explains such a small part of observed corporate bond spreads that there are serious doubts as to whether a multi-name product pricing model can even be built on conventional credit risk pricing foundations.
- “Currently the weakest link ... is the availability of empirical data that would bear on the correlation, actual or risk neutral, of default.” (Duffie and Garleanu (2001)).

Market pricing practice for pricing ABSs and CDOs seems to revolve around either the re-rating or option-adjusted spread (OAS) approach.<sup>41</sup> Re-rating approaches infer a credit rating from an analysis of the underlying collateral,<sup>42</sup> the collateral manager and any credit/liquidity enhancements. The inferred ratings are then used to price the ABS off similarly rated fixed income securities. The OAS approach, described in such practitioner publications as Hayre (2001), essentially projects all of the ABS cash flows, and discounts them back using rates that reflect the ABS's credit and liquidity risk, plus prepayment risk. Mina (2002) presents a case study of such an approach applied to CDO pricing. However, it would not appear that anyone has empirically tested either approach.

A third approach, applicable primarily to the pricing of CDOs, essentially equates price to the sum of the market values of the constituent parts. Duffie and Garleanu (2001) present such a model, although Mashal (2002) says that such risk neutral “reverse-engineering” models are fundamentally flawed, because of the large size of the non-default-risk components imbedded in the prices of typical corporate credits

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<sup>40</sup> Childs et al (1996) used a contingent-claims pricing methodology to examine MBS pricing dynamics, but they did not attempt to test it empirically.

<sup>41</sup> Prior to the development of OAS-type ABS pricing methodologies market practitioners used “average life” approaches, whereby some sort of average prepayment parameters were used to determine a single cash flow vector that was then discounted back using risk-free spot rates (Dunn and McConnell (1981)).

<sup>42</sup> Cifuentes and O'Connor (1996) describe the process by which Moody's calculates the “diversity scores” for CDOs by which a portfolio of correlated assets is mapped into a pseudo-portfolio of uncorrelated assets. Davis and Lo (1999) have developed an “infectious default” contagion model of default correlation.

Although none of these approaches have been subject to rigorous empirical testing, there is a fairly extensive investment banking “literature” that focuses on the apparent “free lunch” in the CDO market, whereby CDOs trade consistently cheap relative to corporate bonds of the same credit rating. Most point to the relative illiquidity of CDOs versus corporate bonds as the main reason, but King (2002) posits that some of this may relate to an imperfection in the market for corporate bonds that the CDO tranching process arbitrages. Basically, it is said that the market overprices very low-rated and very high-rated corporate bonds due to a market segmentation effect which puts many investors at the extreme ends of the credit risk spectrum. (That is, many are constrained to buy only AA-rated loans and bonds, while many others are constrained to buy exclusively high-yield assets.) Hence, “middling” quality assets (rated A through BB) trade with enormous illiquidity premia. In the CDO portfolio creation and tranching process, these “surplus” illiquidity premia can be shared amongst the high-grade and high-yield tranches, and the originating bank.

Most of these rationales would apply to synthetic CDOs, although as shown in Goodman (2002) enhanced opportunities for regulatory arbitrage (versus “cash” CDOs) could provide an even larger surplus to share around.

Most of the recent multi-name credit derivative pricing literature basically refines the techniques put forward by Li (2000) that uses the method of copulas to model the connections between the marginal default probability distributions of the underlying credit risks (see Mashal and Naldi (2002a,b) and Schmidt and Ward (2002)).

### **III.5 Macro issues**

#### ***Conduct of monetary policy***

The empirical analysis in Estrella (2002) shows that mortgage securitisation has made US output less sensitive to monetary policy. In the spirit of the Bernanke and Gertler (1995) bank lending channel monetary policy transmission mechanism theory, he posits that securitisation mutes the impact that monetary policy tightening is supposed to have on banks’ ability to fund themselves, and hence provide loans.

However, Stanton (2002) warns that this conclusion is not applicable to all securitisation activity. There are reasons to suspect that the impact of non-mortgage securitisation would be different. For example, Stanton (1998) and Minton et al (1999) show banks and industrial firms securitise more during recessions, whereas mortgage securitisation tends to decline during recessions. In fact, Stanton (1998) goes on to say that “procyclicality and cross-sectional differences in lending activity should become less severe as markets for securitised loans develop”.

#### ***Interactions between CRT and other markets***

The discussion in Sections 1 and 2 has noted that whereas CRT markets help to complete incomplete credit markets, individual CRT instruments embody differing characteristics and thus vary in their impacts on financial markets. This suggests that the introduction of a new type of CRT instrument can have an impact not only on the underlying market for loans or bonds but also on the markets for other CRT instruments. Morrison (2002) notes that according to practitioners, credit derivatives possess two advantages compared with secondary loan markets: first, they facilitate portfolio diversification management as they are more easily traded and, second, they protect their relationships rents.

Duffee and Zhou (2001) represent one of the only papers to study interactions between CRT markets. These authors analyse the effect of introducing a market for CDSs when a market for loan sales already exists. One of the differences in the characteristics of CDSs and loan sales drives the results of Duffee and Zhou; namely, loan sales (without recourse) require credit risk to be transferred for the full term of the loan, while CDSs allow credit protection to be purchased for a period less than the life of the loan. As noted in Section 2, this difference can be important if the structure of asymmetric information between the lender and protection seller varies over the life of the loan. Duffee and Zhou assume that the quality of the borrower (which is known to the lender but not to the protection seller) has no effect on the borrower’s default probability during the early period of the loan but does affect the default probability later in the life of the loan. Thus, credit protection through a CDS can be purchased during the early time period without creating a lemons problem.

Duffee and Zhou show that, under these assumptions, the introduction of a CDS market can have a significant effect on equilibrium in the loan sale market. For certain cases (corresponding to particular model parameter values), the introduction of a CDS market will result in a reduction in the quantity of loans that are sold, and the average quality of loan sold will be lower. For those loans which would have been sold in the absence of the CDS market, the lender now uses a CDS to purchase protection during the early period of the loan. However, because the CDS only covers a portion of the life of the loan, the total amount of credit protection purchased is now less than it would have been in the absence of the CDS market. On the other hand, in other cases (corresponding to different model parameter values) introduction of the CDS market allows protection to be purchased in the early period for loans for which no loan sale would have occurred in the absence of the CDS market. In this case, the CDS market causes the total amount of credit protection to increase, since loans for which CDSs are used would not have been sold in the absence of CDSs. The ultimate effect on welfare of the introduction of the CDS market will thus depend upon the relative importance of each of these cases.

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## **Appendix 6: Credit risk transfer of loans to small and medium-sized enterprises (SMEs): some case studies**

### **I. Germany**

Although on a path towards consolidation, the German banking system is still characterised by a substantial number of small savings and mutual banks. These institutions have a regional base so that their loan portfolios are concentrated geographically. In principle, CRT techniques should be especially appealing to these banks as a means for diversification.

In fact, making use of their large overall share of the market for loans to SMEs, savings banks have started to address the management of credit risk with a cooperative approach. However, the efforts are still at a relatively early stage and volumes transferred are still low. The Deutsche Sparkassen- und Giroverband, for example, has started a project in which loans of regional savings banks are aggregated in a centralised basket within the banking group which - benefiting from diversification effects - offers a better risk/return profile than the respective single loan portfolios of the participating banks. From this basket, savings banks can draw portions according to the amount they have contributed to it. The main purpose of such transactions is a better risk diversification within the banking group; regulatory capital benefits are not a significant factor. Potential incentive and asymmetric information issues are addressed within the group mainly by common credit risk management standards, reporting requirements and a narrow default definition. Furthermore, savings banks are only permitted to shed a limited part of their overall exposure to a borrower to the centralised pool.

Capital savings considerations are, however, relevant in an initiative by Kreditanstalt für Wiederaufbau (KfW), Germany's leading promotional bank. KfW has established a securitisation programme ("Promise", Programme for **M**ittelstand **L**oan **S**ecuritisation) primarily aimed at banks broadening their (SME) corporate lending (see the diagram below). In a Promise transaction, an originating bank sells the credit risk of its reference loan portfolio - comprising promotional loans to SMEs - to KfW, which serves as a credit default swap counterparty.

Typical synthetic securitisations through this programme involve tranching of risks by KfW acting as risk intermediary. Whereas the super-senior tranche is placed directly on the market by a credit default swap (CDS) with a counterparty, the risk of the senior and mezzanine tranches is transferred to a special purpose vehicle (SPV) either synthetically (by CDSs) or by issuance of securities. The SPV issues credit-linked notes to place these tranches on the market. The junior tranche with the first-loss position is either placed directly on the market by a CDS or - like the senior and mezzanine tranches - is transferred to the SPV and issued as a credit-linked note. As the junior tranche is regularly taken back by the primary lender, the originating bank benefits from regulatory capital savings by a partial credit risk transfer to the market, but retains a substantial interest in the loan.

Between December 2000 and September 2002, seven deals accounted for the securitisation of loans worth €11.4 billion. So far, this KfW programme has been used by large and medium-sized banks in single seller transactions, but it is intended that the bundling of credit portfolios should extend to multi-seller transactions as well. This procedure would further open the door to the risk transfer segment of capital markets for smaller banks with less diversified loan portfolios.

### **II. Japan**

In the second half of the 1990s, the credit intermediation function of the Japanese banking sector was strained because the non-performing loan problem had been weighing heavily on banks. Public authorities and market participants reacted by seeking ways to mitigate constraints on corporate financing, especially for SMEs, and to facilitate smoother financing of business activities. The idea is to reinforce the mechanism whereby abundant funds provided by investors are directly funnelled to meet the funding needs of non-financial firms.

In practice, until recently, only large firms could enjoy the benefits of securitisation techniques. One constraining factor in the financing of Japanese SMEs is the scarcity of assets that can be used to support both bank loans and fund-raising via securitisation. On the other hand, SMEs, which account for 99.7% of all Japanese firms, currently hold ¥74 trillion in receivables (out of ¥191 trillion held in total by all Japanese firms) and these remain almost unutilised.

In view of this potential, the Small and Medium-sized Enterprise Agency introduced a system whereby credit guarantee corporations could provide guarantees for bank loans collateralised by receivables. Several programmes have been launched in the form of CLOs against these guaranteed loan pools. As an extension of these CLOs, other programmes are now being developed in which receivables are used as reference assets. In these transactions, receivables from a number of SMEs are pooled and transferred to an SPV, which issues ABCP. Although banks may be involved as arrangers, these structures enable firms to raise funds from a wider range of investors without relying on banks, whose risk-taking capacity is generally constrained under the current environment surrounding the Japanese banking system.

### **III. Switzerland**

Although in a phase of consolidation, the Swiss banking system is still characterised by a substantial number of small, regionally operating banks (SRBs) such as savings and loans and cooperative banks. Their main activity is mortgage and commercial credit business to SMEs. Diversification and funding seem to be the major factors that make CRT techniques appealing to these institutions.

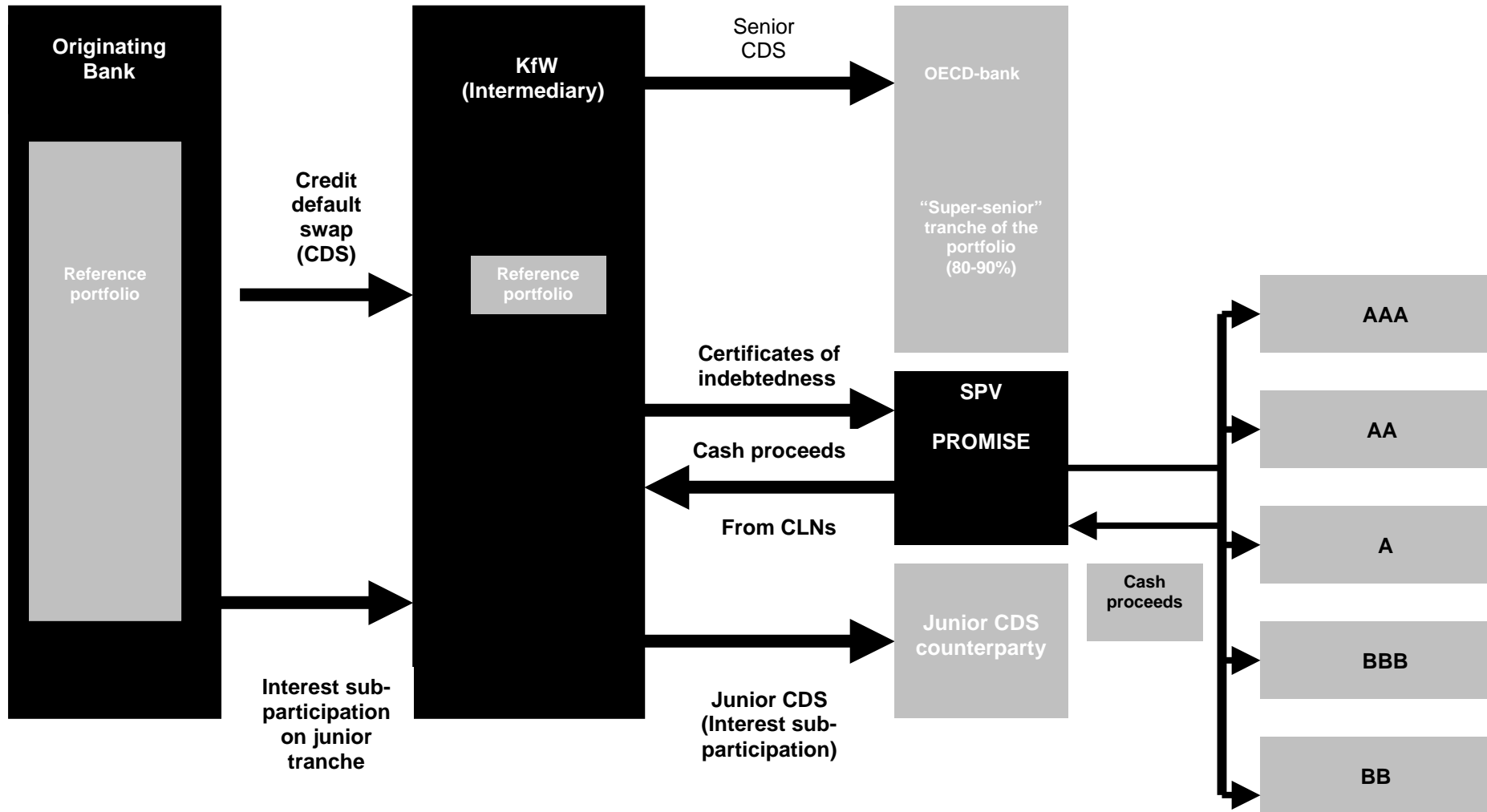
SRBs operate on a regional base so their loan portfolios are not well diversified geographically. Syndicated loans are one solution: large credits are subdivided amongst several small or one small and one large bank. Another approach is the transfer of credit risk - funded or unfunded - to a "central bank" within the group, which manages its own credit portfolio.

SRBs usually have no direct access to capital markets. As other forms of savings have become more popular, funding by savings deposits has become potentially more difficult. The funding aspect is particularly relevant for mortgage securitisations. A large number of SRBs have standardised their contracts and procedures to facilitate securitisation of mortgages, possibly through the "Pfandbrief-Bank", which already provides funds to SRBs through the issuance of bonds (Pfandbriefe). The programme has not started yet, as the funding situation for SRBs seems to be comfortable at the moment. But securitisation is likely to become an alternative to funding through deposits, should the current situation change.

In addition, market pressure - exerted by larger, more sophisticated banks - as well as regulatory changes in general, and the development of Basel II in particular, have forced SRBs to cooperate in the area of credit risk measurement and internal rating systems. To that end, two groups of SRBs have developed tools for the systematic evaluation of credit risk. These are based on models and allow for a detailed rating classification. They are used by all members of the group, partly for risk assessment, and partly for risk-adjusted pricing.

These developments are prerequisites for the use of credit risk transfer instruments. For the time being, the actual use of CRT techniques is at a low level. The main reason for this is the cost attached to CRT techniques, ie the cost of adapting the processes, documentation and IT systems, as well as legal costs (setting-up of contracts, SPVs and ratings). The further development of credit risk management techniques within the SRB sector will lower these costs and make CRT more attractive.

## Key elements of a typical “Promise” transaction





**Annex:**  
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