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Credit Derivatives

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- *Credit derivatives are contracts that transfer an asset's risk and return from one counterparty to another without transferring ownership of the underlying asset. The global market for credit derivatives is still quite small compared with other derivatives markets, but it is growing rapidly. A number of impediments could slow the growth of this market, most of which revolve around the complexity involved in pricing and documenting these transactions.*
- *Commercial banks are the major participants in the credit derivatives market. Banks use these transactions to diversify their portfolios of loans and other risky assets. Credit derivatives have also been used to reduce credit-risk exposure in circumstances where banks consider the regulatory capital charges levied on this exposure to be disproportionately large.*
- *Canadian banks are relatively small players in the global market for credit derivatives. One possible reason for their lower profile could be their large nationwide branch networks, which allow them to mitigate credit-risk concentration without using derivatives.*
- *While there is a possibility that credit derivatives could distort existing risk-monitoring and risk-management incentives, these transactions are likely to enhance the overall liquidity and efficiency of markets by improving the ability of market participants to optimize their exposure to credit risk.*

Credit derivatives are swap, forward, and option contracts that transfer risk and return from one counterparty to another without actually transferring the ownership of the underlying assets. Similar products have been around for centuries and include letters of credit, government export credit and mortgage guarantees, private sector bond reinsurance, and spread locks.[1] Credit derivatives differ from their predecessors because they are traded separately from the underlying assets; in contrast, the earlier products were contracts between an issuer and a guarantor. Credit derivatives are an ideal tool for lenders who want to reduce their exposure to a particular borrower but find themselves unwilling (say, for tax- or cost-related reasons) to sell outright their claims on that borrower.

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Types of Credit Derivatives

The three major types of credit derivatives are default swaps, total-rate-of-return swaps, and credit-spread put options. These transactions can all be structured as off-balance-sheet derivatives contracts embedded in a more traditional on-balance-sheet structure, such as a credit-linked note.

1. Letters of credit and bond reinsurance are very similar. In both instances, an issuer pays a bank (in the case of a letter of credit) or a reinsurance company (in the case of bond insurance) to cover or guarantee debt repayments on a particular issue or issuance program. Spread locks are contracts that guarantee the ability to enter into an interest rate swap at a predetermined rate above some benchmark rate.

Default swaps transfer the potential loss on a "reference asset" that can result from specific credit "events" such as default, bankruptcy, insolvency, and credit-rating downgrades. Marketable bonds are the most popular form of reference asset because of their price transparency. While bank loans have the potential to become the dominant form of reference asset (because of their sheer quantity), this is impeded by the fact that loans are more heterogeneous and illiquid than bonds.[2]

Default swaps involve a "protection buyer," who pays a periodic or upfront fee to a "protection seller" in exchange for a contingent payment if there is a credit event (Chart 1a). Some default swaps are based on a basket of assets and pay out on a first-to-default basis, whereby the contract terminates and pays out if any of the assets in the basket are in default. Default swaps are the largest component of the global credit derivatives market.[3]

Total-rate-of-return swaps (TRORSs) transfer the returns and risks on an underlying reference asset from one party to another. TRORSs involve a "total-return buyer," who pays a periodic fee to a "total-return seller" and receives the total economic performance of the underlying reference asset in return. "Total return" includes all interest payments on the reference asset plus an amount based on the change in the asset's market value. If the price goes up, the total-return buyer gets an amount equal to the appreciation of the value, and if the price declines, the buyer pays an amount equal to the depreciation in value (Chart 1b). If a credit event occurs prior to maturity, the TRORS usually terminates, and a price settlement is made immediately.[4]

Credit-spread put option contracts isolate and capture devaluations in a reference asset that are independent of shifts in the general yield curve. Essentially, they are default swaps that stipulate spread widening as an "event" (Chart 1c). The spread is usually calculated as the yield differential between the reference bond and an interest rate swap of the same maturity.[5] Unlike default or total-rate-of-return swaps, counterparties do not have to define the specific credit events—the payout occurs regardless of the reasons for the credit-spread movement. Spread puts usually involve the "put buyer" paying an upfront fee to a "put seller" in exchange for a contingent payment if the spread widens beyond a pre-agreed threshold level.

Chart 1a

A Default Swap

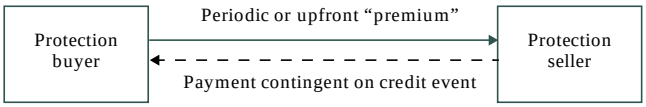


Chart 1b

A Total-Rate-of-Return Swap

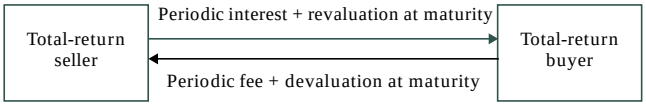


Chart 1c

A Credit-Spread Put Option

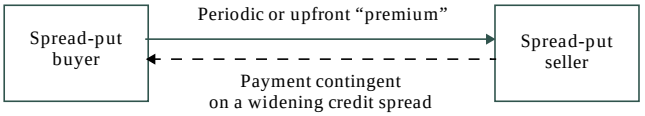
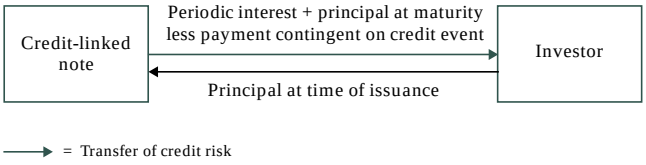


Chart 1d

A Credit-Linked Note



2. Armstrong (1997) discusses recent trends in Canadian banking, particularly in the area of securitization.

3. Surveys by the British Bankers' Association (2000) and Hargreaves (2000) both concluded that default swaps were the largest single component of the credit derivatives market at the end of 1999 (based on the outstanding principal amounts of underlying reference assets).

4. Some contracts allow for optional physical delivery of the reference asset or a pre-agreed substitute asset.

5. Yield spreads are often calculated against government bonds, but such spreads implicitly measure a combination of credit risk and liquidity preference (see Miville and Bernier 1999). Calculating the spread against the swap curve more effectively isolates changes to the perceptions of credit risk. See Fleming (2000) for a U.S. perspective on the government bond versus swap curve "benchmark" issue.

The advantage of the spread put's detachment from defined credit events became particularly apparent during the periods of turmoil in Asian, Latin American, and eastern European financial markets during the late 1990s, where spreads widened dramatically in the absence of any "event" as defined in typical default-swap documentation. However, credit-spread derivatives can be difficult to hedge and very complicated to model and price, and most investors and hedgers can accomplish their objectives with cheaper default swaps (Bowler and Tierney 1999).

Credit-linked notes are securities that effectively embed default swaps within a traditional fixed-income structure. In return for a principal payment when the contract is made, they typically pay periodic interest plus, at maturity, the principal minus a contingent payment on the embedded default swap (Chart 1d).

Market Size and Major Participants

The credit derivatives market is relatively small compared with other, more mature, derivatives markets (e.g., derivatives markets for interest rates and currencies), and represents about 1 per cent of the underlying principal (or "notional") value of the global volume of over-the-counter derivatives.[6] However, it is growing rapidly, reflecting the fact that credit derivatives have proven to be a very useful means of managing the relatively large and growing volumes of credit risk that global markets deal with on a daily basis.[7, 8]

Several observers have suggested that global markets are faced with much larger exposures to credit risk (than to interest rate or currency risk). They therefore suggest that the credit derivatives market has virtually unlimited growth potential. This enthusiastic assessment, however, overlooks a number of practical difficulties. First, the documentation underlying these transactions can be quite complex and lengthy, and the interpretation of credit-event clauses (i.e., determining whether or not a contingent payout has been triggered) can be difficult. Second, the market for these derivatives is not perceived to be very liquid (with infrequent trading in specific credits) or transparent (given the over-the-counter structure of the market and the relatively small number of market-makers who actively quote and disseminate prices). In addition, credit risk will always be a less standardized and more complex "commodity" than interest rate and currency risks (whose homogeneity has helped propel the growth of other derivatives markets). Finally, a number of market participants have suggested that regulatory capital charges on credit derivative positions, particularly when they are being used in a hedging context, make credit derivatives a prohibitively expensive hedging tool (Box 1).

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Still, a number of recent developments should facilitate the growth of this market. For example, in 1999 the International Swaps and Derivatives Association (ISDA) introduced new, streamlined default-swap documentation that should reduce the likelihood of interpretation disputes. The recent launches of two Internet trading platforms for credit derivatives (CreditTrade — *http://www.credittrade.com* and Creditex—*http://www.creditex.com)* could bring some much-needed transparency to the credit derivatives market.[9] The European Credit Swap Index, launched in March 2000 by J.P. Morgan, tracks default-swap premiums on about 100 European corporations. Finally, in April

6. Hargreaves (2000) estimated the outstanding notional value of credit derivatives markets at between US$400 billion and US$1,000 billion as of the end of 1999, while the British Bankers' Association (2000) estimated the size of credit derivatives markets at US$586 billion as of the end of 1999. By comparison, the Bank for International Settlements (2000) reported that the total notional value of outstanding over-the-counter foreign exchange and interest rate derivatives stood at US$74,000 billion at the end of December 1999.

7. The steady decline in the overall relative size of the government bond market from 62.1 per cent of the world bond market in 1990 to 54.3 per cent at the end of 1999 (Basta et al. 2000) has increased the credit-risk profile of outstanding global debt.

8. According to the U.S. Office of the Comptroller of the Currency (OCC), the outstanding notional amount of credit derivatives reported by U.S. commercial banks almost doubled from the end of 1998 (US$144 billion) to the end of 1999 (US$287 billion).

9. Both CreditTrade and Creditex are backed by major market participants. CreditTrade features major involvement from The Chase Manhattan Bank and Prebon Yamane (a leading over-the-counter financial market broker). Creditex's backers include J.P. Morgan, Deutsche Bank, Bank of Montreal, and Canadian Imperial Bank of Commerce.

Box 1: The Regulatory Landscape

Banking supervisors have been supportive of the credit derivatives market within the confines of their interpretations of the BIS regulatory capital framework. Broadly speaking, the regulatory treatment of credit derivatives depends on whether the position is "uncovered" or hedges an existing position. The regulatory capital charge on an uncovered position is generally the same as the charge on an equivalent cash position in the reference asset. For example, the sale or purchase of protection on a corporate bond that draws an 8 per cent capital charge, would also draw an 8 per cent charge.[1]

The capital charge on an existing position that is hedged with an offsetting credit derivative can be reduced to the charge associated with the counterparty, if the counterparty is more creditworthy than the issuer of the reference asset (within the BIS credit-risk framework). For example, if a corporate bond held in the banking book (on which the capital charge is 8 per cent) is offset by a matching credit derivative with an OECD bank (on which a 1.6 per cent charge applies), the capital charge on the bond is reduced to 1.6 per cent. Essentially, the credit risk of a properly matched position is deemed to relate primarily to the potential for default by the derivative counterparty.[2]

A number of market participants have suggested that the counterparty-risk charges on positions that are deemed to be matched are too high. They argue that the purchaser of protection will face a loss only if the reference asset and the seller of the protection default simultaneously. As a result, they believe that historical default correlations should be used to recognize this "added" level of protection. However, given that default correlations have proven to be quite unstable over time, banking supervisors remain justifiably skeptical about the extent to which these correlations could be used to reduce capital charges on matched positions.

1. The regulatory rules discussed in this note relate primarily to "banking-book" positions. Buy-and-hold positions are held in the banking book, and positions that are held for potentially short-term horizons and marked to market are held in the "trading book." However, the thrust of the rules is the same for both banking-book and trading-book positions. For more detail on Canadian regulatory rules, see Office of the Superintendent of Financial Institutions (OSFI) (1999).

2. To obtain relief from regulatory capital by using a credit derivative hedge, the transaction must meet certain criteria for effectiveness and permanence. For Canadian practitioners, these criteria are detailed in the OSFI (1999) regulatory rules.

2000, Standard and Poors launched a series of U.S. corporate credit-spread indexes that could form the basis for a more generic and useful style of credit-spread put option.

Commercial banks account for over half the trading activity in the market for credit derivatives. Trading is concentrated among a small number of institutions, which is not unusual for off-balance-sheet derivatives.[10] Anecdotal evidence suggests that market activity is concentrated in, and about evenly split between, London and New York. Insurance companies and securities dealers account for most of the remaining activity, insurance companies being particularly active sellers of protection.

Anecdotal evidence also suggests that Canadian banks have been slower to embrace credit derivatives than their international counterparts. Reasons cited for the slow emergence of credit derivatives in Canada include the Canadian banks' access to cost-effective funding through their retail deposit base, as well as their ability to achieve a broad diversification of credit risk internally through their national branch networks. However, competition from global financial institutions may put pressure on Canadian banks to increase their activity in credit derivatives markets to allow them to offer similar services to their clients.

10. In terms of concentration of business, the OCC estimates that five banks accounted for 95 per cent of the total notional outstanding credit derivatives contracts reported by U.S. commercial banks at the end of 1999, with Morgan Guaranty Trust accounting for 57 per cent and Citibank for 14 per cent. By comparison, the OCC reported that five banks accounted for 91 per cent of outstanding interest rate and currency swaps. The British Bankers' Association (2000) survey found that banks and securities houses were both the largest buyers of protection (with an 81 per cent market share) and the largest sellers of protection (with a 63 per cent market share) at the end of 1999.

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Most credit derivative transactions are written on non-sovereign reference entities. According to the British Bankers' Association (2000), transactions written against sovereign reference entities comprised only 20 per cent of the market at the end of 1999, with corporate and bank assets comprising 55 per cent and 24 per cent, respectively.

How Credit Derivatives Are Used

Credit-line management and "regulatory arbitrage" are two of the most important applications of credit derivatives motivating market participants to purchase protection against credit risk. Funding arbitrage and product restructuring are important factors that motivate market participants to sell protection against credit risk.

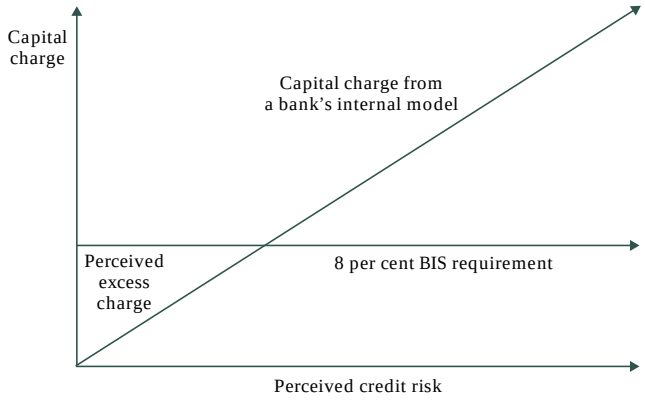
Credit-line management is particularly relevant for dealing with situations where a bank is over-concentrated in loans to companies in specific sectors of the economy, for example, because it has a comparative advantage in originating loans in those sectors. While concentration risk can be mitigated by other means (such as selling loans in the secondary market or originating loans in non-traditional sectors), there are advantages to using credit derivatives for this purpose. To begin with, loan sales can potentially damage valuable client relationships (i.e., clients may resent the fact that their bank is reducing its exposure to them, seeing this as a signal that the bank has diminished faith in their creditworthiness). Second, the origination of loans in non-traditional sectors can expose the bank to new risks. Credit derivatives can help banks to diversify their loan portfolios more cost-effectively, without damaging client relationships.

Credit derivatives can also be used for regulatory arbitrage, which is motivated by the one-size-fits-all capital charge structure imposed by national regulators according to the rules set out in the Bank for International Settlements "Capital Accord" (BIS 1988). Most bank loans, for example, require that 8 per cent of a loan's book value be charged against capital. In contrast, many of the larger banks use internal credit-risk models that indicate a wide range of applicable capital charges based on borrowers' creditworthiness. These banks thus have an incentive to off-load credit-risk exposure on those loans for which the internally generated capital charge is lower than the 8 per cent regulatory requirement (i.e., to divest themselves of relatively "low-risk" loans that would otherwise dilute the bank's return on capital).[11] Chart 2 shows a bank's gain from such arbitrage in the triangle labelled "perceived excess charge."

Chart 2

Hypothetical Capital Requirements

As a percentage of book value

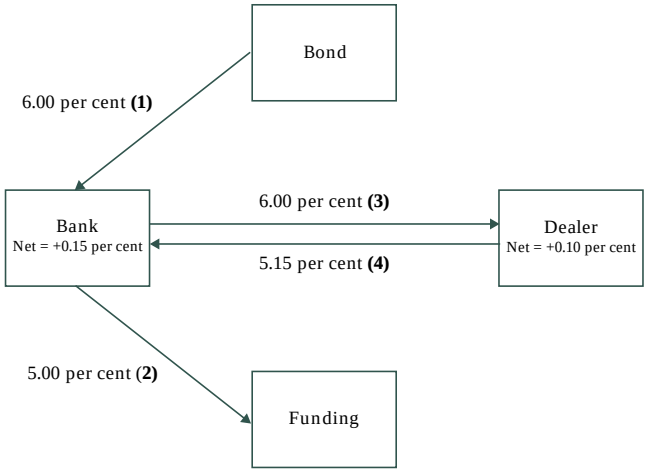


Credit derivatives can be used to facilitate a type of funding arbitrage in which low-funding-cost banks "rent" some of their comparative advantage to high-funding-cost investors (such as hedge funds and securities firms) in return for credit-risk mitigation. For

11. For example, consider a bank that wishes to off-load its exposure on a loan made to a AA-rated corporation (such loans face a capital charge of 8 per cent). The bank purchases protection on the AA-rated corporation from a lower-rated OECD-regulated bank (all OECD-regulated banks draw a 1.6 per cent charge, regardless of their credit rating). This transaction will improve the bank's return on capital as long as the return on the "freed-up" capital (by moving to a 1.6 per cent capital charge from an 8 per cent capital charge) exceeds the fee charged by the commercial bank. Some regulators—including Canada's Office of the Superintendent of Financial Institutions (OSFI)—have, however, limited the extent to which banks can engage in these activities by insisting that the protection seller must have a credit rating at least as high as that of the reference asset in order for the purchase of protection to be recognized. In the above example, then, the OECD-regulated bank selling protection would need to have at least a AA credit rating for regulators to recognize the hedging benefits of a protection purchase.

Chart 3

An Example of Funding Arbitrage Using a Total-Rate-of-Return Swap



example, Chart 3 shows a situation in which a bank buys a risky bond that pays 6.00 per cent **(1),** funds it at 5.00 per cent **(2)** and enters into the pay side of a total-rate-of-return swap with a dealer (who faces a higher funding rate of 5.25 per cent). The dealer receives the 6.00 per cent total rate of return on the bond **(3)** and, in return, pays 5.15 per cent to the bank **(4)**. The bank improves its risk profile and earns 0.15 per cent (since it borrowed at only 5.00 per cent and is effectively lending the dealer funds at 5.15 per cent), but now has counterparty exposure to the dealer. The dealer earns a net 0.85 per cent rate of return on its risky bond position, which is 0.10 per cent higher than if it had conducted the transaction on its own (see Chart 4, in which the dealer purchases the risky bond **(5)** and funds itself at 5.25 per cent **(6)**), but now has counterparty exposure to the bank. In essence, the bank could charge the dealer a lending rate anywhere between 5.00 per cent and 5.25 per cent, leaving both counterparties better off. In practice, the incremental revenue that both the bank and dealer receive must compensate them for the added counterparty credit risk they bear by undertaking this transaction. Box 2 generalizes some of these ideas and applies them to default swaps.

Chart 4

Rate of Return to a Dealer Not Using a Credit Derivative

On the product-structuring side, credit derivatives facilitate the creation of risk/return profiles that may be either too expensive or impossible to achieve in cash markets.[12] For example, suppose that an investor wishes to purchase a 5-year bond issued by the Government of Brazil and denominated in euros. If no such asset exists, the investor could purchase a 5-year bond issued by the Republic of Germany and denominated in euros. Simultaneously, the investor would sell 5-year default protection on the Government of Brazil. By entering into these transactions, the investor will receive regular coupon payments on the German bonds *plus* a periodic fee for the default protection it has sold to its credit derivative counterparty. In exchange for this periodic fee, the investor will face a loss (i.e., be forced to make a payment to its credit derivative counterparty) if Brazil were to default on its debt. The profile of net risk and return for these transactions is very similar to a 5-year, euro-denominated bond issued by Brazil (in which investors would receive a slight premium vis-à-vis the German government bonds but face a loss if Brazil were to default on its debt).[13]

Potential Risks Associated with Credit Derivatives

Credit derivatives offer many benefits. If used inappropriately, however, they can exacerbate some of the risks that market participants regularly face. Moreover, the use of credit derivatives can potentially distort existing risk-monitoring and risk-management incentives.

While regulatory arbitrage may lead to a more appropriate allocation of capital (premised on the assumption that the flat capital charges outlined in the 1988 BIS Capital Accord may not be optimal), there is a risk

12. Das (1998) provides a complete list of potential structuring and investment applications.

13. The default risk on the German bond position is assumed to be trivial and has been ignored in this example, but one could mitigate even this risk by purchasing protection against a German government default.

Box 2: Some Basic Pricing Economics for Credit Derivatives

The pricing of a credit derivative is closely tied to funding costs. The total-rate-of-return swap is an obvious case, being not much more than a synthetic financing transaction or lease. Hence, the periodic fee on total-rate-of-return swaps should be below the rate at which the total-return buyer can fund the reference asset. Since the total-return seller is effectively selling the underlying asset, the swap fee should be above the rate at which the seller can invest funds.

Pricing a default swap is more complex because its economic performance is tied to specific credit events. However, if it is assumed that the terms of the default swap cover all "events" that would affect the total rate of return on the underlying reference asset, a protection sale can be viewed as being equivalent to a fully funded long position in the reference asset. Hence, the premium should be closely related to the spread between the expected total rate of return on the reference asset and the funding cost.

The wider the gap between the buyer's marginal funding cost and the seller's marginal reinvestment rate, the greater should be the incentive to trade credit derivatives. The ideal counterparties would therefore be high-cost funders (like hedge funds) and highly rated banks with easy access to low-cost funding. Note that the incremental revenue associated with these transactions must sufficiently compensate both counterparties for the additional counterparty credit risk that they must bear.

that this activity can lead to an increase in banks' risk profiles. This is because banks engaged in regulatory arbitrage are effectively off-loading low-risk assets and retaining higher-risk assets (in a manner consistent with their own internal risk-assessment models). The net impact of this activity (i.e., the extent to which banks are left with too much or too little capital) depends on the how well banks' models reflect the true risks of the aggregate loan portfolio, compared with the flat 8 per cent BIS charge.

More specifically, if individual banks' specialized models of risk and required capital are more accurate than the regulators' simpler model, then such arbitrage can allow banks to obtain a better risk-return trade-off with no adverse systemic consequences. The Basle Committee on Banking Supervision has proposed a new capital-adequacy framework (which would replace the 1988 BIS Capital Accord) that should reduce the incentives for regulatory arbitrage. The proposed framework moves away from the current generic capital charges and towards charges based on the ratings assigned by external credit-rating agencies. Such charges could range from 1.6 per cent for top-rated credits to 12.0 per cent for bottom-rated credits. This framework may also allow banks to use their own risk-assessment models to compute capital charges.[14]

Another potential downside of credit derivatives, particularly with respect to credit derivatives on bank loans, concerns loan-monitoring incentives. For any given loan, the originating bank is usually in the best position to monitor the ongoing creditworthiness of the borrower. The bank's incentive to perform this monitoring function will, however, be significantly reduced if the bank subsequently purchases credit protection on this loan via a credit derivative. Whereas loan sales and securitizations are structured so that monitoring incentives are retained by the originator, credit derivatives typically are not.[15] If, how-

14. The proposal was published in June 1999. The cut-off date for comments from interested parties was 31 March 2000, but no implementation date has been set.

15. Gorton and Pennacchi (1995) suggest that, in the case of loan sales, originating banks either retain a fraction of all loans sold or provide buyers with some sort of implicit guarantee. Securitizations often involve credit enhancements by which the originating bank retains some degree of credit risk.

ever, the term to maturity of the credit derivative is shorter than the term to maturity of the loan, monitoring incentives might be maintained because the originating bank retains the risk of late default.[16] Also, a bank that shirks its monitoring responsibilities could suffer reputational damage that would make it costly to transact in this market. At the same time, it is worth noting that, in some cases, monitoring and collection services can be transferred to third parties that specialize in such activities.

However, mitigating some of these risks on a systemic level is the fact that credit derivative transactions could potentially increase total banking system capitalization. For example, in a typical bank-to-bank transaction, the protection buyer reduces its capital charge from 8 per cent to 1.6 per cent, while the protection seller's charge goes from zero to 8 per cent (see Box 1). Hence, in this example, the system-wide capitalization is actually higher by 1.6 per cent of the notional value of the transaction than it was before the transaction. Only if the protection seller is an OECD government or a fully guaranteed agency of an OECD government will there be a reduction in system-wide capitalization (by 6.4 per cent of the transaction).[17] Unfortunately, it is very difficult, based on available data, to determine the net impact on the total capitalization of the banking system.

Scott-Quinn and Walmsley (1998) discuss a number of other potential downsides to the development of the credit derivatives market. They point out that this market could complicate the resolution of a potential default situation, resulting in smaller and delayed recoveries, which could, in turn, distort the default data that risk managers might use to check pricing and measure risk exposure.[18] For example, there could be a temptation, in the middle of a restructuring negotiation, for a protected bank to play "hardball" and trigger a default swap payout, especially if the protection was about to expire.

Credit derivatives should enhance the liquidity and efficiency of markets for risky products by facilitating risk transfer and unbundling.

Thus, despite the certain advantages associated with credit derivatives, there is a risk that these transactions could distort existing risk-monitoring and risk-management incentives. Generally speaking, however, credit derivatives should enhance the liquidity and efficiency of markets for risky products by facilitating risk transfer and unbundling (i.e., by allowing market participants to separate and transparently price and trade credit risk). Credit derivatives may also improve the price-discovery process for credit risk by facilitating the trading of such risks for which cash markets are illiquid or are distorted by various technical factors.

16. See Duffee and Zhou (1999) for a more theoretical discussion of this point and other aspects of the economics of the credit derivatives market.

17. OSFI (1995) assigns a zero charge to obligations of OECD governments and their fully guaranteed agencies, and to obligations of Canadian provincial and territorial governments. On the other hand, insurance companies and other private entities draw a full 8 per cent charge. Hence, protection purchased from such entities provides no capital relief, leaving banking-system capitalization unchanged.

18. Distorted default data would be a particular problem for those who use structural models to manage credit risk. Structural models measure credit risk as a function of estimated default probabilities and post-default recovery rates, so distortions in default data would make back-testing almost meaningless. Nandi (1998) provides a concise summary of various valuation models for default-risky securities.

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