

4. Explain why the ability to separate credit risk exposure from a credit-risky asset is an important driver of market growth.
5. Discuss why legal and operational risks must be considered as part of the overall risk management framework. Give two examples of each type of risk as related to credit derivatives.

CHAPTER 2

Fundamental Credit Derivative Products

INTRODUCTION

We noted in Chapter 1 that the global credit derivative market has expanded rapidly over the past decade in terms of both depth and breadth. The market has also grown in terms of product offerings and innovation. The fundamental “building blocks” that were originally introduced in the mid- to late-1990s have become relatively standard and liquid, and basic product construction and transaction procedures have become widely accepted. The “next generation” of credit derivatives, which creates additional risk/return opportunities for intermediaries and end-users, has started to appear and promises to extend market capabilities even further.

We divide our discussion of credit derivative products into two broad sectors: fundamental credit derivative instruments and structured/synthetic credit derivative instruments. Our focus in this chapter is on the essential credit derivative products introduced in Chapter 1, including asset swaps, credit default swaps, credit spread forwards, total return swaps, basket swaps, and credit spread options. We also consider certain innovations and extensions, including asset swap switches, asset swaptions, CDS index swaps, first to default baskets, senior baskets, and subordinated baskets. We will build on this base in the next chapter when we consider various structured and synthetic credit derivative assets.

ASSET SWAP STRUCTURES

The asset swap is often regarded as a pioneering, if somewhat limited, version of the modern credit derivative, enabling participants to trade the credit spreads of selected reference assets; the ability to trade credit spreads via an asset swap suggests that an institution can benefit from spread widening or tightening, just as it might with certain other types of credit derivatives. Asset swaps predate credit derivatives by nearly a decade and remain an integral, and relatively commoditized, element of the capital markets. In this section we consider standard asset swaps, callable and puttable asset swap packages, asset swap switches, and asset swaptions.

Asset Swaps

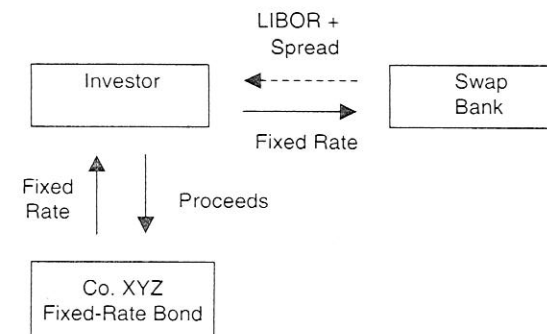
Investors routinely seek to deploy their capital in specific asset classes, currencies, or rates. If appropriate assets already exist in the marketplace, then an investor simply buys the desired asset by funding it through normal sources. However, if the precise characteristics are not available, then the asset can often be created synthetically by combining a host security with an interest rate or currency swap. Similarly, there are times when the asset swap structure can be used to capitalize on market inefficiencies, mispricings, and illiquidity. Both of these factors have proven important drivers of activity over the past two decades.

The corporate capital markets feature an embedded quality differential that allows low-quality issuers to obtain a comparative advantage in the floating-rate markets and high-quality issuers to achieve a comparative advantage in the fixed-rate markets (and an absolute advantage in both markets). Depending on market conditions and the size of the quality differential, investors can therefore purchase high-rated fixed-rate bonds directly, or high-rated FRNs asset swapped into fixed rates; similarly, they can purchase lower-rated FRNs directly, or lower-rated fixed-rate bonds asset swapped into floating rates. For instance, if an investor seeks to invest in Company XYZ's bonds on a floating-rate basis, but XYZ has only issued fixed-rate liabilities, the intermediary can sell the investor the fixed-rate bonds and attach a swap that converts the fixed-rate coupons into LIBOR. In practice the swap flows are adjusted to provide investors with a synthetic investment trading at par with

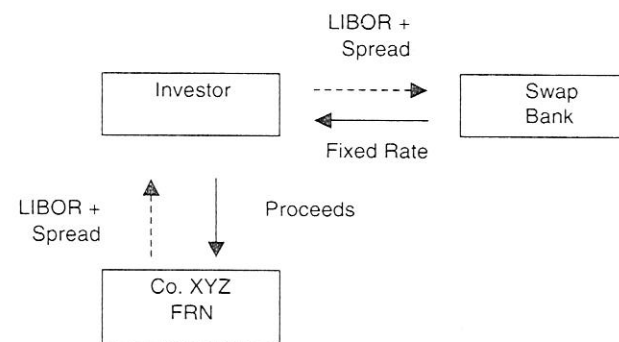
FIGURE 2.1

Asset Swap Packages

(a) Synthetic FRN Investment Package



(b) Synthetic Fixed-Rate Investment Package



a stated yield.¹ Though no specific floating-rate XYZ asset actually exists, the intermediary synthesizes one by combining the fixed bond and the interest rate swap. The reverse transaction is also possible: if XYZ only features LIBOR-based liabilities and an investor seeks a fixed-rate return, the investor can buy the FRN and enter into an associated swap where it receives fixed and pays LIBOR plus a spread. The periodic flows on these fundamental asset swap packages (i.e., after the investor has purchased the asset from the swap bank and entered into the associated swap) are highlighted in Figures 2.1 (a) and (b). Note that the same concept

¹ The adjustments may relate to premium/discount on the underlying asset, as well as any differences in accrued interest.

applies to asset swaps created with currency, rather than interest rate, swaps; in such cases the transaction also involves initial and final exchange of principal, as in any conventional currency swap. Asset swaps involving basis flows (e.g., CP versus LIBOR, EURIBOR versus EONIA) and nonstandard/amortizing/zero-coupon cash flows can also be created. Regardless of the specific structural details, the intent is to provide the investor with an opportunity to benefit from XYZ's credit spread levels and movements. Asset swaps are typically arranged on notional amounts ranging from \$5 million to several hundred million, with maturities extending from approximately 1 year up to 10 years.

Asset swap activity is influenced by a number of factors, including the existence of arbitrage opportunities that permit the development of a synthetic investment at a higher yield, or restrictions that bar the creation of conventional fixed income supply (or which prohibit investors from acquiring certain classes of assets). The arbitrage differential between the asset yield and swap levels must be large enough to provide all parties with economic benefits. The differential is a function of supply/demand for fixed versus floating issues, asset liquidity, new issue supply, and, as noted above, the credit spread differentials between strong investment grade and weak investment grade/subinvestment grade issuers. For instance, an investor seeking to invest in LIBOR + x bp assets funded at LIBOR can do so on an outright basis, assuming it can find appropriate floating-rate assets and its funding levels are set at LIBOR (or sub-LIBOR). However, the investor may be able to take advantage of an arbitrage opportunity and use an asset swap to achieve the same goals. If fixed payments under the swap are less than the payments received from a fixed asset, then a LIBOR + x bp spread is created; if this spread is greater than the spread on a direct FRN purchase (funded at LIBOR flat or sub-LIBOR), then the asset swap arbitrage is effective. For example, if an investor can receive 5.5% on a three-year, fixed-rate bond and LIBOR + 15 bps on a three-year FRN, and can enter into a three-year pay fix/receive LIBOR at 5.25%, the net return on the synthetic asset is LIBOR + 25 bps, or 10 bps more than the direct purchase.

Callable and Puttable Asset Swaps

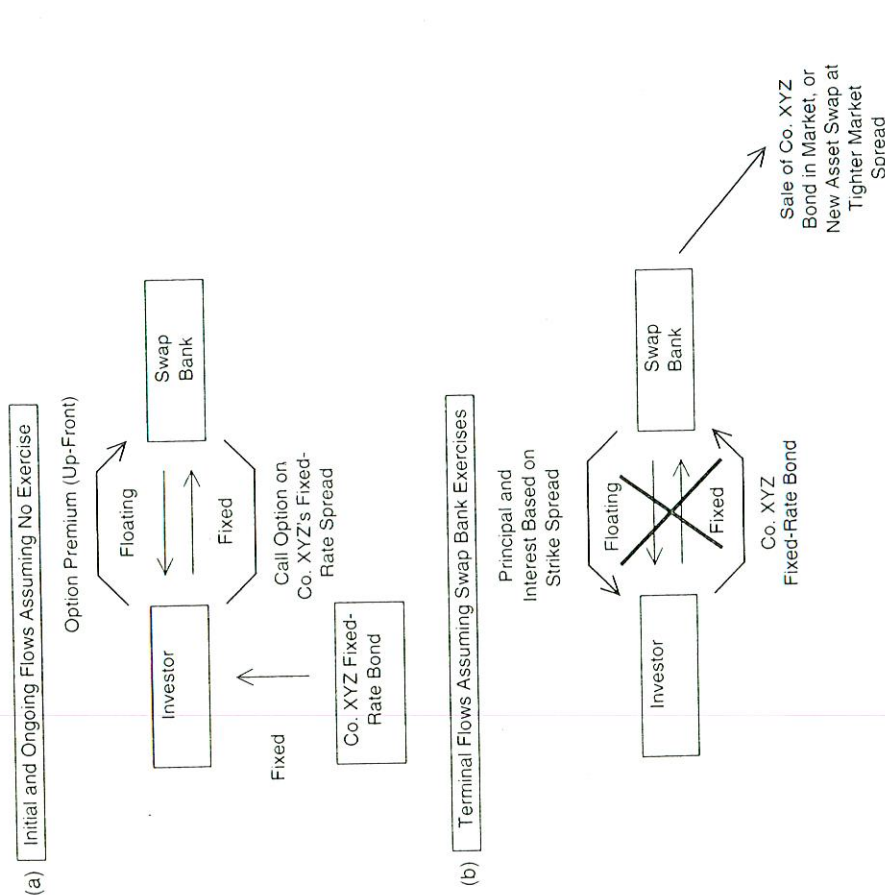
We can now extend our discussion to consider callable and puttable asset swap packages. A callable asset swap (also known as a

remarketable asset swap) is similar to the asset swap package described above, except that the bank selling the package retains a call option on the underlying asset, allowing it to repurchase the asset at a given spread at some future time. The total package can therefore be regarded as a combination of a callable swap (itself a package of a swap and an option) and an underlying fixed or floating-rate bond. The option generally features a European or Bermudan exercise that is synchronized with the coupon dates of the asset. The strike spread is typically set equal to the spread at which the asset is placed with the investor; if the spread tightens during the life of the transaction (e.g., the price of the asset rises as a result of specific or general credit improvements), the bank calls the package away from the investor, delivering cash proceeds equal to the strike spread times invested principal. The bank can then sell the underlying asset in the marketplace at a profit, or enter into a new callable asset swap with a new investor at the tighter market spread; this process helps realize mark-to-market value arising from credit improvement. Naturally, if the spread widens instead of tightens, the swap bank will abandon the option and the investor will preserve its asset swap package until the contracted maturity date. In exchange for giving the bank the right to call away the package, the investor receives an incremental yield that represents the premium from selling the option. This synthetic structure gives both parties specific benefits: the bank preserves the ability, on an off-balance sheet basis, to efficiently crystallize value by liquidating or reselling the structure if asset spreads tighten, while the investor earns an incremental yield for granting the option. The callable asset swap structure (based on a fixed-rate bond) is summarized in Figures 2.2 (a) and (b).

A puttable asset swap functions in a similar way, except that the investor, rather than the bank, retains the option. Specifically, the investor acquires a package comprised of an asset (e.g., fixed-rate bond or FRN) and a puttable swap, where the put allows the investor to sell the asset swap package back to the bank at a predetermined strike spread. As with the callable structure above, the put option generally has a European or Bermudan exercise that is synchronized with the coupon dates of the asset (and, again, the strike spread is typically set equal to the investor's original purchase spread). If the spread widens during the life of the transaction (e.g., the price of the asset falls as a result of specific or general credit deterioration) the investor puts the package to the bank.

FIGURE 2.2

Callable Asset Swap



receiving principal and interest defined by the strike spread. The bank may then retain the asset in its portfolio, sell it in the marketplace, or attempt to arrange a new asset swap structure with another investor at the new (albeit wider) spread level. Depending on carrying value, the bank may or may not post a mark-to-market loss. If the spread tightens, the investor will choose not to exercise the option, thus preserving its package until the contracted maturity date. The investor, in gaining the right to put the package back to the bank, pays an option premium in the form of an up-front payment or a lower yield on the asset swap coupon. As above,

both parties obtain benefits through the synthetic structure: the bank receives incremental income from selling the put option (temporarily or permanently removing the underlying asset from its balance sheet), while the investor obtains de facto downside protection against spread widening on the underlying asset. Note that the puttable asset swap structure is also an essential element of callable bond investing, as investors must be assured that they can terminate the swap component of an asset swap strategy if the underlying bond is called back by the issuer; absent this feature, investors would be left with naked swap positions upon exercise of the bond call. The puttable asset swap structure (based on a fixed-rate bond) is summarized in Figures 2.3 (a) and (b).

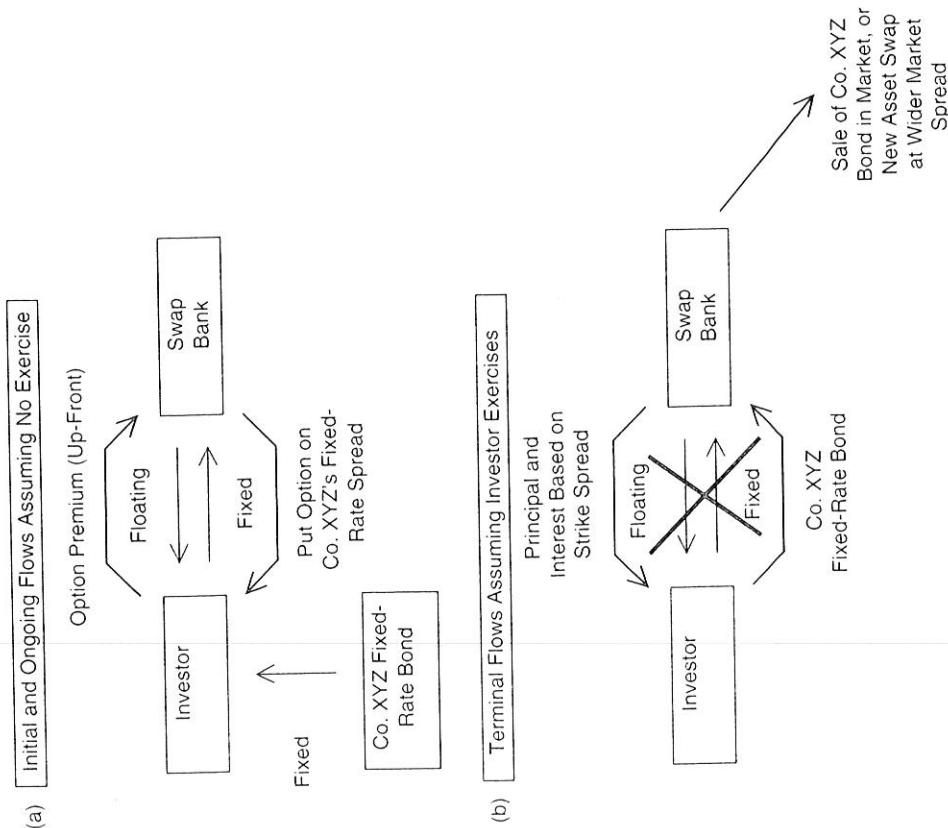
Asset Swap Switches and Asset Swaptions

Asset swap switches involve the exchange of two different asset swap packages. Under the most basic version of this structure, an investor acquires an asset swap package from a bank or financial intermediary and simultaneously agrees to deliver the package and accept another one in return if the spread on the second package widens to a particular strike level; the credit references in the two asset swap packages are generally uncorrelated. By agreeing to switch assets, the investor receives an enhanced yield on its investment. For instance, an investor may own an asset swap package on credit reference ABC at LIBOR + 30 bps and agree with Bank D to exchange it for an asset swap package on reference XYZ, currently trading at LIBOR + 50 bps, if XYZ's trading spread widens to +70 bps. Bank D therefore has the right to put the XYZ package to the investor while simultaneously calling back the ABC package. In order for this transaction to function from an economic perspective, the investor and the bank must have different views on the current and future creditworthiness of ABC and XYZ. For instance, the investor must believe that XYZ represents good value at +70 bps, but is too expensive ("rich") at +50 bps. The bank is exposed to 20 bps of spread widening before it can trigger the swap, but effectively acquires default protection through the structure.

A more recent innovation in the sector is the synthetic lending facility, commonly known as an asset swaption. Under this synthetic contract, the investor earns an up-front or periodic fee for agreeing to purchase a security or a loan from an intermediary on a forward basis. This is equivalent to the investor selling, for premium, a

FIGURE 2.3

Puttable Asset Swap



put option to the intermediary on a revolving credit line or note underwriting program arranged for a third-party credit borrower/issuer and committing to participate in an unfunded revolver/note program until it is funded or terminated. If the intermediary exercises the option, the investor is obliged to purchase the reference asset on an outright or asset-swapped basis at the agreed strike level. Once this occurs, the investor has a long position in the borrower's credit risk.

CREDIT DEFAULT SWAPS

As indicated in Chapter 1, the credit default swap (CDS) has emerged as the single most popular credit derivative in the market. The CDS functions like an insurance policy, with the swap buyer paying the swap seller a premium to protect against losses resulting from a defined credit event such as bankruptcy, reorganization, moratorium, payment default, or repudiation. The swap purchaser (i.e., the beneficiary) "swaps" the credit risk with the provider of the swap (i.e., the insurer or guarantor), receiving a compensatory if the credit event is triggered. Because the transaction is unilateral (i.e., the purchaser expects the seller to perform if the credit event occurs), it does not take the form of a standard OTC swap contract, which is always bilateral. In fact, the CDS can more properly be considered a credit default put option,² giving the purchaser the economics of a long put position on a credit-risky bond price. If the defined credit event occurs, the CDS seller must either (a) accept delivery of the reference asset and pay par value (for an asset that is likely to be trading at a deep discount) through a process known as physical settlement, or (b) compensate the buyer for the difference between par and the postdefault price through a process known as cash, or financial, settlement. If cash settlement is used, the price discovery method must be stipulated in the contract document; price discovery generally involves obtaining quotes from multiple dealers and establishing an average after removing outliers. Though the CDS appears to be a form of insurance (i.e., payment of premium in exchange for an indemnification that is contingent upon the occurrence of a named loss), it is distinct in two key respects: the swap is an OTC contract that is almost always documented via standard ISDA documentation rather than insurance forms; and, the contract can be arranged by a party that is not exposed to the underlying risk, meaning it need not be a contract of indemnification protecting an existing exposure. The latter feature, in particular, has generated significant two-way growth, as speculators and hedgers can participate without needing to demonstrate proof of insurability or proof of loss.

² The reduced loss credit default put option is a variation on the theme, where the buyer of the option agrees to absorb a portion of a default in exchange for payment of a smaller premium. The first loss structure can be seen as a form of deductible.

TABLE 2.1

Factors Affecting the Price of a Credit Default Swap

Factor	Pricing Impact
Time to maturity	The longer the maturity, the greater the likelihood of default, the higher the premium.
Probability reference credit will default	The higher the probability of default, the higher the premium.
Credit rating of CDS counterparty (as seller)	The lower the credit rating of the CDS counterparty, the lower the premium.
Correlation between CDS seller and reference credit	The higher the correlation between the seller and reference, the lower the premium.
Expected recovery rate	The higher the recovery rate, the lower the premium.

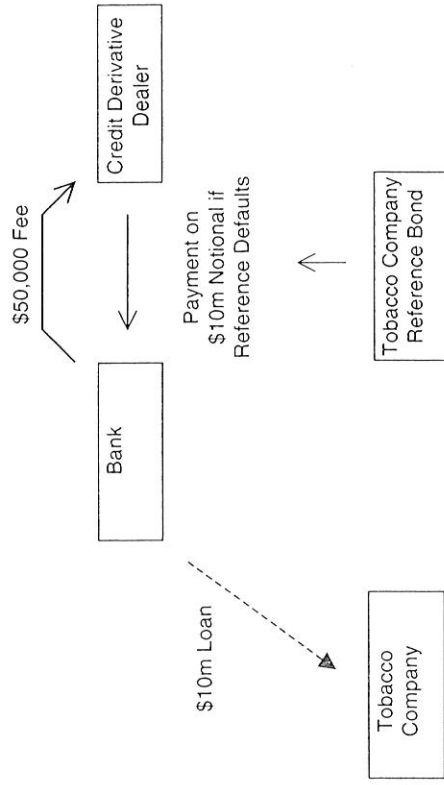
CDSs on major credit issuers have become extremely liquid over the past few years, to the point where end-users and dealers often prefer transacting in derivative contracts rather than physical reference assets; this is particularly true for institutions attempting to establish short positions in a reference credit, where it may be difficult to borrow and sell the physical security as a result of supply or regulatory issues. CDSs are also useful for institutions pursuing portfolio diversification and rebalancing efforts, as risk or investment exposures can be reshaped in an efficient and cost-effective manner.

The premium, or fee, payable on a CDS can be paid up-front or over the life of the transaction; in practice it is generally set as a basis point spread over LIBOR times the notional amount of the contract. The premium is a function of various factors, including time to maturity, probability of reference credit default, expected recovery rate given default, credit rating of the CDS counterparty, and possible correlation between the counterparty and the reference credit; these factors are summarized in Table 2.1.

CDSs are generally written for maturities ranging from six months to five years, with institutional trading size of \$10–\$50 million. Reference assets can be drawn from the high-grade, high-yield, and emerging market sectors; in practice, most activity and liquidity is found in the high-grade sector. Naturally, CDSs can be customized to meet the specific needs of the buyer. Let us consider an example of a U.S. bank that is concerned about pending

FIGURE 2.4

Credit Default Swap on Tobacco Company Reference

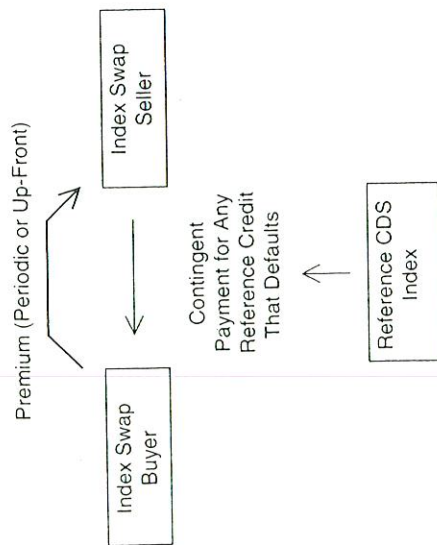


litigation that may result in a deterioration of the credit quality of one of its largest tobacco clients, to whom it has extended a \$10 million loan. The bank is eager to reduce its default exposure to the tobacco firm, but does not want to sell its existing loan exposure (as it fears that any such action could damage the relationship). Accordingly, it enters into a five-year CDS with a credit derivative dealer for \$10 million, sufficient to cover the credit risk on the loan; the reference under the transaction is the tobacco company's publicly traded 10-year bond. Importantly, the transaction is privately negotiated so that the bank's clients are unaware that the bank is hedging its exposure. The transaction fee for the CDS is 50 bp, or \$50,000 per year. Figure 2.4 illustrates the flows of the CDS.

Under the terms of the agreement, the credit derivatives dealer makes a contingent payment to the bank equal to the difference between the market price and face value of the bond if a defined credit event occurs (e.g., bankruptcy, failure to pay). For example, if the tobacco company receives an adverse judgment that creates financial distress and it defaults on its bond (and other debt), the reference bond may drop to a price of 60. The dealer pays the bank 40 (the market-based recovery price), the difference between 60 and the bond's face value of 100; this amounts to \$4 million in cash terms. This provides coverage for the bank's own \$10 million loan to the company, which may also

FIGURE 2.5

CDS Index Swap



be worth approximately 60 postdefault.³ Note that the bank is exposed to the credit risk of the tobacco company and the credit derivatives dealer as counterparty. While a simultaneous default by the dealer is unlikely, the correlation between the reference and dealer must be understood; if there is a high probability that a default by the reference credit might have a negative impact on the dealer's own financial standing, the bank will be less inclined to pursue the transaction, or will do so only by paying a lower premium.⁴

A recent entrant in the marketplace is the CDS index swap, a derivative contract covering a broad pool of credits that together comprise a standardized index. The buyer of an index swap pays the seller a premium in exchange for a compensatory payment if a credit event occurs within the index; if a credit event occurs, the reference asset is removed from the index and the contract continues based on the remaining reference assets, but on a reduced notional principal. The buyer is obliged to pay the same fixed premium on the remaining references. Figure 2.5 illustrates the index structure and cash flows.

³ In fact, the value may be slightly higher or lower, depending on asset valuation and priority of claims.

⁴ In practice this might occur if a weak financial institution is writing a great deal of unhedged contracts on weak reference credits; several defaults (and thus payouts) may be sufficient to trigger a default by the financial institution on its own liabilities.

CDS index swaps are becoming increasingly liquid because they rely on standardized indexes, which are comprised of the most liquid CDS references in the market (as determined by the largest credit derivative dealers). Previously disparate efforts led by Trac-X and iBoxx (with different dealers in support of each effort) have been consolidated into a single project administered by Dow Jones: These include the DJ CDX indexes for North America and emerging markets and the DJ iTraxx credit indexes for Europe and Asia. Each class is standardized with respect to index construction and maturities, and each class features a variety of sector and geographic subindexes (denominated in major currencies in order to avoid currency risk). The most active indexes are the North American high-grade index (CDX.NA.IG) and the European high-grade index (iTraxx Europe), each featuring 125 credit references. Though the indexes are considered high grade, the references are weighted heavily towards the lower end of the investment grade spectrum (e.g., 90% in A/BBB-rated entities). Each index remains static over its lifetime (apart from defaulting references, which are removed) and is rebalanced every six months in order to maintain a continuous supply of tradable references in both 5- and 10-year maturities. Liquidity of index contracts has led to a tightening of bid-offer spread for the major indexes (e.g., CDX.NA.IG swaps trade at a spread of 1–4 bps; the equivalent contract for a recognized physical bond index can be as wide as 40 bps). Index swaps can be traded in funded or unfunded form. Unfunded swaps are equivalent to multireference CDS basket swaps on the standard index of references; the protection buyer in this instance faces counterparty exposure risk. Funded swaps are a bond equivalent, where the protection buyer receives the pool of index references from the seller and pays a notional amount up-front. Because the structure is funded, the buyer faces no counterparty exposure.

Consider an example of a CDS index swap based on the iTraxx Europe, which is comprised of 125 of the most liquid investment grade CDSs in Europe.⁵ Each day the 125 reference CDS prices are marked to market and a new fair price for the index is established. A firm that wishes to buy protection must pay the difference between the initial spread on the index and the current fair price (if the fair

⁵ All of the reference entities comprising the index have equal rating and can only be changed if a credit event occurs and the members of the index agree on a replacement or change. At the start of each index series (i.e., every six months), the spread for the index is established and remains constant throughout the series life.

price is above the initial index), or receive the difference (if the fair price spread is below the index). This payment is made whenever a participant enters or exits an index spread trade. Assume the initial iTraxx Europe index price is 35 bps, payable by the buyer quarterly for the life of the trade. If the fair price widens 1 month later to 55 bps, a protection buyer entering the trade must pay an up-front fee equivalent to the present value of the 20 bps for the life of the trade and then continue paying the fixed 35 bps every quarter. If one of the 125 reference entities in the index defaults, the protection seller pays the protection buyer € 1 million. The trade then continues at a premium of 35 bps on 124 credits and the lower notional amount.

CREDIT SPREAD FORWARDS

The credit spread forward is a forward contract on a risky credit spread that allows the purchase or sale of a credit spread at a forward price for settlement at some future date; credit spread forwards can be negotiated in absolute and relative versions. Under the absolute spread version, the seller agrees to pay the buyer a fixed credit spread and receive a market spread; the fixed spread is set at trade date and the evaluation against the market spread occurs at transaction maturity. The buyer, by extension, agrees to pay the market spread in exchange for the fixed spread; this structure is illustrated in Figure 2.6. For instance, if a bank agrees to pay a fixed 100 bps for the spread on Company ABC's reference bond and receive ABC's market spread, it will generate a gain as ABC's market spread widens beyond 100 bps (i.e., ABC's credit deteriorates) and

will post a loss as it tightens (i.e., improves); the bank's counterparty faces the opposite scenario. In the extreme, if ABC defaults the bank will receive a payment related to ABC's postdefault spread level. The payout on the forward is computed as the difference between the fixed and market spreads, times the duration of the reference asset,⁶ times the notional of the transaction; the payment is thus net, adjusted by the duration to reflect the weighted average cash flows of the reference bond.

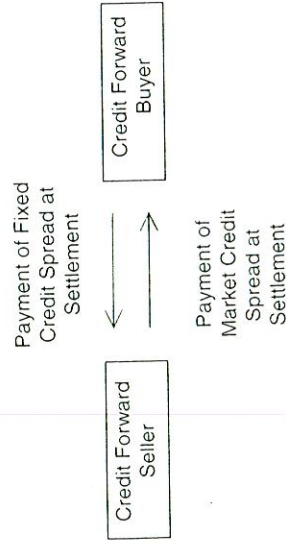
The relative spread version functions in a similar manner, except one party pays the spread over the risk-free benchmark on reference asset 1, while the second party pays the spread over the risk-free benchmark on reference asset 2; this essentially involves the spread differential between two credit-risky references and removes the risk-free benchmark from the equation. In practice asset swap spreads are often used as references in credit spread forwards, even though LIBOR is not strictly a risk-free benchmark rate. Like CDSs, forwards can be purchased/sold for periods of several months to several years, on dealing amounts ranging from \$10 million to \$100 million. While most forwards are structured for single periods, they can also be bundled into portfolios to create multiperiod swaps.

TOTAL RETURN SWAPS

The total return swap (TRS) is a bilateral contract that transfers the economics of a credit reference between two parties; the contract covers the entire spectrum of payoffs, from credit strengthening to credit deterioration and default. Under a standard transaction, the TRS receiver is entitled to the total return on the reference asset (appreciation plus coupons) in exchange for periodic floating payments (e.g., a LIBOR-based flow plus a spread); this is equivalent to creating a synthetic long position in the reference asset (indeed, the TRS is often considered a form of synthetic financing). The TRS payer, in turn, is entitled to any depreciation that occurs in the security, along with a LIBOR spread.⁷ If the price of the reference

FIGURE 2.6

Absolute Credit Spread Forward



⁶ The credit spread duration, which measures the sensitivity of the security's price to a movement in spreads, captures the effects of price changes over the life of the security on a present value basis.

⁷ As noted, in transferring the price appreciation/depreciation, the TRS mechanism transfers economic changes that are due to interest rate movements and credit spread movements; the two are not separated, meaning that the vehicle is as much an interest rate risk tool as a credit risk tool.

asset rises as a result of credit improvement, the receiver benefits; if it declines as a result of depreciation or default, the payer benefits. Because the TRS payer often owns the underlying reference asset, it transfers the economic risk of the asset, creating a synthetic short position (or first loss credit protection); it must, of course, continue to fund the balance sheet position through its own sources.⁸ The TRS can be arranged on a funded or unfunded basis. A funded TRS requires the TRS receiver to purchase a risk-free or low-risk floating-rate asset that yields the LIBOR stream payable to the TRS payer. The receiver holds no such asset in the unfunded TRS, so the LIBOR stream must be sourced from cash flow; this means that the TRS position is leveraged.

The standard TRS structure features dealing size that can grow to over \$100 million and a maturity that can range from six months to approximately five years. Though valuation is generally transparent, challenges can arise when the underlying reference asset is illiquid and robust price quotes are difficult to obtain. The “total return” referenced under terms of the transaction includes all interest payments on the reference asset, plus an amount based on the change in the asset’s market value. If a default occurs prior to maturity, the receiver compensates the payer through a net payment equal to the difference between the asset price on trade date and the asset price postdefault (cash settlement basis); alternatively, it can take delivery of the asset by paying par value (physical settlement basis). Figures 2.7 (a) and (b) summarize the flows of unfunded and funded TRSs.

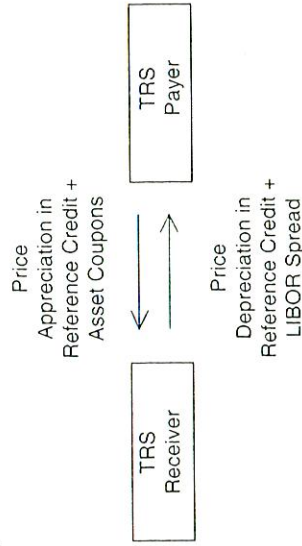
Like the CDS buyer, the TRS payer can separate its economic exposure to a reference asset without having to sell it in the market, creating risk management and relationship management advantages. The receiver, in turn, can enjoy funding and investment benefits. Returning to the tobacco company introduced above, we can examine how an investor might benefit from a TRS position. Assume that a hedge fund believes the bond market has overreacted to the tobacco litigation risk, driving tobacco credit spreads to levels that are wider than warranted. The fund wants to crystallize this view and can do so by purchasing the tobacco company’s

⁸ The net profit to the TRS payer is the basis point spread over the funding cost times the notional amount of the transaction. Thus, if the payer receives LIBOR + 10bps from the receiver and can fund at LIBOR flat, it earns 10bps running on the notional of the transaction.

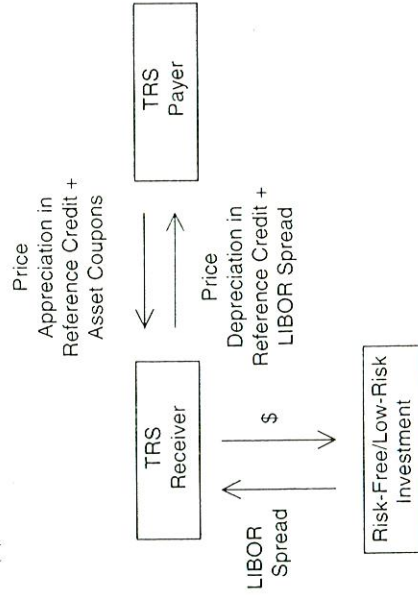
FIGURE 2.7

Total Return Swap

(a) Unfunded TRS



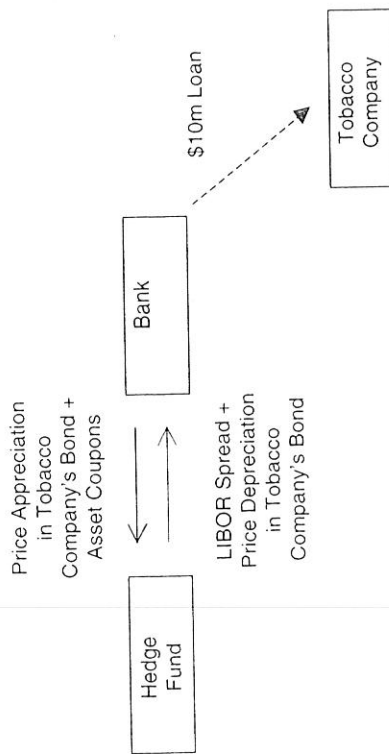
(b) Funded TRS



bonds, arranging a credit spread forward, or entering into a TRS as a total return receiver. Because the fund wants to maximize the potential for returns (i.e., employ maximum leverage), it opts to use an unfunded \$10 million TRS to express its view. We may also assume that the bank that has extended a loan to the tobacco company continues to be concerned about its exposure; instead of arranging a CDS, it can enter into a TRS with the hedge fund, offsetting its exposure to a potential decline in the value of the tobacco company’s bond—creating a de facto hedge in the process. Though it does not have to pay an up-front premium as it did for the CDS protection, it is now liable for paying the total returns on the tobacco company’s reference bond. The fund will benefit if the

FIGURE 2.8

Total Return Swap on Tobacco Company Reference



coupons and any price appreciation on the bond exceed the LIBOR spread it must pay; it remains at risk, of course, for any potential deterioration in the tobacco company's bond—including an event of default.⁹ The bank will benefit if the tobacco company's credit deteriorates in the face of a negative legal judgment. Figure 2.8 summarizes the agreement between the bank and the hedge fund.

BASKET SWAP STRUCTURES

Basket swaps are credit derivatives that allow for the risk transfer of a pool of reference credits; this creates an efficient and cost-effective way of dealing with multiple credit exposures. Baskets effectively give institutions the chance to manage/hedge portfolios of reference credit risk exposures and investors an opportunity to earn premium from the creation of diversified portfolios of credit-risky assets. Though standard baskets are akin to miniportfolios of CDSs, the transactions are documented and executed as single trades, reducing administrative and control burdens. In addition, the act of combining discrete credits permits any beneficial effects of credit correlation to be reflected in the pricing; this can lead to a cheaper risk management solution (i.e., if the credits

⁹ Any negative bond portfolio returns unrelated to the tobacco company's credit risk would also be reflected in the hedge fund's payment (e.g., changing interest rates).

are uncorrelated). We consider several of the most common basket swap structures in this section, including the standard basket swap, first (*n*th) to default basket swap, senior basket swap, and subordinated basket swap.

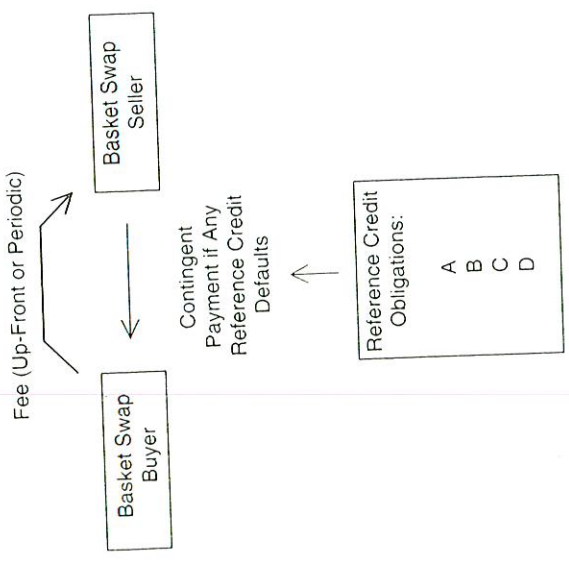
Standard Basket Swaps

A standard basket swap, the most common of the synthetic credit portfolio structures, allows several reference credits to be combined into a single basket, providing the seller with a premium and the buyer with a compensatory payment if any of the credits defaults; if every credit in the basket defaults, the buyer receives a compensatory payment for each one. For instance, if the buyer specifies a basket of four reference credits of \$10 million notional each, and three of the four default, it will receive a compensatory payment equal to the postdefault price of the defaulting credits times \$10 million notional per credit. It is important to stress that a standard basket swap remains in force even after a credit has defaulted; indeed, the transaction terminates only on the stated maturity date. As each credit in the basket defaults and is removed, the standard basket swap transaction continues based on a reduced notional principal (but constant basis point premium). This "continuation" feature is distinct from the first-to-default baskets discussed immediately following. Note that although the basket buyer receives a payment for each default, it receives no payment if the reference credits deteriorate but do not default (e.g., credit spreads widen but the obligors remain current on their principal and interest payments); this reinforces the point that the basket swap is equal to a portfolio of CDSs (which are, themselves, binary default options).

There is considerable flexibility in assembling a reference basket: the structure can include 2 to 20+ obligations, industries can be identical or different, country exposure can be single or multiple source, and ratings can range from investment grade to subinvestment grade; maturities can range from six months to several years, and deal size can grow to several hundreds of millions of dollars. As with any individual CDS, the credit buyer pays the seller a fee; however, the inclusion of multiple reference credits can lower the overall fee payable—though this depends ultimately on the construction of the basket and the correlation between the reference credits. Credits that are very closely correlated do not receive the benefit

FIGURE 2.9

Standard Basket Swap



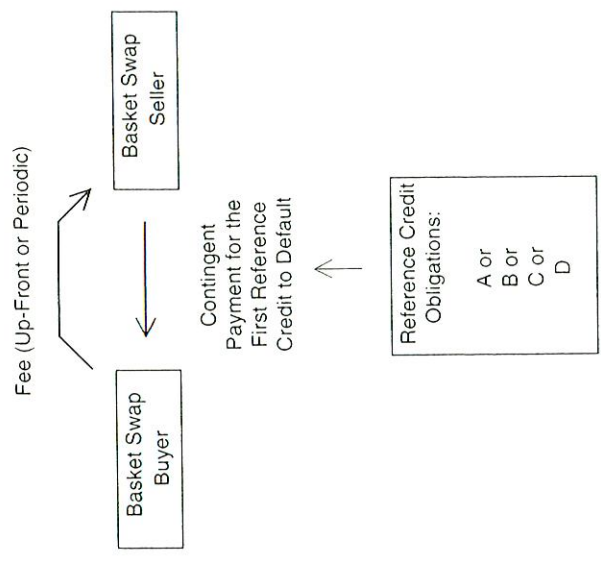
of a premium reduction, as no diversification is achieved; those that are less correlated (or, indeed, uncorrelated) can generate some degree of savings. Figure 2.9 highlights a standard basket swap.

First (n-th)-to-Default Basket Swaps

The first (or n -th)-to-default swap is a popular variation of the standard basket swap. The structure again begins with the creation of a portfolio of related or unrelated reference credits. In this instance, however, the buyer of the basket receives only a single compensatory payment when the first (or n -th) credit in the portfolio defaults; once the specified default event occurs, the structure unwinds and the seller faces no further liability—even if another default occurs. Assume, for instance, that a basket contains 10 reference credits and the buyer receives a payment based on the first credit to default. (Which of the 10 actually defaults is irrelevant—they are all considered equally.) Once the first default occurs, the buyer receives the notional amount of the basket times the postdefault price of the defaulting credit and, even though nine performing credits remain in the basket, the transaction terminates. Indeed,

FIGURE 2.10

First-to-Default Basket Swap



if a second default occurs one day after the first default, the seller is not obligated to make a compensatory payment. Though the first-to-default basket shares certain similarities with the standard basket swap, the fact that the payout is limited to a single default event means that the overall fee paid for the protection is much smaller. In some instances the structure is created to accommodate the second, third, fourth, or n th, credit to default; this means $(n - 1)$ defaults must occur among the reference obligations before the buyer receives a compensatory payment. Because this is obviously a much lower probability event, n th-to-default structures are considerably cheaper than standard basket swaps and first-to-default swaps. Figure 2.10 illustrates the flows of a first-to-default swap.

A first-to-default basket is similar to the standard collateralized debt obligation (CDO) we discuss in the next chapter. Specifically, the basket seller occupies a position similar to the investor in the equity/residual tranche (or subordinated tranche, depending on how the transaction is structured), bearing the first loss if default occurs. However, the basket seller has an off-balance sheet exposure while the CDO investor has a funded balance sheet

investment; in addition, the basket features a narrower reference portfolio than the CDO.

Senior and Subordinated Basket Swaps

Senior and subordinated basket swaps represent two additional variations on the basket structure. As above, these basket swaps are customized credit portfolios that reference a number of credits. Their payment characteristics are, however, unique. In the senior basket swap the seller pays the buyer for any credits in the portfolio that default (and in that sense is identical to the standard basket swap), but will not do so until a minimum loss threshold has been reached. This creates a first-loss/deductible structure, suggesting that the seller holds a senior loss position while the buyer occupies the subordinated position. For instance, the reference portfolio might feature five credits at \$10 million notional apiece and a first-loss level of \$10 million. If all five credits default during the life of the transaction and the postdefault price for each is 40 (again, for simplicity), then the compensatory payment on a standard basket is \$30 million. However, under the senior swap structure the buyer absorbs the first \$10 million of losses as a form of deductible, meaning the compensatory payment nets to \$20 million. Figure 2.11 summarizes the senior basket swap structure.

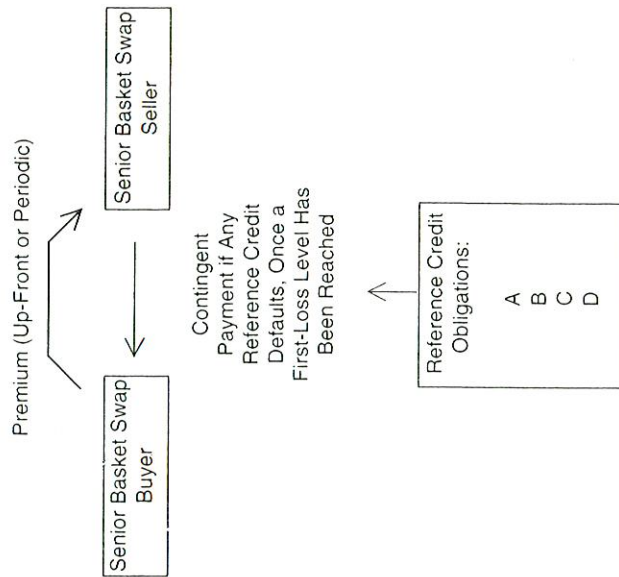
The subordinated basket swap is comprised of a customized portfolio of reference credits and provides a payout on every credit that defaults, from the instance of first dollar default; this indicates that the seller occupies the subordinated loss position and the buyer the senior loss position. However, the basket also features a cap, or aggregate limit, on the total amount of payout that can be made over the life of the contract. Thus, assuming a \$25 million subordinated basket contract based on the same five-credits, \$10 million basket noted above, the total payout to the buyer will be \$25 million—even if all five credits default and the postdefault price on each is 40. Figure 2.12 illustrates the subordinated basket structure.

CREDIT SPREAD OPTIONS

The credit spread option is the last of the fundamental credit derivative products. The credit option grants the buyer the right, but not the obligation, to purchase (call) or sell (put) the credit spread of a reference credit at a particular strike level; in exchange for this

FIGURE 2.11

Senior Basket Swap



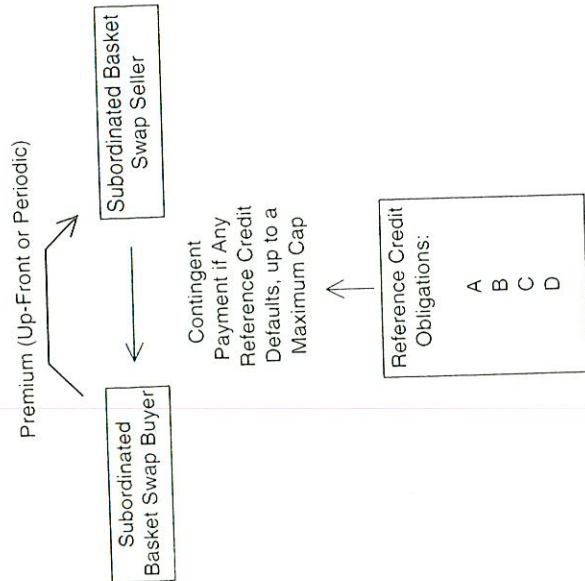
right, the buyer pays the seller an up-front premium payment.¹⁰ Like other optionable contracts, the credit spread option is unilateral.

A put option on the credit spread gives the buyer the right to sell the spread at the strike, meaning a gain is generated as the reference credit deteriorates and its spread widens versus the risk-free benchmark; in the extreme, a defaulting credit will feature a very wide credit spread, so the credit spread put also provides default protection. A call option on the spread, in contrast, gives the buyer the right to purchase the spread at the strike, meaning a gain as the reference credit improves and the spread tightens. The spread may be defined in terms of a floating-rate reference, such as LIBOR, or a fixed-rate risk-free benchmark, such as Treasuries. For instance,

¹⁰ The credit spread option has its foundation in mortgage backed securities (MBS)/U.S. Treasury option strategies, with investors selling calls on MBS and buying calls on U.S. Treasuries in order to protect against a general widening of MBS spreads. This strategy ultimately expanded into other areas, such as spreads between Mexican government obligations and U.S. Treasuries, and has now become an established part of the credit derivative market.

FIGURE 2.12

Subordinated Basket Swap



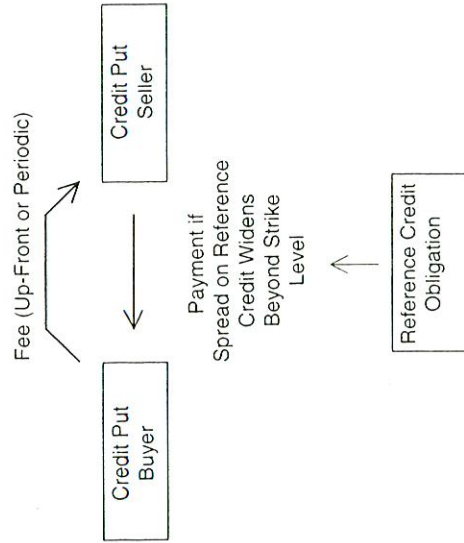
assume an investor purchases a credit spread put option at a strike spread of Treasuries +100 bps. If the reference credit is downgraded from A to BBB-, the spread on the bond may widen to T+200 bps; though the credit is not in default, the buyer is due the 100 bps spread over the strike spread (times the notional of the transaction). Accordingly, the spread option can be viewed as a conventional credit put that provides the buyer with a full continuum of payoffs.

Credit spread options can be used to capture relative value changes in spreads independent of interest rates, or to express a view on forward credit spreads¹¹ or the term structure of spreads. For instance, an investor believing an asset is overvalued but that

¹¹ The forward credit spread can be computed by first determining the spot price of the risky bond and the associated risk-free benchmark; the forward prices of both instruments can then be computed and converted into forward yields, with the differential between the two yielding the forward spread. Forward credit spreads many not reflect investor expectations and are notoriously volatile.

FIGURE 2.13

Credit Spread Option



default is improbable can sell a credit spread put option on the asset, earning premium in the process. If the spread widens to the strike, the investor will have to purchase the asset from the option buyer, but may be comfortable doing so as its target spread level has been reached; in addition, it will have generated premium income to supplement the profit on the position.

Vanilla credit spread options are bought and sold on a range of reference credits, and can be structured with American or European exercise involving physical or cash settlement. Transaction maturities range from six months to five or more years, and dealing size ranges from \$10 million to \$100 million. Figure 2.13 highlights the cash-settled credit spread put structure.

Returning to our earlier example of the tobacco company, we illustrate how a bank might use a credit spread put to hedge a portion of its exposure on the \$10 million loan. Assume the bank is still concerned about the results of pending litigation, which will be known within six months. Assume also that the public reference bond is trading at a spread of Treasuries +200 bps and has a duration of five-and-a-half years. Accordingly, the bank decides to purchase an at-the-money put option on \$10 million for a premium of 60 bps. We can next imagine two scenarios: in six months' time the litigation is resolved in the tobacco company's favor, causing the

spreads on the bond to tighten to +150 bps; although the bank's put option expires worthless, the specter of financial distress has been removed and the likelihood that the company will remain current on the \$10 million loan is very favorable. The only sum the bank loses is the premium paid for the option. Under a second scenario the litigation result may be unfavorable, causing the spread on the bonds to widen to +400 bps as fears over possible financial distress mount. Though the bank now has increasing concerns about potential repayment on the loan, it has a partial hedge from the put option: the 200 bps widening over the strike, times the current duration of five years (six months have passed since the five-and-a-half duration at the start of the trade) yields a gain of \$1 million, which can be used to offset any potential loss on the loan. Note that if the bank had been interested in a larger hedge, it could have arranged a notional amount of \$20 million or more.

In addition to the standard structures noted above, exotic credit spread options, including knock-in and knockout options, are available. For instance, in a knockout credit spread put, the put is eliminated if the reference credit spread tightens by a certain number of basis points (i.e., it breaches the barrier). A knock-in put, in turn, becomes active once spreads widen to a certain level—meaning the put seller must take delivery of the asset at the wider spread level and the put buyer gains effective default protection. Because knock-ins and knockouts do not provide for a full spectrum of payouts, they are generally cheaper than standard spread options.

CHAPTER EXERCISES

1. Explain how the asset swap arbitrage works and provide an example using the following instruments/rates:
 5-year fixed bond rate of 6%
 5-year FRN yield of LIBOR + 35 bps
 5-year swap rate of 5.40%
2. Describe how a bank or investor can obtain default protection by using an asset swap switch.
3. In what way is a CDS different to a conventional OTC swap contract? Describe a more appropriate analogy from the financial markets.

4. Name three factors that drive the price of a CDS and describe how each one influences price levels.
5. Explain why an unfunded TRS is similar to a synthetic financing.
6. If an investor buys a 12-month credit spread call option on Company ABC's bond with a strike spread of 100 bps for a premium of 35 bps, what is the appropriate course of action if ABC's spread tightens to 50 bps? Widens to 150 bps? What is the breakeven level of the trade?
7. Assume the following reference credit portfolio:
 Credit 1: \$10 million notional, postdefault price 40
 Credit 2: \$10 million notional, postdefault price 30
 Credit 3: \$10 million notional, postdefault price 50
 Given a \$30 million structure, how much will an investor receive
 - a. If Credit 2 defaults in a standard basket?
 - b. If Credit 2 defaults in a first-to-default basket?
 - c. If Credits 1 and 2 default in a first-to-default basket (in that order)?
 - d. If Credit 3 defaults in a senior basket with a \$5 million first-loss limit?
 - e. If Credit 1 defaults in a senior basket with a \$5 million first-loss limit?