

WILEY FINANCE

THE HANDBOOK OF CREDIT RISK MANAGEMENT

Originating, Assessing, and Managing
Credit Exposures

Sylvain Bouteillé • Diane Coogan-Pushner

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The Handbook of Credit Risk Management

*Originating, Assessing, and
Managing Credit Exposures*

SYLVAIN BOUTEILLÉ
DIANE COOGAN-PUSHNER



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To my wife, Setsuko; my sons, Pierre and François; and my parents

—Sylvain Bouteillé

To my Dad

—Diane Coogan-Pushner

Preface

The financial crisis, which struck the global economy in the late 2000s and continues today with the European sovereign debt troubles and ongoing banking fallout, reminds us of the relevance of sound credit risk management principles and processes. It serves as a powerful wake-up call for executives of industrial companies and financial institutions across the globe. Even simple financial transactions performed daily can create heavy losses and jeopardize the very existence of a firm. Are the customers able to pay? What happens if the bank where money is deposited defaults? Can broker dealers that hold collateral disappear overnight?

For everybody, the crisis (which we refer to as the *2007 crisis* because in 2007, delinquencies on mortgages began occurring on a large scale and Standard & Poor's [S&P] downgraded thousands of asset-backed securities) and the collapse of major financial institutions offers an opportunity to take one step back and to rethink the basics of credit risk management. It is too often viewed only as the art of assessing single name counterparties and individual transactions. Credit risk management is more than that. The management of a credit risk portfolio involves four sequential steps:

1. Origination
2. Credit assessment
3. Portfolio management
4. Mitigation and transfer

Each one must be individually well understood, but, also, the way they interact together must be perfectly mastered. It is only by fully comprehending the entire chain that risk professionals can properly fulfill their task of protecting the balance sheet of the firms employing them.

We provide a comprehensive framework to manage credit risk, introducing one of the four essential steps in each part of the book. This book is based on our professional experience and also on our experience of teaching credit risk management to graduate students and finance professionals. Next, we provide an overview of each part.

PART ONE: ORIGINATION

Part One focuses on the description of credit risk and on the credit risk taking process in any organization involved in credit products. We also provide a simple checklist to analyze new transactions.

In Chapter 1 (“Fundamentals of Credit Risk”), we define credit risk and present the major families of transactions that generate credit risk for industrial companies and financial institutions. We conclude with the main reasons why properly managing a portfolio of credit exposures is essential to generate profits, produce an adequate return on equity or simply survive.

In Chapter 2 (“Governance”), we present the strict rules that must be in place within all institutions taking credit risk. It all starts with clear and understandable credit policies or guidelines. Then, in order to control accumulation, we discuss the role of limits on similar exposures. We also provide a concrete framework to approve new transactions. To finish, we discuss the human factor: how a risk management unit must be staffed and where it must be located inside an organization.

In Chapter 3 (“Checklist for Origination”), we introduce nine key questions that must be answered before accepting any transaction generating credit risk. It may sound trivial, but the best way to avoid credit losses is not to originate bad transactions. All professionals involved in risk taking must, therefore, ask themselves essential questions such as these: Does the transaction fit the strategy? Does it fit into the existing portfolio? Is the nature of the credit risk well understood? Is the deal priced adequately or is there an exit strategy?

PART TWO: CREDIT ASSESSMENT

Part Two introduces the methods to estimate the amount of exposure generated by transactions of various natures before detailing how to analyze the creditworthiness of a company or of a structured credit product.

The focus of Chapter 4 (“Measurement of Credit Risk”) is on the quantification of credit risk for individual transactions. We present the three main drivers influencing the expected loss of a transaction: the exposure, the default probability, and the recovery rate. The exposure is the evaluation of the amount of money that may be lost in case of default of the counterparty. The default probability is a statistical measure that aims at forecasting the likelihood that an entity will default on its financial obligations. We introduce a two-step approach to derive a default probability: the assignment of a rating followed by the use of historical data. Finally, there are few transactions that generate a complete loss when an entity defaults. Creditors are usually able to receive some money back. The amount is summarized by the recovery rate. The expected loss is the multiplication of the three parameters presented above.

Chapter 5 (“Dynamic Credit Exposure”) is dedicated to the measurement of exposures that cannot be estimated in advance as they are dependent on financial market values. We present, with examples, two main families of transactions generating a dynamic credit exposure: long-term supply/purchase agreements of physical commodities and derivatives trades involving, for instance, interest rates, foreign exchange, or commodities. We explain that the credit exposure of such transactions is the replacement cost of the counterparty and is measured with the concept of mark-to-market (MTM) valuation. We conclude by introducing the concept of value at risk (VaR), which provides a measurement of credit risk for a given time horizon and within a certain confidence interval. One of the key things to remember is that VaR is a convenient method, but it does not represent the worst-case scenario. In the real world, actual losses can and have exceeded VaR.

The cornerstone of all credit risk management processes is assessing the credit risk of counterparties. In Chapter 6 (“Fundamental Credit Analysis”), we present the most common method of analysis, which is a quantitative-based review of the counterparty's financial data, and we also present a qualitative-based review of the firm's operations and economic environment in which it operates. We start the analysis by covering basic principles of accounting and the salient features of

a company's balance sheet, income statement, and cash flow statement. We then describe the key ratios summarizing the financial health of a company.

We introduce the concept that the interests of the shareholders and of the creditors are not aligned. This is known as an agency conflict. In essence, creditors are not in a position to influence decisions impacting the fate of the money they invest in a company. This is the prerogative of management, appointed by shareholders. We conclude Chapter 6 by outlining a model building of the shareholders-versus-creditors relationship, developed in the 1970s by the Nobel Prize Laureate Robert Merton.

Besides fundamental credit analysis, there are alternative ways for estimating the creditworthiness of a company, including its probability of default. We present the most common alternative ways in Chapter 7 (“Alternative Estimations of Credit Quality”). The most popular is based on the Merton Model presented in Chapter 6. Several companies offer commercial applications of the model like Moody's Analytics Expected Default Frequency (EDF™). We introduce the basics of the methodology behind the EDF™ and also its pros and cons. We explain that useful indication of credit quality can be extracted from the capital markets, notably the prices of credit default swaps and of corporate bonds. The limitations of these alternative sources are fully explained.

The previous chapters focused on corporates and financial institutions but in Chapter 8 (“Securitization”) we introduce the basics of structured credit products, primarily asset-backed securities, or ABS. Banks developed asset securitization in the 1970s as a way to originate mortgages without keeping them and their associated credit risk, on their balance sheet. We discuss the three building blocks of any securitization scheme: the collateral (i.e., the assets sold by the originator), the issuer of the ABS (which is an entity created for the sole purpose of making a transaction possible and is called a Special Purpose Vehicle, or SPV), and the securities sold to investors. We present the main families of ABS that are primarily supported by consumer assets like mortgages, auto loans, and credit-card receivables.

PART THREE: PORTFOLIO MANAGEMENT

Part Three is primarily dedicated to the management of a portfolio of credit exposures with a focus on capital requirements. We also present how regulators all over the world impose strict conditions on financial institutions in order to limit their risk taking and maintain their capital levels, as the regulators' mandate is to protect the public and maintain the financial stability of the world economy. We finish with a description of the main accounting implications associated with the major credit products.

Assessing individual transactions is not enough to protect a firm's balance sheet. In Chapter 9 (“Credit Portfolio Management”), we introduce the fundamentals of credit portfolio management (CPM), which consists of analyzing the totality of the exposures owned by a firm. The main goals of CPM are to avoid accumulation on some companies or industry sectors, to prevent losses by acting when the financial situation of a counterparty deteriorates, and to estimate and minimize the amount of capital necessary to support a credit portfolio. For companies with a small portfolio, CPM can be intuitive and performed with simple methods. For institutions with a large portfolio and complex exposures, CPM requires the use of analytical models. We explain why it is crucial to adapt the sophistication of CPM activities to the real needs of an entity. As such, we present three different complexity levels that we recommend any firm adopt based on its own needs and resources.

Chapter 10 (“Economic Capital and Credit Value at Risk (CVaR)”) is dedicated to the description of the analytical concepts used to evaluate the amount of capital necessary to support a credit portfolio. We introduce the concept of a loss distribution, which associates an amount of money that can be lost with a corresponding probability. The shape of the distribution is influenced by the correlation between the assets, that is, the chance that the financial condition of distinct entities deteriorates at the same time, usually as a result of the same economic conditions. A credit loss distribution is not a normal bell-shaped distribution, but, rather, it is heavily skewed. This reveals that there is a high probability of losing a small amount of money (summarized by the expected loss of the portfolio) and the low probability to lose a lot of money. To survive under the latter scenario, firms need to set aside capital. We explain that the amount of capital is determined by the concept of VaR due to credit exposure (or credit VaR, i.e., CVaR) applied to the entire portfolio. Active portfolio

management aims at reducing the amount of capital by executing rebalancing transactions.

Chapter 11 (“Regulation”) outlines the myriad of regulators and their respective domains as it relates to assuming or being exposed to credit risk. We present the reach of the regulators from the perspective of a credit originating business that does business with a regulated entity, since the regulation itself will materially influence the credit profile of the obligor. We also present the reach of the regulators from the perspective of the regulated entity, which are primarily financial institutions, as it relates to taking on credit risk. Regulators and their regulations are numerous, and, as this book goes to print, there are global efforts underway to harmonize both the regulatory agencies and their regulations and to remove the loopholes that exist. We attempt to give readers a sense for these new regulatory directives, including their mandates, scope, and timelines.

In Chapter 12 (“Accounting Implications of Credit Risk”) we outline for readers the accounting treatment, under both U.S. GAAP and International Accounting Standards, of instruments that involve credit risk. This includes the accounting for loans, for other credit instruments such as bonds, and impairment. We outline the rules relating to de-recognition and consolidation of assets, counterparty netting agreements, and the credit and debit valuation adjustments used in derivatives accounting. Although accounting should never drive risk management decisions, all risk professionals should understand the basic accounting implications associated with originating, holding, and unwinding exposures.

PART FOUR: MITIGATION AND TRANSFER

Because there is always a risk that the financial situation of a counterparty deteriorates after the conclusion of a transaction, it is common to put safeguards in the legal documentation. If properly designed, the safeguards in place can reduce the risk of default or improve the amount recovered after a default. We will describe the most common safeguards at the beginning of Part Four. We will then introduce techniques available to risk managers to either transfer the credit risk they hold to a third party, or to neutralize it with an offsetting position, both tactics known as hedging.

For derivative transactions, in order to reduce the losses in case of the default of one's counterparty, financial institutions utilize standard principles that we describe in Chapter 13 (“Mitigating Derivative Counterparty Credit Risk”). The implementation of these principles provides confidence to market participants and promotes large scale trading or liquidity. One standard principle to limit credit exposure is to have counterparties post collateral, that is, transfer cash or easily sellable assets whenever their trading losses, measured by the mark-to-market value of all the transactions, exceed a pre-agreed threshold. By setting very low thresholds, the uncollateralized exposure and, therefore, the potential loss are always low. We explain the key principles of a robust collateral posting mechanism. After the recent crisis, regulators vowed to impose even stronger rules for derivatives markets participants. We explain how bilateral trades between financial institutions are gradually being replaced by the involvement of central counterparties or clearinghouses.

Chapter 14 (“Structural Mitigation”) is dedicated to techniques and conditions imposed on a counterparty during the lifetime of a transaction. Their objectives are either to maintain the creditworthiness of the counterparty after the inception of a transaction, or to trigger immediate repayments in case of deterioration. We start by outlining the standard techniques used in bank loans. Conditions imposed to borrowers are called covenants and we present the two main types, negative and affirmative. They do not improve the recovery expectations but prevent or delay defaults. We also describe the differences between secured and unsecured loans. In the second part we focus on the various techniques used to strengthen securitization schemes.

In Chapter 15 (“Credit Insurance, Surety Bonds, and Letters of Credit”), we introduce three traditional methods used to transfer the credit risk that an entity

faces to a third party. Credit insurance applies exclusively to trade receivables, that is, invoices sent to customers after a sale. It is offered by insurance companies and indemnifies the policyholder if a client does not pay. Insurance companies also offer surety bonds. Their role is to provide a payment if a counterparty fails to perform a contractual, legal, or tax obligation. We present the main two applications of surety: contract bonds in the construction industry and commercial bonds in many industrial sectors. We conclude by introducing letters of credit offered by banks to support transactions entered into by their clients. If a counterparty does not perform on its obligations, the letter of credit is drawn, that is, the issuing bank pays on behalf of its client thereby reducing the losses.

Credit derivatives are another technique employed to reduce a credit exposure and are explained in detail in Chapter 16 (“Credit Derivatives”). We first present the concept of the product before explaining how a firm purchasing a credit derivative is protected in case of default of a third-party entity. We then present the various uses of credit derivatives. First, a credit derivative provides a simple way to hedge a credit exposure. This was the original purpose of these instruments. Second, it can be a relatively simple way to gain credit exposure to an entity, without having to fund an investment and without having to assume interest rate exposure. Third, it can be used to speculate on the demise of an entity. We terminate by providing an overview of the limitations of credit derivatives as a hedging instrument and by presenting products based on credit derivatives exchanged in the market-place.

Collateralized debt obligations or CDOs have sometimes been blamed for the role they played in the 2007 crisis. In Chapter 17 (“Collateral Debt Obligations”), we introduce the basic concept of CDOs, explaining that they are a form a securitization already detailed in Chapter 8. We distinguish between the CDOs backed by bank loans and called collateralized loan obligations or CLOs and ABS CDOs, which are backed by asset-backed securities. We focus on CLOs because they are still an active product used by banks to protect loans they have on their balance sheet or to finance loans they originate. We provide a framework to analyze CLOs for entities investing in them. In contrast, ABS CDOs have totally disappeared today.

Chapter 18 (“Bankruptcy”) is dedicated to financial distress and bankruptcy. We start by defining bankruptcy and its legal context. We provide patterns of companies that have defaulted, which serve as early warning for credit analysts. In order to be concrete, we present the cases of two U.S. companies that

defaulted recently: Eastman Kodak and MF Global Holdings.

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PART
One

Origination

CHAPTER 1

Fundamentals of Credit Risk

WHAT IS CREDIT RISK?

Credit risk is the possibility of losing money due to the inability, unwillingness, or nontimeliness of a counterparty to honor a financial obligation. Whenever there is a chance that a counterparty will not pay an amount of money owed, live up to a financial commitment, or honor a claim, there is credit risk.

Counterparties that have the responsibility of making good on an obligation are called “obligors.” The obligations themselves often represent a legal liability in the form of a contract between counterparties to pay or perform. Note, however, that, from a legal standpoint, a contract may not be limited to the written word. Contracts that are made orally can be legally binding.

We distinguish among three concepts associated with the inability to pay. First is insolvency, which describes the financial state of an obligor whose liabilities exceed its assets. Note that it is common to use insolvency as a synonym for bankruptcy, but these are different events. Second is default, which is failure to meet a contractual obligation, such as through nonpayment. Default is usually—but not always—due to insolvency. Third is bankruptcy, which occurs when a court steps in upon default after a company files for protection under either Chapter 11 or Chapter 7 of the bankruptcy laws (in the United States). The court reviews the financial situation of the defaulted entity and negotiates with its management and creditors. Whenever possible, the court tries to keep the entity in business by selling assets and/or renegotiating financing arrangements with lenders. Bankruptcy proceedings may end in either a restructuring of the obligor's business or in its dissolution if the business cannot be restructured.

In most cases, losses from credit risk involve an obligor's inability to pay a financial obligation. In a typical scenario, a company funds a rapid expansion plan by borrowing and later finds itself with insufficient cash flows from operations to repay the lender. Other common cases include businesses whose products or services become obsolete or whose revenues simply no longer cover operating and financing costs. When the scheduled payment becomes due and the company does not have enough funds available, it defaults and may generate

a credit loss for the lenders and all other counterparties.

Credit losses can also stem from the unwillingness of an obligor to pay. It is less common, but can lead to the same consequences for the creditors. The most frequent cases are commercial disputes over the validity of a contract. For instances in which unwillingness is at issue, if the dispute ends up in litigation and the lender prevails, there is recovery of the amount owed and ultimate losses are lessened, or even avoided entirely, since the borrower has the ability to pay.

Frequently, credit losses can arise in the form of timing. For example, if monies are not repaid on a timely basis, there can be either interest income foregone or working capital finance charges incurred by the lender or trade creditor, so time value of money is at stake.

Credit risk can be coupled with political risk. Obligors doing business in different countries may have both the ability and willingness to repay, but their governments may, without much warning, force currency conversion of foreign-currency denominated accounts. This happened in 2002 in Argentina with the “pesification” in which the government of Argentina forced banks to convert their dollar-denominated accounts and debts to Argentine pesos. Companies doing business in Argentina saw their U.S. dollar-denominated bank deposits shrink in value, and their loans and trade credits shrink even more, since the conversion rate was even more egregious for loans than deposits.

A common feature of all credit exposure is that the longer the term of a contract, the riskier that contract is, because every additional day increases the possibility of an obligor's inability, unwillingness, or nontimeliness of repayment or making good on an obligation. Time is risk, which is a concept that we will explore further throughout the book.

For each transaction generating credit risk, we will address three fundamental questions in the forthcoming chapters:

1. What is the amount of credit risk? How much can be lost or what is the total cost if the obligor fails to repay or perform?
2. What is the default probability of the counterparty? What is the likelihood that the obligor fails to pay or perform?
3. How much can be recovered in case of bankruptcy? In the case of nonpayment or nonperformance, what is the remedy and how much can be recovered, in what time frame, and at what expense?

TYPES OF TRANSACTIONS THAT CREATE CREDIT RISK

Managing credit risk requires first identifying all situations that can lead to a financial loss due to the default of a counterparty. Long gone are the days when it was an easy task. Today, there are many different types of financial transactions, sometimes very sophisticated, that generate credit risk.

Traditionally, credit risk was actively managed in bank lending and trade receivables transactions. A rule of thumb for identifying credit risk was to look for an exchange of cash or products at the beginning of a commercial agreement. The risk was that the money would not be repaid or the products not paid for. Recently, however, the development of modern banking products led to transactions generating large credit exposures without lending money or selling a product, as we explain in Chapter 5.

Credit risk is present in many types of transactions. Some are unique, but some are rather common. In the following paragraphs, we will describe seven common business arrangements that generate credit risk.

Lending is the most obvious area. There is a cash outflow up front, from the lender to the borrower, with a promise of later repayment at a scheduled time. A second transaction type involves leases, when a piece of equipment or a building is made available by an entity (the lessor) to another entity (the lessee) that commits to make regular payments in the future. The lessor typically borrows money to finance the asset it is leasing and expects the future cash flow from the lessee to service the debt it contracted. The third type is the sale of a product or a service without immediate cash payment. The seller sends an invoice to the buyer after the product has been shipped or the service performed, and the buyer has a few weeks to pay. This is known as an account receivable.

Prepayment of goods and services is a fourth type of transaction that involves credit risk. Delivery is expected at a certain time and of a certain quality and/or performance, and the failure of the counterparty may lead to the loss of the advanced payments and also generates business interruption costs. A fifth type of transaction that creates credit risk involves a party's claim on an asset in the custody of or under the management of another party, such as a bank deposit. Most individuals choose their bank more for the services they offer or the proximity to their home rather than after a detailed analysis of its financial conditions. Large corporates think differently because they have large amounts

of cash available. They worry that the banks with their deposits may default. Before trusting a financial institution, they review its creditworthiness. They also spread their assets among many banks to avoid a risk concentration. With the 2011 bankruptcy of MF Global, many more individuals and businesses will be thinking twice about funds left in brokerage accounts and carefully evaluating limits under the Securities Investor Protection Corporation (SIPC) or, outside the United States, its equivalent.

A sixth type of transaction is a special case of a claim on an asset: a contingent claim. The claim is contingent on certain events occurring, such as a loss covered by an insurance policy. At policy inception, the policyholder has no claim on the insurer. However, once the insured suffers a covered loss, the insured has a claim. If the insurer fails to pay the claim, this would constitute a credit loss. Another example of a contingent claim would be a pension fund that has a claim on the assets of its sponsor should the fund's liabilities exceed its assets. Nothing has been prepaid and no funds were lent, but there is credit risk borne by the pension participants in the event that the sponsor cannot honor the fund's liabilities.

Finally, a seventh type of transaction involves not a direct exposure, but a derivative exposure. It arises from derivatives transactions like interest-rate swaps or foreign-exchange futures. Both parties commit to make future payments, the amounts of which are dependent on the market value of an underlying product; for example, the exchange rate between the U.S. dollar and the Japanese yen. In Chapter 5 we explain how to calculate the amount of credit risk in these types of transactions. Although there is no up-front cash outflow as there is in a loan, the counterparty's financial distress results in the same outcome: loss of money.

These transactions groupings, as described in [Table 1.1](#), are general categories. Further breakdowns are possible that map to particular credit instruments frequently used in these transactions. For example, loaned money can take the instrument form of a corporate bond, a bank loan, a consumer loan, asset-based lending, or commercial paper, among others.

Table 1.1 Types of Transactions That Create Credit Risk

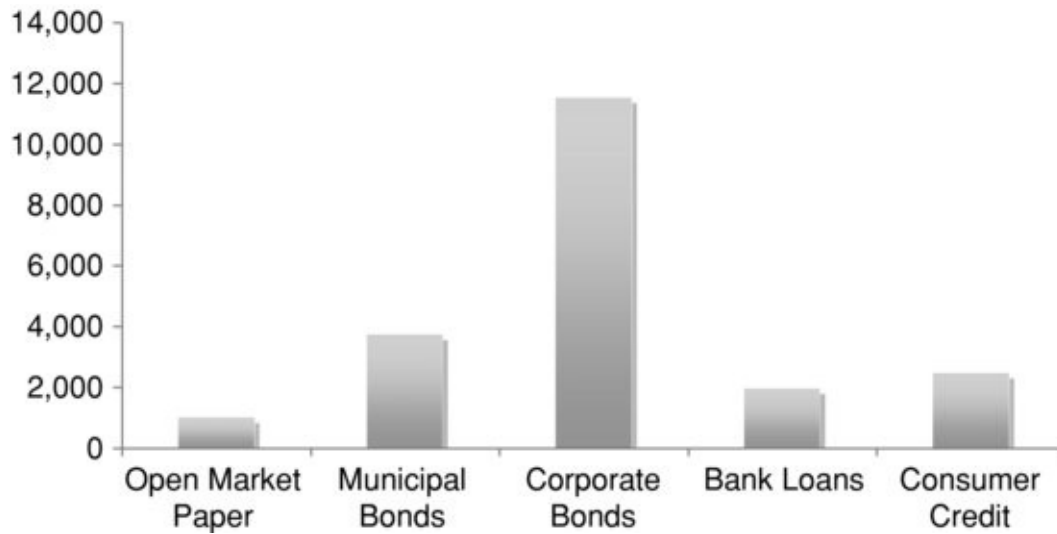
Credit Type	Losses Result From	Loss Type
Loaned money	Nonrepayment	Face amount
	Slow repayment	Time value of money
	Dispute/enforcement	Frictional costs
Lease obligation	Nonpayment	Recovery of asset, remarketing costs,

		difference in conditions
Receivables	Nonpayment of goods delivered or service performed	Face amount
Prepayment for goods or services	Nondelivery	Replacement cost
	Performance on delivery not as contracted	Incremental operating cost
	Slow delivery	Time value of money
	Dispute/enforcement	Frictional costs
Deposits	Nonrepayment	Face amount
		Time value of money
Claim or contingent claim on asset	Nonrepayment/Noncollection	Face amount
	Slow repayment/Slow collection	Time value of money
	Dispute/enforcement	Frictional costs
Derivative	Default of third party	Replacement cost (mark-to-market value)

[Figure 1.1](#) displays credit risk exposure stemming from loaned money by instrument as of September 30, 2011. The predominant source of credit exposure, at least in the United States, is corporate obligations. Although there is roughly \$54 trillion of debt outstanding, representing borrowing in U.S. debt markets, these include noncredit risky instruments such as U.S. Treasury obligations, government sponsored enterprise (agency) obligations, and agency-backed mortgage obligations. Excluding these obligations, the figure is approximately \$23 trillion, and of this, over \$11 trillion, or 53 percent consists of corporate debt (bonds and loans). The remaining obligations are largely corporate related, including bank and other loans (\$4 trillion), and commercial paper (\$1 trillion), most of which is issued by corporations.

[Figure 1.1](#) Sources of Credit Risk by Instrument, Billions USD

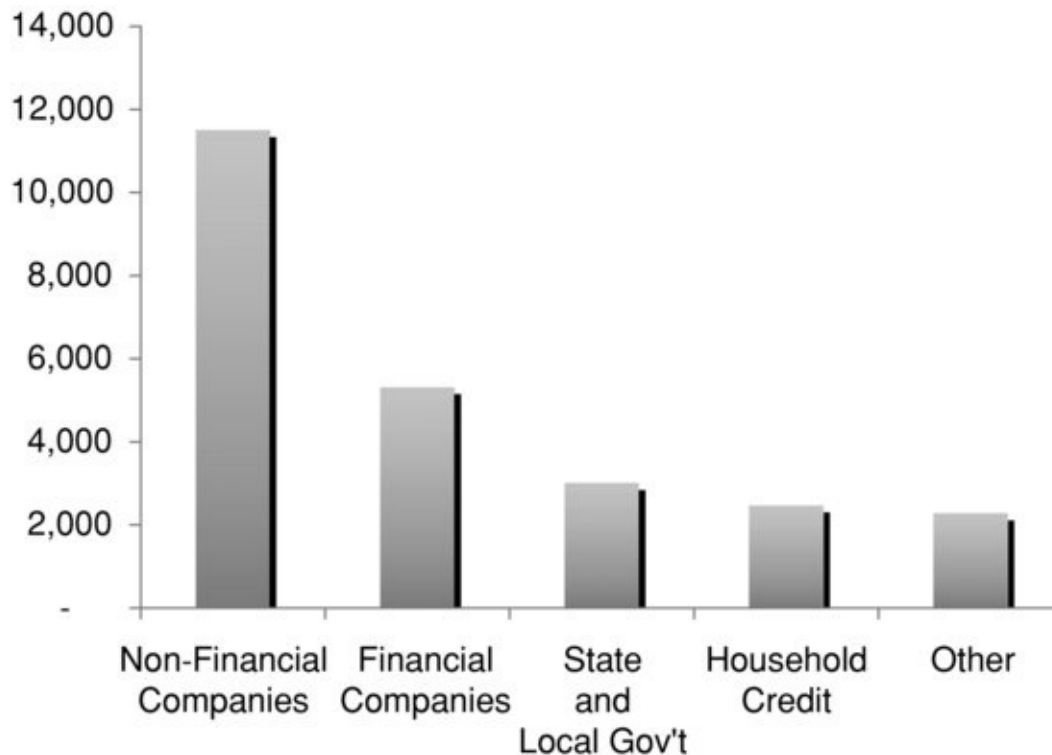
Source: Federal Reserve Board of Governors, “Flow of Funds,” December 8, 2011, Tables L.4 and L.223.



[Figure 1.2](#) displays the source of credit risk exposure by entity. Note that nonfinancial corporations are a far larger source of credit market debt than financial corporations are. Again, we choose not to include federal government debt or household-mortgage debt (the majority of which is agency backed), since one could argue that these forms of borrowing have no real associated credit risk exposure.

[Figure 1.2](#) Sources of Credit Risk by Entity Type, Billions USD

Source: Federal Reserve Board of Governors, “Flow of Funds,” December 8, 2011, Table L.1. Note that deposits are not counted in the Federal Reserve's definition of credit market debt. Household debt excludes mortgages.

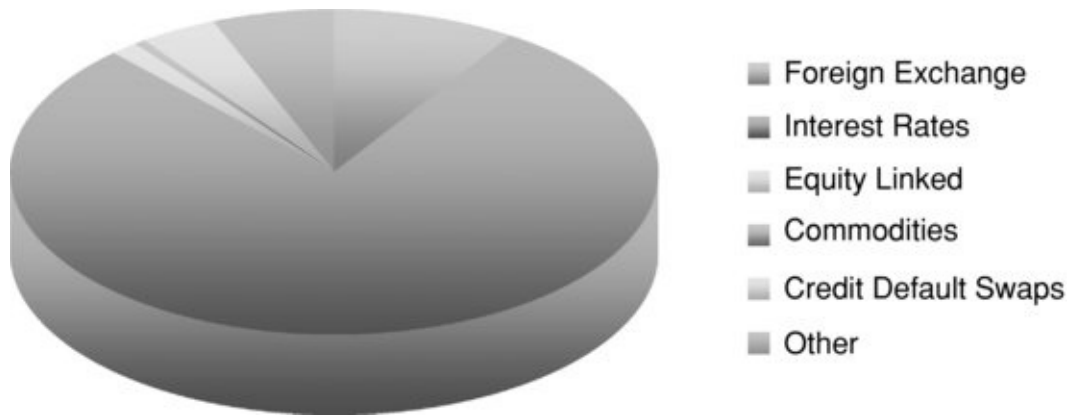


In the United States alone, \$2.4 trillion of trade receivables are on the books of corporations, and this figure represents 72 percent of all trade receivables as of June 2011.¹

Finally, the potential notional credit exposure arising from derivative transactions as of December 2011 is estimated to be in excess of \$700 trillion. The vast majority of this exposure arises from over-the-counter (OTC) interest-rate derivative contracts. [Figure 1.3](#) shows the relative sizing of counterparty credit risk exposure by derivative type, based on the notional value of the contracts. Note that the notional value corresponds to gross credit exposure, which we will discuss in Chapter 4 and is the most conservative measure of credit risk.

Figure 1.3 Notional Value of Counterparty Credit Risk Exposure for OTC and Exchange Traded Derivatives, End December, 2011, Billions USD

Source: Bank of International Settlements, Statistical Release, Table 19, December 2011: “Amounts Outstanding of Over-the-Counter (OTC) Derivatives by Risk Category and Instrument”; and “Detailed Tables on Semi-Annual Derivative Statistics,” end December, 2011; May 2012 “Statistical Release for Exchange Traded Derivatives.”



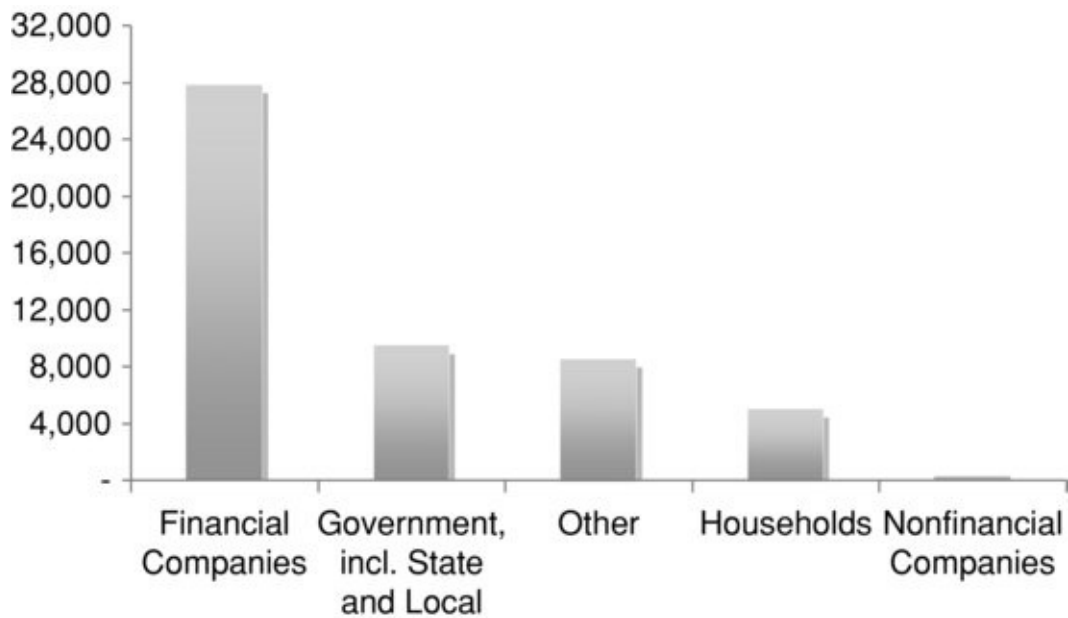
WHO IS EXPOSED TO CREDIT RISK?

All institutions and individuals are exposed to credit risk, either willingly or unwillingly. However, not all exposure to credit risk is inherently detrimental; banks and hedge funds exist and profit from their ability to originate and manage credit risk. Individuals choose to invest in fixed income bond funds to capture extra return relative to holding U.S. Treasury bonds. For others, like industrial corporations or service companies, because they sell goods or services without pre-payments, credit risk is a necessary by-product of their main activities.

In [Figure 1.4](#), we can see who bears the exposure to loaned money. We see that financial companies have the largest exposure, followed by the U.S. federal government, state and local governments, foreign entities, households, and, far behind, nonfinancial companies. This of course is reasonable since nonfinancial corporations are not in business to invest in debt instruments or to assume credit risk as a primary business endeavor.

Figure 1.4 Exposure to Credit Market Instruments by Entity, Billions USD

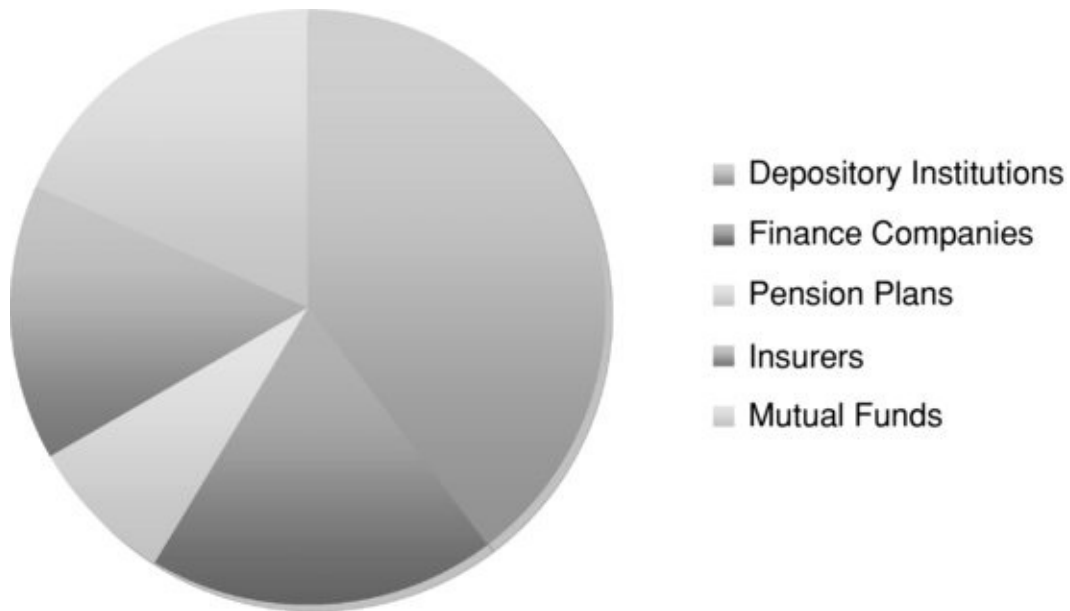
Source: Federal Reserve Board of Governors, “Flow of Funds,” Table L.1, “Credit Market Debt Outstanding,” December 8, 2011.



[Figure 1.5](#) shows the breakdown of the financial sector in terms of who holds the exposure to these debt instruments. Within the financial sector, depository institutions have the most exposure (\$11 trillion), with finance companies, mutual funds, and insurers having about half as much. Pension funds, private and public, also have significant exposure. This figure paints a high-level picture of why some institutions, primarily financial institutions, employ large teams of credit risk managers since so much is at stake.

Figure 1.5 Financial Institutions' Exposure to Credit Market Instruments, Billions USD

Source: Federal Reserve Board of Governors, "Flow of Funds," Table L.1, "Credit Market Debt Outstanding," December 8, 2011.



Financial Institutions

Since financial institutions face the most credit risk exposure, we will naturally focus on these entities throughout this book. In the following subsections, we briefly describe how each of these financial institutions is exposed.

Banks

Because they are in business to extend credit, banks have the largest credit portfolios and possess the most sophisticated risk management organizations. Interestingly enough, their appetite for credit risk has declined over the years, as margins are low and regulatory capital requirements high. The recent activities of regulators across the globe to strengthen the financial system will lead to further reluctance to take on credit risk.

The focus for large banks has shifted toward fee-generating services, such as mergers-and-acquisitions advisory services or debt and equity issuance. However, loans and lines of credit still constitute the largest sources of credit risk for a bank. For corporate clients, they are offered as a way to develop a relationship, and they often would not produce a sufficient return on capital on a stand-alone basis. However, because the loans and lines of credit represent the potential for large losses, banks employ teams of risk managers who do nothing but analyze the credit risk of borrowers and review the loans' legal documents. In order to further reduce the credit risk exposure that these loans present, banks are increasingly turning to the capital markets to hedge the exposure created in

extending the credit.

Loans include asset-based lending like repurchase agreements (“repos”) and securities lending. In short, banks lend money or securities against the provision of collateral such as Treasury bonds or equity. If the borrower cannot repay or give back the securities, the lender can sell the collateral, thus reducing or eliminating losses. In theory, the collateral held is sufficient to cover the amount of borrowed money or the value of the securities in case the counterparty defaults. When the financial markets are volatile, though, the value of the collateral can decline quickly, just at the time when the counterparty defaults. Banks, therefore, manage their exposures carefully. We introduce repos in more detail in Chapter 13.

After loans, the derivatives business generates the largest credit risk exposure for banks and comes from many directions. We will explain in Chapter 5 why derivatives generate a form of credit risk known as “derivative counterparty” exposure. For JPMorgan Chase & Co., the derivative receivables counterparty credit risk exposure on a fair-value basis at the end of 2011 was \$92.5 billion, comprised of interest-rate derivative contracts, followed by foreign exchange, commodity, credit default swap and equity derivatives. Net of cash and liquid security collateral, the derivative receivables exposure was approximately \$71 billion, which compares to its equity base of almost \$184 billion. Although the ratio appears large, the value of the receivables declines over time and the exposure metric represents what would be lost if all counterparties defaulted on the date that the exposure was valued.

Most of the examples that will be used in this book relate to banks' exposures.

Asset Managers

The asset management business consists of collecting money from individuals and institutions and investing it in order to meet the investors' risk and return objectives. For instance, cautious investors anxious to protect their principal prefer money-market funds, primarily invested in short-term and high quality debt. Investors with more appetite for risk may favor mutual funds focusing on equities or emerging markets debt and equity.

Asset management is a huge business worldwide. In the United States, companies like State Street Global Advisors or Fidelity Investments manage more than \$1 trillion of third-party money. The result is that asset managers, with huge amounts of money to invest, face credit risk exposures whose management

is integral to their business model. When managers select their investments, they pay very close attention to the creditworthiness of a corporate or of a sovereign borrower that has the potential to reduce the performance of their fund, including causing losses to their clients. Whereas portfolio managers may be tempted to make investments that promise high return, the funds' risk managers will discourage the portfolio managers from doing so due to the real possibility that the money may not be repaid.

Hedge Funds

Hedge funds also have vast amounts of funds to invest daily and have a correspondingly large amount of credit exposure. Their investors have a greater risk appetite, but demand high returns to compensate for this risk. They are, therefore, more aggressive than typical investors, and they invest in riskier financial instruments, many of which traditional asset managers do not have access to. Their participation in financial markets has made many business transactions possible by allowing risk to be transferred that otherwise would not have occurred. For example, they may purchase distressed loans, sell protection against a decline in a borrower's creditworthiness, or assume the riskiest positions in commercial real estate financing, all of which allow for the necessary transfer of risk to make a transaction possible. In many corporate restructurings, hedge funds play a proactive role to maximize their recoveries, as a result of their investment in risky debt.

What is unique though is that some hedge funds also view the possibility of an entity defaulting as an opportunity to deploy capital. In contrast to traditional financial institutions that hire credit risk managers to avoid the default of their counterparties and protect shareholders' money, hedge funds employ resources to identify entities that may default. They enter into transactions that make, not lose, money, in cases of financial distress.

Whereas a bank that has a credit exposure may want to hedge the exposure and collect if a credit-loss occurs, a hedge fund may profit from the financial distress of an obligor even if it has no direct exposure to that obligor. The growth in derivatives products has made the execution of such strategy relatively easy. We will describe in Chapter 16 how credit default swaps (CDSs) work and how they can be used to “short” credit; that is, to make money when the financial situation of a company or a country deteriorates.

Insurance Companies

Insurance companies are exposed to credit risk in two main areas: their investment portfolio and reinsurance recoverables. The insurance business is similar to asset management in that the company has vast amounts of cash to invest. It collects premiums from policyholders, invests the money, and later pays claims when losses occur. It is not unusual for an insurance company to show losses on its core underwriting operations (i.e., claims paid exceed premiums collected for a block of policies) yet record profits, thanks to their investment results. Every year, in his annual letter to Berkshire Hathaway shareholders, Warren Buffett, who owns insurance companies like GEICO, spends pages explaining why he likes a business that provides him with cash flow and the means to do what he likes and does best, invest.

An insurance company's balance sheet is, therefore, characterized by large amounts of claims reserves on the liability side and corresponding investment positions on the asset side. The reserves do not belong to the shareholders but to the policyholders who, in the future, may claim money from the insurance company after a loss. The largest U.S. life insurance group, MetLife, Inc., holds nearly \$500 billion of assets on its balance sheet as of the third quarter of 2011.

As a result, insurance companies are among the largest and most active institutional investors. With each dollar of their investment portfolios comes the possibility not to be paid back. In the insurer's strategic asset allocation process, one of the most important criteria is credit risk. Management of this risk is key since there is a trade-off between expected return, which favors shareholders, and maintaining a low risk profile, which favors policyholders. Their portfolio will include large proportions of safe Treasury bonds, which require little to no credit analysis, as well as riskier and higher returning debt issued by commercial real estate vehicles or even leveraged equity investments in hedge funds. Insurance companies have large dedicated teams of professionals in charge of managing all credit positions they hold, even when these positions are managed on a day-to-day basis by a third-party asset manager.

In addition, life insurance companies manage money on behalf of their policyholders in separate accounts, and from this perspective they are similar to a mutual fund. In the case of MetLife, Inc., it manages more than \$200 billion of customer funds. For many of these accounts, there is no risk sharing between policyholders and shareholders. However, in these instances, if the insurer makes poor investment decisions for their policyholders, the insurers may suffer

damage to their reputation and jeopardize future business opportunities. For other accounts, the insurer may guarantee minimum returns and failure to earn the minimum, say due to credit losses, would deplete the insurer's capital base or even cause insolvency.

The other area of credit risk faced by the insurer relates to their reinsurance activities. Insurers first originate policies that carry the risk of claims becoming far larger than premiums collected. If so, reserves set aside will be inadequate to cover losses, and insurers' capital would be tapped. Thus, behind the scenes, insurance companies all over the world transfer some of the risks they originate to reinsurers. The reinsurance business is dominated by a handful of large, primarily European companies like Munich Re (Germany).

The transfer of the risk from primary insurers to reinsurers happens via commercial agreements. The model is straightforward: Insurers who originate policies and collect policyholder premiums transfer part of the risk by buying a policy and paying a premium. Once a policyholder reports a claim to the insurer, the insurer reports part of this claim to the reinsurer. The insurer's claim then becomes a reinsurance receivable and it has to be paid within a few weeks. During this period, reinsurers verify and sometimes question the validity of the claims. For small and frequent losses, the credit risk stems essentially from this time lag. The amount of premium paid equates more or less to the amount of losses to be claimed, with the risk being that the reinsurer has disappeared in between. For catastrophic losses, the credit risk is much larger. When an earthquake or a hurricane occurs, reinsurers may have inadequate resources to make payments. Thus, primary insurers must carefully choose their reinsurance partners, and try to avoid "putting all their eggs in one basket;" that is, they distribute risks among many reinsurers, which is not an easy task because the industry is highly concentrated.

Another form of credit risk associated with reinsurance is the contingent claim that the insurer has on the reinsurer. In the preceding example for receivables, the primary insurer knows its losses and submits its claim to the reinsurer. However, in the case of some liability policies, there can be decades between collecting premiums and the policyholder's report and ultimate settlement of a claim. The insurer must estimate what these claims might be, and these estimates generate a contingent claim on the reinsurer, that is, an asset on its balance sheet contingent on the event that it ultimately pays those estimated losses to policyholders. This asset is called a reinsurance recoverable, and it represents an even larger item on an insurer's balance sheet than receivables on paid losses,

and for the typical insurer, it is usually the largest single item on the asset side of the balance sheet after invested assets.

Pension Funds

Similar to a life insurer that invests monies on behalf of a policyholder, a pension fund sponsor (e.g., corporate employer) invests funds on behalf of pension beneficiaries. As of September 2011, assets under the management of all U.S. private pension funds totaled \$1.2 trillion, and those under U.S. public pension plans sponsors (state and local governments) totaled \$989 billion. A significant portion of these funds, from one-quarter to one-half, is invested in credit risky assets. Private pension funds must abide by ERISA (Employee Retirement Income Security Act of 1974) prudent-investor rules, and public funds have similar standards; as such, both must be active managers of credit risk even if the asset management of the funds is outsourced to third-party managers. On a final note, federal pension funds do not have significant assets, mainly because their obligations are largely unfunded.

Corporates

Corporates do not like credit risk but cannot avoid it. It is a by-product of their operations, and their position is not enviable. Investors, rating agencies, and other stakeholders have little tolerance for credit losses, and yet credit risk management is outside of their core competency. To make matters worse, when the customer of a corporation files for bankruptcy, a list of the customer's creditors is published and often relayed by the mass media. The bankruptcy of a customer creates negative publicity and can have a negative effect on the corporation's stock price performance and raises questions about the quality of its operations.

The biggest source of credit risk for a corporate is account receivables. Sales are generally not paid in advance, and, thus, corporates have effectively extended short-term credit to their customers. The stronger the customer, the longer and more favorable the terms of payment are for that customer. Well-known examples in the retail industry of a company's ability to extract long and favorable terms from suppliers are Wal-Mart in the United States, and Carrefour in France.

Assessing the credit quality of a customer can be very challenging. Most corporates have a few large clients for whom public information is current and

easily available. However, the majority of a company's business customers are often small firms for which reliable financial data are more difficult to obtain. In the past 20 years in developed economies, progress has been made toward making the publication of updated statements compulsory, but there is still a long way to go.

Risk managers working in corporations have to make credit decisions based on spotty information. They are helped by specialized companies that have developed databases with millions of records related to financial information and payment patterns. A credit score that summarizes the most relevant criteria to assess the probability of getting paid can complement raw data. The most well-known vendor in the United States is Dun & Bradstreet; in Europe, Bureau Van Dijk; and in Japan, Teikoku Databank.

Faced with the decision of whether to sell to a customer, corporates have options to mitigate this credit risk exposure:

- They can buy insurance on their receivables, and an insurer indemnifies them in the event they are not paid.
- They can sell their receivables to factoring companies, which provide cash and credit insurance at the same time.
- Foreign transactions can be secured by documentary credit.

These mitigation tools will be explored in Chapter 15.

The second source of credit risk for corporates stems from the circumstance in which they have significant amounts of cash to invest. When investor demand for long-dated bonds is high and yields are low, large corporates take advantage of the market conditions to draw on their credit lines or they issue large amounts of bonds even though they have no immediate funding needs. They build war chests that they can use when acquisition and other business opportunities arise. For example, in 2012, corporates had a record amount of cash borrowed at record low yields. Yet, due to the recession and the dearth of investment opportunities, the cash was not deployed into the business but instead was deposited in banks and invested in short-term securities, both of which bear credit risk.

Generally speaking, corporates are prudent and favor safe investments like cash and cash-equivalent products, thereby limiting the amount of credit risk they are taking. Certainly, it makes little sense for bondholders to hand over cash for the corporate to buy securities or deposit in banks, since the bondholders could do that directly. However, as we saw in the recent financial crisis, even

cash was not safe. Corporates re-evaluated creditworthiness of the banks that held their deposits and then diversified their deposits across banks, knowing that, ultimately, no bank is “too big to fail.” Another consequence of the financial crisis and the re-evaluation of credit was that the demand for U.S. Treasury bills grew by an unprecedented amount, to the point where nominal yields became negative. Corporate and other investors literally paid to park their investable funds, arguably due to fear of credit losses. Oddly enough, one reason the demand for corporate bonds has been so high in recent years is that nonfinancial corporations emerged from the financial crisis and the ensuing recession as arguably the most prudent stewards of investor funds, unlike state and local governments, government sponsored enterprises, and others, so parking cash with a corporation never looked so safe.

For certain industry sectors, the third source of credit risk, is—by choice or by obligation—derivative trading activities, such as the trading of commodity futures. Given the volatility of the price of commodities, corporates that need these raw materials usually enter into long-term fixed-price contracts. Examples include food companies, which buy agricultural futures, and utilities, which buy combustible product futures to lock in the cost of running their power plants.

Inherent in these trades is a counterparty's inability to make or take delivery of the commodity, and both parties in the trade are exposed to each other's credit risk—the seller who must make delivery and the futures buyer who must make a payment. In the past two decades, the futures markets have become adept at mitigating these inherent sources of credit risk with the clearinghouses requiring margins, or collateral, which vary with the price of the commodity, and providing a backstop to these transactions in the event that the margin proves insufficient. However, many corporates are engaged in the buying and selling of commodities for delivery at a future date that does not happen on an organized exchange, that is, using forward contracts, and in these cases, the credit risk exposure is large on both sides. The counterparty can default on its obligation, forcing the corporate to buy or sell in the spot market at prevailing conditions, which can result in a mismatch of costs and revenues with the potential for significant losses. In Chapter 5, we will review examples of contracts that create large credit exposures, especially compared to the company's income and capital bases. Corporates engaged in these industries—agriculture, food, energy, and utilities—generally have the most well-developed credit management teams.

Finally, some large corporates that produce expensive equipment have financing arms to help their clients acquire or lease their products. This activity

is known as vendor financing. IBM Global Financing (technology), Caterpillar Financial Services (heavy equipment), or Ford Motor Credit Company (automobile) are good examples. They work exclusively for their parent company's clients, and they function like nondepository banks. The business model is to buy equipment from their parents with borrowed money (bank debt and capital markets) and to rent or lease the equipment to customers. The risk is that customers may default on their repayments and leave the lenders with credit losses.

Individuals

Few individuals worry about credit risk, but the reality is that all households are exposed. Think of the situation in which a family loses money because they made advance payments to a contractor who does not complete the home-renovation project. This is credit risk!

Individuals also bear credit risk in their investment activities, just as insurers and corporates do. The individual manages credit risk in his or her selection of the mutual fund to invest in. The investor may choose to invest in a high-yield fund versus an investment-grade bond fund to extract more yield by taking more credit risk.

Finally, money deposited at banks generates credit risk. Regulators frequently shut down banks, which can lead to losses for their clients. In most countries, some protections are in place. In the United States, the Federal Deposit Insurance Company (FDIC) guarantees all deposits up to \$250,000 per account.

WHY MANAGE CREDIT RISK?

An important aspect of credit risk is that it is controllable. Credit exposure does not befall a company and its credit risk managers out of nowhere. If credit risk is understood in terms of its fundamental sources and can be anticipated, it would be inexcusable to not manage it.

Credit risk is also the product of human behavior; that is, of people making decisions. Precarious financial circumstances that obligors may find themselves in result from the decisions that the company's managers have made. The decisions that they make are consequences of their incentives and the incentives of the shareholders whom they represent. Understanding what motivates the shareholders and managers is an important aspect of a counterparty's credit risk

profile. We explore more of this thinking in Chapter 6, “Fundamental Credit Analysis.”

In summary, weak management of a credit portfolio can be costly and can even lead to bankruptcy. As we will review in Chapter 10, exposure to credit risk is capital intensive. A large equity base must be built to survive large and unexpected losses. With a credit portfolio, a large number of small losses are expected and manageable. However, there is also a small chance to face large losses, which can be lethal.

All firms should devote significant attention and resources to credit risk management for their own survival, profitability, and return on equity:

- **Survival.** It's a concern primarily for financial institutions for which large losses can lead to bankruptcy, but even a nonfinancial corporation can have credit losses that can cause bankruptcy.
- **Profitability.** It sounds trivial to state that the less money one loses, the more money one makes, but the statement pretty much summarizes the key to profitability, especially of low-margin businesses.
- **Return on equity.** Companies cannot run their business at a sufficient return on equity if they hold too much equity capital. Holding large amounts of debt capital is not the solution either, because debt does not absorb losses and can introduce more risk into the equation. The key to long-term survival is a sufficiently high amount of equity capital complemented by prudent risk management.

During the recent financial crisis, certain global players performed much better than their peers thanks to very powerful credit risk management principles that kept them afloat. In any economic environment and for any type of company, actively managing a credit portfolio can help increase the company's return on equity. We will review in Chapter 9 the basic principles of portfolio management. In short, the objective is to maximize revenues for a given amount of capital allocated to credit activities.

¹ U.S. Federal Reserve Board of Governors, “Flow of Funds,” Table L.223 Trade Credit.

CHAPTER 2

Governance

One individual or a group of individuals can make a bad judgment about a specific transaction. As a result, a firm can lose money, even a lot of money if the transaction is sizeable, but it is unusual that a single transaction leads to the bankruptcy of a company. Serious problems that lead to bankruptcy occur when portfolios of toxic transactions are built. In the absence of fraud, what allows this to occur is a poor risk management framework and corporate governance failure. All professionals follow the rules, but either the rules don't function as intended, staff are not adequately skilled, origination lacks oversight, incentive systems reward the wrong goals, or the approval processes are flawed. When massive losses occur, investigations often reveal that all procedures were respected. It was a collective failure and there is nobody to blame.

Therefore, the question is: What is the best way to organize credit risk management in a large organization? The focus of attention must be on the processes that lead to risk taking—primarily origination, credit risk assessment, and approval processes.

We are not saying that operations of Portfolio Management (Part Three of this book) and Mitigation and Transfer (Part Four) are not important as well, but the best way to avoid losses is not to enter into bad transactions to start with. There are no efficient portfolio management or mitigation strategies that can compensate for deficient risk-taking activities. When a bad portfolio of transactions is originated, it is too late, and there is a high probability that it will translate into heavy financial losses.

If origination drives performance, then what drives origination? Most corporations' incentive systems reward top-line growth (in part because actual versus expected bottom-line growth is not immediately observable) and sometimes return on risk-adjusted capital. Originators will push for volume, expected margins, and expected returns, all of which are enhanced by showcasing their transactions in the most favorable light possible. In this environment, the risk manager must control quality. Best practice for the governance system revolves around four key principles, which are critical to the quality of what gets originated:

1. **Guidelines:** Clear guidelines governing the approval of transactions

generating credit risk.

2. Skills: Delegation of authority to committees and people with appropriate skills.

3. Limits: Setting up of limits.

4. Oversight: Qualified staff with adequate independence and resources.

GUIDELINES

Guidelines are a set of documents that explain the rules that must be complied with before a transaction is concluded. These guidelines are sometimes called “credit policies,” “risk management standards,” or some variation of these, all of which refer to the same thing.

To be efficient, guidelines must have the following characteristics:

- **Understandable:** Language must be clear and simple. Guidelines should be easy to understand and written in plain language. This is especially true for global organizations in which not every line manager is a native speaker. The guidelines are not a set of legal documents that establish a foundation to take action against an individual who breached them but rather an internal document whose purpose is to enable compliance. It may be a good idea to exclude lawyers from the initial drafting of guidelines!
- **Concise:** The size of the guidelines must be reasonable. If they are too long, no one reads them. A well-written document respects the reader's time and gets to the point quickly.
- **Precise:** The necessity to be short and understandable must not come at the cost of being overly general that render the guidelines ineffective. Guidelines that lack specificity can allow for bad transactions to fall through the cracks. Rather, the guidelines must address real-life situations in some detail so that the origination and line staff know what they have to do prior to closing a transaction.
- **Accessible:** All professionals who need the guidelines must first know where to find them. It seems obvious, but in too many cases, guidelines are buried in an organization's ever-changing document retrieval system. As a result, many professionals cannot even locate the most up-to-date set of guidelines. A simple and efficient way to make guidelines accessible is to prepare a one-or two-page summary that can be posted on a wall or included in a folder with reference to the name and location of the complete set. This

will serve to remind staff of the risk management principles guiding transactions and of the whereabouts of the full set.

Creation and Approval Process

Guidelines are what ultimately protect the shareholders' capital of a firm and sometimes the firm's very existence. Bad human judgment is a common characteristic of poor transactions, but the executive management of a firm is ultimately accountable if the guidelines, either by direct authorization or omissions, permit certain transactions to occur.

This is why guidelines must be sponsored by a senior executive such as the chief risk officer or the chief financial officer and the approval of guidelines must be done by the most senior risk management committee. Companies listed on the New York Stock Exchange must have the audit committee of the Board of Directors review risk management policies, so for these firms, the audit committee would have the ultimate oversight on the guidelines. In addition, most financial institutions have a separate risk committee within the Board of Directors, which would also be responsible for the oversight and review of these guidelines.

A process must be in place to maintain guidelines, keeping them up to date and in-step with the evolution of the business. They must, therefore, be reviewed and modified from time to time. It is also the responsibility of the most senior risk committee to request regular updates about the quality and the relevance of the existing guidelines.

Promulgating and Maintaining Guidelines

The chief risk officer's office will own the guidelines, and it is this department's responsibility to draft, seek approval for, promulgate, and maintain the guidelines. In large organizations, this is a full-time job for one professional. It is crucial that this person has more than a basic knowledge of the underlying business, as well as enough seniority, for the following reasons:

- **Knowledge:** Guidelines must realistically reflect the way products and markets operate and evolve. Junior persons do not have a sufficient understanding of the business environment to either write good guidelines or to educate staff members of the guideline's intent.
- **Politics/Diplomacy:** Authoring guidelines does not make anyone popular.

Creating or modifying guidelines can be a power game between line managers/originators and risk managers, which will be contentious and involve significant negotiation. Senior people can better handle delicate situations and can better resist pressure.

- **Approval process:** As explained later, guidelines are approved at a very senior level of an organization. As such, they have to be sponsored and presented by staff who are credible with sufficient experience and knowledge.

The need to create new or significantly modify existing guidelines arises when a company enters a new business area, when markets experience change or innovation, or if operations change significantly, including mergers-and-acquisitions (M&A) activity. Even in the absence of these changes, existing guidelines need to be updated periodically since operations are never static.

Content of Guidelines

Guidelines should include but need not be limited to the following topics:

- Purpose of the guidelines.
- Methodology for defining a transaction's key parameters.
- Transaction approval and delegation of authority.
- Process to deal with new products.
- Process to review and update the guidelines.
- Consequences of failure to follow guidelines.

Breach of Guidelines

If the company is well managed, the breach of guidelines should be infrequent. A breach is a serious act, and in most financial firms, it leads to immediate termination of employment. No one is supposed to take more risk than what the Board of Directors has accepted. That is why it is so important that guidelines are known and understood.

Guidelines can have carve-outs, for such variables as foreign-exchange volatility. For example, an originator may conclude a transaction that uses up the company's available credit limit for a particular counterparty but then finds the exposure over the limit due to exchange rate movements. The guidelines would have addressed this type of outcome and expressed limits on, for example, a local currency basis, since foreign-exchange management is usually handled by

the treasury function.

A centralized database that captures information on transaction exposure and other key credit parameters as they relate to guidelines is a tool that enables their enforcement and also facilitates deal flow. Originators can do a quick look-up to see if their proposed transaction is permissible. Having such a system obviates the need to second guess whether an originator knew the rules since the feedback is instantaneous. If an originator tries to enter a nonauthorized transaction, the system will reject it; and if the transaction is done anyway, the system provides documentation that it was unauthorized.

SETTING LIMITS

Limits represent the absolute dollar (or other currency) amount of risk that a company wants to take, or, in other words, the maximum loss that a company is prepared to withstand. They are frequently called credit lines. Limits can be attached to counterparties, industries, countries, or products. The concept is more complicated than it appears, because, for some transactions, the maximum loss in case of bankruptcy cannot be estimated in advance and depends on the market at the time of bankruptcy. This is the case for long-term supply/purchase agreements of physical commodities or derivative transactions. We will explore the concept of dynamic credit exposure in Chapter 5.

To work around the uncertainty of certain exposures, combinations of limits are frequently used. For instance, a company may state that it is comfortable taking \$200 million of risk on Company A but that exposure stemming from derivative transactions must not represent more than 50 percent of the total.

How to decide what the limits should be is more art than science. One can rely on value-at-risk models (Chapter 10) to make a link between the parameters of the exposure and the capital the company wants to risk with credit activities. Quite often, though, experience and gut feelings prevail. The executive management believes that a loss of, say, \$150 million would be accepted by external parties such as shareholders, rating agencies, or regulators. So they set the absolute limit at \$150 million for all counterparties but accept much smaller exposures on weaker names, based on their individual credit characteristics.

Ideally, all originators know the aggregate size of the credit lines for each of their counterparties. If several business units are competing for the same credit line for a particular counterparty, the credit line can be allocated to business in

advance. The existence and size of the credit lines are actually a frequent source of tension between front offices and risk management teams. Originators' preference is to have pre-approved limits so that they can start marketing to prospective clients and not be in the undesirable position of generating business that is subsequently not supported by their firm.

SKILLS

In a perfect world, all transactions would be approved by committees composed of the firm's most senior people. This is naturally not feasible, so the authority granted by the Board of Directors to the executive management of a firm has to be delegated further.

The rules to delegate authority constitute a central piece of the guidelines and a source of friction between risk management and the origination units. An old cliché in risk management circles is that risk management priorities are (1) not to lose money, and (2) to make money, in that order, and that business priorities are (1) to make money, and (2) not to lose money, in that order. To simplify, originators typically want maximum freedom that risk managers do not want to grant them. Originators have the responsibility to sell products and to grow the business. They have profitability objectives and they require freedom to execute their business plans. They want the ability to close transactions without having to garner approval from too many people. The role of risk managers is to see beyond the expected profitability of a transaction and to think of the consequences of a nonfavorable development.

Importantly, the risk management unit has no approval authority. It is not a profit center and, as such, risk managers play an advisory role helping individuals or committees decide whether they want to enter into a transaction. This does not diminish the value of risk management but just reflects the fact that business managers are accountable for the top and bottom lines of their units.

Note that, for transactions meeting certain criteria, input or a recommendation from risk management may be required, and these criteria will be clearly stated in the guidelines. It is rare that risk managers have a veto right. If they strongly disagree, they must have a platform to express their opinion. A written memo must be attached to the documentation package for the credit committees. They must sit in the committees and have the opportunity to present their opinion in

person.

The delegation of authority follows a two-step process:

Step 1: The assignment of fundamental parameters that characterize, from a risk management point of view, each and every transaction.

Step 2: The delegation of the approval authority based on these parameters.

An approval process must also be defined for transactions for which guidelines do not enable, due to complexity or uniqueness, the assignment of parameters. The guidelines may require that these types of transactions are automatically elevated to a high-level authority, such as a transaction committee, which may recommend further upward delegation.

Defining Risk Parameters

The most common parameters of a credit-sensitive transaction are:

- **Amount of exposure:** This represents an estimation of the maximum amount of money that a company can lose. The way to calculate this number depends on the nature of the transaction.¹
- **Credit quality:** Each company must develop a scale to summarize the creditworthiness of each counterparty.²
- **Tenor:** This is the period of time during which there is credit exposure at the end of which there is remaining financial obligation due by the counterparty. In the example of a loan, the tenor is the period between the closing of the loan agreement and when the last principal repayment is due.


Delegation of Authority

The simple rule is that the riskier the transaction, the higher the approval level must be. Transactions with a high exposure or a low credit quality or a long tenor necessitate senior-management attention and must be approved by committees staffed with people with the relevant level of knowledge, experience, and hierarchical level. On the contrary, small and short-tenor transactions with a high-quality counterparty can be approved at a lower level. Simple and straightforward transactions can even be approved by a single individual.

When a transaction enters the pipeline of a firm, the first step in the delegation of authority is to assign fundamental parameters to that transaction. It is then compared to the thresholds of the guidelines to decide who or which committee has authority to approve it.

An example of approval authority can be found in [Figure 2.1](#), in which the counterparty's credit quality is on the vertical axis, the delegation of authority is on the horizontal axis, and transaction exposures are represented by the values inside the figure.

Figure 2.1 Single Transaction with a Tenor Up to Five Years

		Exposure in U.S. Dollars			
Internal Rating of the Counterparty	R1	150	200	250	
	R2	125	150	175	
	R3	100	125	150	
	R4	75	100	125	
	R5	50	75	100	
	R6	25	50	75	
		Head of Trading	Head of Trading	Transaction Committee	Executive Risk Committee
		 Recommendation of Credit Risk Assessment Unit			

Let's take the example of a three-year transaction with a counterparty rated R3 that generates an exposure of \$130 million. The tenor is less than five years, so the chart in [Figure 2.1](#) applies. The transaction must be approved by the transaction committee that has authority for an R3 counterparty up to \$150 million, and, in addition, requires the recommendation of credit risk management, which is required for all transactions in excess of \$100 million in this rating category.

The hierarchy for the authority delegation may begin with the individual originator, then progress to the business unit head, which may then be followed by a transaction committee that is made up of unit heads and relevant advisors, such as compliance, legal, and tax. Beyond a certain size, credit quality, and tenor thresholds, transactions will be delegated to an executive board or a credit committee, which is comprised of the firm's most senior management, and would include among others, the CFO, the chief counsel, and the CEO. Importantly, this authority delegation is cumulative, meaning each delegation level must approve the transaction. A transaction cannot go directly from the originator directly to the credit committee without first being endorsed by the intervening levels.

Credit Committees

The highest level of approval is often called the credit committee and is staffed with the firm's most senior executives. The transactions that arrive here have a lot at stake and as such, they follow a few basic principles:

- The quality of the decision is highly dependent of the quality and the diversity of people sitting on the committee. All disciplines must be represented to make sure that no aspect of a transaction is forgotten. The following departments that must be represented include but are not limited to the business unit (i.e., profit center), risk management, legal, tax, compliance, and accounting.
- The charter of the credit committee must be part of the credit guidelines or other document detailing the approval process.
- Membership must be personal with limited ability to delegate.
- Originators must prepare an approval package. It must cover all aspects of the transaction and be distributed well in advance so that committee members have time to read it and request additional information or advice if necessary.
- There must be a respected chairperson who allows all parties to present their opinions and facilitates the discussion in a dispassionate manner.
- Originators bringing a transaction must understand that a committee can say no. A committee that never says no is not efficiently managed.
- If there is no consensus, a vote can be held.
- The discussions must be recorded with detail and accuracy via meeting minutes, distributed quickly after the meeting. If a transaction goes sour, one of the first documents that management and auditors ask for are the credit committee minutes.

OVERSIGHT

Risk management is the first line of defense to protect an organization's balance sheet. Efforts to originate and structure transactions are useful but, ultimately, choosing the right transactions is what distinguishes the good organization from the weaker ones. It is, therefore, essential that risk managers are qualified and work in an environment that enables them to perform their tasks efficiently.

Independence

The issue of independence is today much better understood than a few years ago. There must not be any compromise about the independence of the risk management unit. Two simple rules are:

1. It should never be located within a business unit with a profit center.
2. A risk manager's compensation should never be based on the profitability of the business.

All staff involved in risk management must have a chain of command that ultimately reports to the chief risk officer (CRO) and not a business unit head, to maintain independence and avoid conflicts of interest.

Many large companies have a CRO who reports directly to the chief executive officer. As such, she or he occupies the same seniority as the most senior business heads. Beyond the formal hierarchy and approval process, the reporting structure allows the CRO to informally influence the CEO. This is important not so much for any actual objections that the CRO may voice concerning a particular transaction or product, but more because the business unit heads know that this access is there, which should steer them toward complying with the guidelines.

Lastly, the CRO is likely to have privileged access to the risk committee and/or the audit committee of the Board of Directors. To the extent that the directors are truly independent, which under Sarbanes-Oxley is increasingly the case in the United States, this feature may be the most critical element to ensure independence of the CRO.

Qualifications

Getting the respect of the business partner is a goal of risk managers. Conflicts are part of the job but they don't prevent mutual respect; to achieve it, it is essential that everyone speaks the same language. Business people do not have time to educate the risk managers who would lose credibility and political capital if they would need to have fundamental elements of transactions explained to them.

As much as originators are confident in their skills, they do not mind hearing constructive criticism from time to time. Having quality risk managers as sparring partners helps them innovate and formulate a better proposition. When the risk manager is weak, originators wait to involve him or her until later in the process and just for the purpose of obtaining the required recommendation.

Proximity to the Business Unit

As much as we advocate for a strict independence from the business unit, risk managers must be located organizationally and physically near operations since they need to have a full understanding of the underlying business. They must fully comprehend what motivates their peers, the customers, the vendors, and all parties involved in a transaction. Physical proximity allows risk managers access to this.

Although it is unusual for risk managers to be invited to business discussions with clients, a good credit risk manager who has gained the trust of the originator can bring value to a client discussion. In particular, when originators do not make progress with a client because of a term, condition, price, or limit, bringing in a risk manager who can diplomatically articulate the rationale for the firm's position can be persuasive or at least act as damage control on the relationship. Two caveats for accepting these invitations.

First, risk managers are not necessarily seasoned negotiators. Good negotiators always enter a negotiation with a very firm walk-away position. They know that they can be sensitive to a client's arguments during a live discussion and refrain from making decisions under pressure they may regret later. Good risk managers must do the same. They must know in advance the absolute limits they do not want to breach and use the forum as a platform for conveying these limits.

Second, being too close to front office activities can backfire. The risk manager's *raison d'être* is to provide a different point of view and to protect the firm's balance sheet.

Open Mind

Let's finish with a soft factor. . . . One old cliché of risk management is that “a good risk manager does not say no but how.” In other words, the art of risk management is not to refuse transactions, but to make suggestions that enable their acceptance. The good thing about this concept is that both the business and the risk management sides agree with it. Business people want to close deals and the risk manager who says no is a source of frustration. An effective risk manager understands their point of view and helps them succeed. Jobs in risk management are more interesting if they involve the ability to sit down with originators, discuss the details of a deal, and support its structuring.

FINAL WORDS

One sentence frequently heard in the financial industry is that the real head of risk management is the Chief Executive Officer (CEO). This goes beyond the idea that the CEO is ultimately responsible for the profitability of the firm and that he will pay cash (understand he will be fired) bad decisions based on bad judgments. However, a company does not have to go through a quasi-death experience to realize how central risk management is in the day-to-day operations. What the statement really means is that the CEO has the absolute responsibility to make the whole organization respect risk management principles.

As each and every employee must be aware of the risks involved in doing business and must be committed to adhere to strict principles, it cannot happen that the senior management does not set the example.

What is expected is that the CEO and his direct reports support the established risk management principles and behave just as if they were directly in charge of risk management. When making strategic decisions, not only day to day transactions but also, for instance, mergers and acquisitions, the CEO has to involve his risk management department at the right time.

¹ We present these details in Chapters 4 and 5.

² We present these details in Chapters 6, 7, and 8.

CHAPTER 3

Checklist for Origination

In the previous chapter, we described some key governance issues as they relate to activities generating credit risk. A good organization is not enough though. The profitability of a credit portfolio is heavily impacted by the way all professionals involved in the process behave. It all starts with the handling of new transactions. In the context of this book, this is what we call origination.

Origination also matters for business deals that are not credit deals per se. In the ordinary course of business, companies assume credit risk in order to sell products and services, such as extending credit to a customer. For these types of transactions, the same principles about origination apply. Business heads will seek to generate volume and will want to make credit terms easy for clients. That extension of credit must follow the exact process as described in Chapter 2, for example, establishing guidelines, limits, assigning parameters, and putting together an approval process that is clearly defined.

Since the best way to avoid credit losses is to carefully select transactions to enter, good credit risk management starts with origination. Even under pressure to generate revenues, smart organizations differentiate themselves by their ability to avoid bad deals and to select strong transactions. This is true for all businesses; entering into business arrangements with robust vendors and good customers is the difference between profits and losses.

There is no shortage of sales people, internally and externally, to suggest deals and to put pressure on unit managers to accept them and on risk managers to opine favorably on them. Good managers will take a sobering view of all transactions and move forward only with those that meet or exceed specific criteria. They will stay away from transactions for which the organization lacks expertise, including the ability to adequately structure or monitor a transaction. That said, no amount of structuring can make a bad transaction good.

What we will cover in this chapter are essential questions to answer when considering a new transaction—in short, a checklist. They can provide credit committees with a list of compulsory themes to discuss or, at a minimum, to be informed about. They can also serve as a basis of analysis to credit risk managers, even before they start the detailed credit assessment.

DOES THE TRANSACTION FIT INTO MY STRATEGY?

All business units must have a clear mandate known by stakeholders. For what we are interested in, transactions generating credit risk must be clearly identified in advance so that a proper organization—processes and people—is put in place.

We do not mean that one-off transactions should never be considered. There are sometimes market opportunities or commercial reasons that cannot be ignored. It is also legitimate from time to time to “test the water” as part of a business development exercise and to enter into a reasonably sized transaction in order to acquire knowledge and to develop some contacts in the marketplace.

The danger of accepting one-off transactions is that the existing skills may not be sufficient. As another old saying goes, “You do not know what you do not know.” Well-tested structuring skills and back office infrastructure may turn out to be irrelevant when entering a new field. If a one-off transaction defaults, it raises eyebrows within an organization but, above all, outside parties may take a hard stance against doing business with the organization. The credibility of the firm's risk management framework is at stake.

Multiple examples were observed after the 2007 crisis. Traditionally conservative investors such as school districts, charity organizations, and retirement plans invested in structured credit products or gave money to hedge funds. When the market turned, large amounts of money were lost and observers wondered what the institutions were thinking when they made their investment decisions. Lawsuits against intermediaries, in many cases investment banks, were filed, but in some cases, judges considered that the investors were experienced enough and did not grant damages.

If compelling reasons exist to enter into a new kind of transaction generating credit risk, some basic principles must be followed:

- Elevate the decision-making process to a senior committee, not as a way to cover a unit from accountability, but in order to get additional points of view.
- Invest in external advice: well-chosen lawyers, accountants, consultants can provide valuable help.
- Document the thought and approval processes thoroughly.
- Make sure that all relevant departments in the organization are involved, for instance, transaction lawyers, tax specialists, accountants, and monitoring

professionals.

- Last, but not least, *do not rush*. You should drive the timetable; do not let the counterparty do it. If you are not ready when the transaction must close, take a pass.

DOES THE RISK FIT INTO MY EXISTING PORTFOLIO?

For companies with existing credit exposures, it is necessary to assess a new transaction not only on its own merits but also within the context of the rest of its portfolio, or “the book.” Among the considerations are:

- **Limits:** We explained in the previous chapter that limits must be set on counterparties, industries, products, and countries. The first thing to verify when confronted with a new transaction is whether the firm has authorized remaining capacity to assume more exposure and is, thus, in a position to transact.

If the capacity is already exhausted, an increase of the limit can be requested, according to the processes in place. There may also be the possibility to hedge the credit exposure. As we will see in Part Four, there are some techniques available to mitigate credit exposures, such as the purchase of a credit insurance policy or a credit default swap, which would enable completing a transaction in which the credit exposure is incidental but the transactions brings other value to the firm, such as meeting a client request or taking on a transaction generating a nice profit from its noncredit features.

Concentration: Even if a transaction generates a credit exposure within the approved limit, it may not be compelling to do it. When a portfolio is already loaded with transactions of similar characteristics, doing a new one may impact concentration. When we discuss credit models in Chapter 10, we will see that, everything else being equal, imbalanced portfolios require more capital than well-diversified ones. That is why it is important that portfolio managers be represented in credit committees. They can provide an overview of the portfolio that complements the stand-alone analysis.

- **Critical mass:** A common misstep is to create an “orphan.” From a portfolio management perspective, adding a new and uncorrelated transaction is beneficial. It brings some diversification that helps reduce capital

requirement and, therefore, increases the profitability. However, it creates more work for tax, accounting, surveillance, among others, and the overhead cost and distraction created may overshadow the diversification benefits.

- **Dry powder:** Credit and portfolio managers may opt to keep some reserve capacity to deploy when they expect to see more profitable opportunities coming in the future. Because credit capacity is a scarce resource, they may prefer to wait instead of originating new transactions that use up capacity. Since ordinary business operations create risk exposure, and the exposure uses capacity, a line manager may prefer to wait until pricing and margins improve so as to not run out of credit capacity at a critical moment.

DO I UNDERSTAND THE CREDIT RISK?

Having a thorough understanding of all aspects of credit risk present in a transaction sounds basic, but it is essential. When confronted with a new transaction, risk managers must take one step back and make sure that they truly understand the nature of the credit risk and its drivers.

For plain vanilla transactions that are well known and closed on a very regular basis, it may not be necessary to spend too much time. If a risk manager is assigned to a trading desk that closes a few similar transactions a day with the same pool of counterparties and well-tested documentation, the focus of his or her job is primarily the risk assessment of the counterparty.

Sometimes, however, what may seem to be plain vanilla is not, and there are two caveats:

1. Although financial markets evolve quickly, most changes are more a succession of small steps rather than quantum leaps. One participant creates a small variation of a well-known product, then another one builds on those changes, and so on. After a while, products can have undergone significant changes that modify their risk profile. The lesson is that, however small, even a minor change must receive proper attention as, combined with other minor changes, they create a new breed of products that can have a very different risk profile.
2. One has to be careful with transactions that look close to something familiar. There could be some similarities with a well-known field but the devil lies in the details. Subtle differences can make a big difference. A risk

manager must not assume that he knows a new product because it is similar to another. It can be very dangerous.

Consider, for example, a company looking to grow abroad. Although doing business abroad is similar in many ways to doing business at home, being able to properly document a sale and getting paid in a foreign company is a very different exercise than in one's own country.

Transactions of a new nature must be dissected thoroughly. Even if the general structure of the deal seems to be understood quickly, risk managers must not make shortcuts. The best piece of advice they can give is that there is no shame in asking questions. When originators invite risk managers to a meeting and explain quickly what the transaction is all about, all too often risk managers do not dare to speak up and to ask the good questions. Doing so is, however, a useful exercise that can reveal that originators and structurers themselves have missed or underestimated major risk factors.

DOES THE SELLER KEEP AN INTEREST IN THE DEAL?

This question is extremely important for transactions where an entity is asked to assume a credit exposure originated by another entity. When asked to assume credit risk, a good reaction is to wonder “why are they selling?” It is essential to understand the motivation of the seller, especially so when it is in a position to influence the performance of a transaction. When assuming credit risk on a public entity when a seller cannot influence its credit performance, there is less reason to be concerned.

There can be good and legitimate reasons to sell, like reshaping of a portfolio or unwillingness to take on any (additional) credit risk. However, there can also be an asymmetry of information, meaning that the seller has more information or simply more experience than the buyer, which can lead to adverse selection, in which the seller disposes of the risks that he knows will not perform well and keeps the risks that he believes will perform well. Thus, buyers have to be particularly vigilant when sellers are getting rid of their exposures in a selective way. Note that some legal concepts are designed to protect buyers from sellers who may abuse their privileged information. Buyers can obtain representations and warranties, which is essentially a legal affirmation by the seller that the data it shows are both correct and comprehensive and that it has fully disclosed any

negative information.

One way to mitigate the risk of adverse selection is to require the seller to retain some exposure over a defined time period. For instance, the buyer may require the seller to keep 20 percent of the exposure on an unhedged basis throughout the lifetime of the transaction. The goal is to create an alignment of interest between the seller and the buyer, that is, to require the seller to keep skin in the game.

ARE THE PROPER MITIGANTS IN PLACE?

Mitigants are structural elements that help avoid or reduce a loss when a transaction deteriorates. Given the uncertainty around the counterparty's future creditworthiness, most transactions include some protection for the creditors. The idea is that transactions stay the way they are as long as the obligor performs close to its level at deal inception. If its situation deteriorates, some mechanism must kick in to protect creditors.

A simple example is a lease agreement. If the lessee defaults on its monthly payments, the lessor has the legal right to take back the asset. Mortgages are also classic examples of situations in which lenders can repossess a home when the borrower misses too many payments.

Because strong mitigants can avoid or reduce credit losses, when structuring a transaction, credit professionals must imagine what could go wrong and what can be implemented when it happens. Borrowers anxious to raise money are accustomed to mitigants and expect requests from lenders. The strength of the mitigant package depends very much on the competitiveness of the industry. When money is abundant, transactions are poorly structured and unfavorable to the lenders. When credit is scarce, borrowers are in a less favorable position and forced to accept stringent conditions.

Mitigants present a good opportunity for risk managers to demonstrate how creative they are. Remember the not-no-but-how attitude expected from risk managers. When they do not like a transaction, originators expect risk managers to propose solutions that enable them to say yes.

IS THE LEGAL DOCUMENTATION SATISFACTORY?

A decision to enter into a transaction involving credit risk is never complete before the legal documentation has been finalized. It is crucial for credit risk managers to make sure that lawyers do reflect in the binding agreements the conditions that have been presented by the business people and signed off by the relevant credit committee.

Credit risk professionals are rarely involved in post-committee discussions, but they should inquire on a regular basis about the status of the legal negotiations. At a minimum, they should be briefed prior to the finalization of the documentation to make sure that there have been no deviations from their recommendations during the negotiations.

It may sound trivial, but there are so many examples of transactions whose documentation is so sloppy that the basic rights of the creditors cannot be enforced.

IS THE DEAL PRICED ADEQUATELY?

In Chapter 9, which is dedicated to portfolio management, we will mention the need, on a portfolio basis, to be compensated for the expected losses and for the amount of capital at risk, and this touches on credit risk pricing. However, we will not delve into the intricacies of pricing in this book because it is covered in great detail elsewhere.

Naturally, it is essential for entities taking credit risk to be able to calculate what taking credit risk costs in order to make a profit on a risk-adjusted basis. Large financial institutions benefit from the work of quantitative teams whose role is to calculate the correct pricing for transactions, both prior to inception and during their lifetimes. They provide a neutral opinion to the credit committees.

Discussions about pricing in a credit risk management context can be very heated. Front-office people tend to think that the profitability of their transactions and the impact on their profits and losses (P&Ls) are off-limits to risk managers. “Tell me if you can recommend the transaction from a default perspective and I’ll take care of the rest” is a typical mindset.

In some cases, as we cover in Chapter 9, firms may establish transfer pricing schemes. Transfer pricing allows for business units to measure profits based on assigned costs; any one unit's costs may be above or below its true costs, but the scheme allows some transactions to subsidize others while motivating each unit to maximize its own P&L. A typical example is commercial loans. Loans have

been priced very aggressively for a long time and they are priced below cost to the customer. All banks are nevertheless aggressively pursuing basic loans because they are gate openers, or loss leaders, for the bank's other, more profitable transactions. A basic banking relationship starts with participation in a commercial loan syndication that permits an introduction to the corporation's management and a chance to introduce value-added products.

As a result, credit assessment professionals should not be directly involved in pricing discussions. Portfolio managers are, however, indirectly involved by providing essential information to the pricing decision, such as expected credit losses and an estimation of the capital need.

A notable exception to adequate pricing is trade receivables, which, paradoxically, often represents the biggest source of credit risk for a nonfinancial company. This credit risk exposure is usually not priced into the transactions, which implies that margins are smaller than they appear on a risk-adjusted basis.

DO I HAVE THE SKILLS TO MONITOR THE EXPOSURE?

Monitoring the evolution of a credit exposure is a key part of the credit risk management process. It is sometimes known as surveillance. Large financial institutions employ dozens of professionals dedicated to the surveillance of their portfolio.

In short, the main purpose of the surveillance activities is to detect, at an early stage, transactions whose performance is deviating from expectations. It can be a daunting task, and clear processes performed by skilled staff must be in place. Credit losses can be avoided or limited by taking actions at the appropriate time.

When a new transaction is presented to credit officers, the unit manager must verify that the firm has the ability to monitor the transaction's performance. First, what about the skills? If the new deal is similar to many others in the portfolio, it is likely that knowledge will not be an issue. On the contrary, if the transaction is of a new type, reviewing its performance over time may be challenging. The absence of skills is, in most cases, not a legitimate reason to reject a good transaction but putting in place an efficient monitoring process prior to inception is appropriate. Training may be necessary.

Issues about the quantity and quality of data can also arise. Think of a transaction in a foreign country for which reports are only produced in a

language that no one in the surveillance department understands? Also, what about transactions providing reams of data on a monthly basis? Are there IT resources dedicated to handle them? Does the company have the skills to sort out and interpret all these data? A classic example is securitizations involving consumer assets like a mortgage-backed security. Updated numbers about key performance indicators, like 30-day delinquencies, are available on a monthly basis. A firm with only a few securities in its portfolio can analyze the data with a spreadsheet, but an asset manager with hundreds of securities could rapidly be overwhelmed and unable to detect downward patterns on a timely basis. As a result, it may not act quickly enough and may face unexpected losses.

Monitoring is not a trivial function within a firm and should be allocated appropriate resources.

IS THERE AN EXIT STRATEGY?

Having an exit strategy means being able to hedge or sell a credit exposure at any time. In all organizations, priorities or risk appetite can change. A transaction that looks very attractive today can become a burden as time goes by. Just think of an investment firm heavily exposed to high-yield bonds that wants to exit the sector just as spreads widen (prices fall) and buyers become scarce.

The need to reduce credit exposure can also stem from the build-up over time of an imbalanced portfolio. A firm may be very eager to take a large exposure on a company, a country, or a sector at one point in time. As the business matures, they may end up with too much concentration and take too much risk or miss opportunities to enter into more profitable transactions. Another scenario is credit deterioration when it is necessary to reduce its exposure.

When building a portfolio, one should think of the challenges and costs to get rid of positions if needed. In fact, presenting options to unwind a credit exposure should be part of all investment decisions and credit approvals. Efficient credit committees should spend time grilling originators about their ability to eliminate credit risk should this become necessary.

Thinking about exit strategy is particularly appropriate for active investments like buying a bond or entering into a speculative derivative transaction. It is less relevant for an organization obliged to take credit risk to support other activities.

FINAL WORDS

Selecting good transactions is not a chance process, and there are many pressures within an organization to close deals. For most people, saying no can be harder than saying yes. There can be psychological reward for closing transactions, since this is a tangible accomplishment. Closed transactions are even symbolized with deal “tombstones,” which are essentially trophies awarded by senior management to deal teams for a closing. Thus, against these pressures, origination must be a highly disciplined and respected process within a risk-bearing organization.

Because it is harder to contain losses once they start than it is to avoid them in the first place, the risk-bearing organization must evaluate everything that can go wrong. What is the motivation of the seller? Does the organization have the institutional knowledge to understand and manage this risk? How is the risk correlated to others in the portfolio and does it fit the organization's strategy? Is the risk adequately priced and is the legal documentation adequate? Does managing this risk create opportunity costs for the organization and are there adequate resources to monitor it? If the deal goes bad, what are the options available? The firm must have complete and satisfactory answers to each of these questions to proceed with a transaction.

PART
Two

Credit Assessment

CHAPTER 4

Measurement of Credit Risk

The quantification of credit risk is an essential task, which is performed at the individual transaction level and at the portfolio level. In this chapter, we will focus on individual transactions.

One number cannot sufficiently summarize individual transactions. No magic figure indicates whether a transaction is good or bad. No one figure allows for an ordinal ranking of transactions by quality. Rather, transactions have to be analyzed by several dimensions, four of which, taken together, are good barometers of risk. They are:

1. **The exposure:** The amount of money at risk.
2. **The default probability:** The likelihood that the counterparty will default.
3. **The recovery rate:** The amount of money relative to the exposure that can be recovered in case of default.
4. **The tenor:** The time period in which some or all of the money is outstanding.

These parameters are used to analyze and compare credit exposures. They also constitute the basis to decide who has authority to approve a transaction, as we saw in the Chapter 2.

EXPOSURE

Exposure is the single most important number attached to a transaction because it represents, in most cases (some derivatives transactions are a notable exception), the potential maximum amount of money that could be lost in case of default. As such, it is a useful, albeit imperfect, gauge of absolute credit risk and of relative credit risk across transactions.

When the senior management of a company or the risk committee of the Board of Directors wants to get a sense of the amount of risk it is taking, the list of the largest exposures is a key document. Similarly, when banks are asked by stakeholders to disclose their relationship with a counterparty, an industry, or a country, they provide their exposures, often without additional details. It is not that the banks would not like to tell more, but the explanations would not be understandable for most people and could create confusion. A good example is the European sovereign debt crisis that surfaced in 2011. On a regular basis, newspapers were reporting individual banks' exposures on Greece, Spain, and other euro-zone countries as a way to gauge the potential consequences of default on the balance sheets of these banks.

The beauty of exposure is that it is easy to understand and is a risk measure that is the closest thing to a common denominator.

Here stops the simplicity about the exposure, however! It may sound surprising, but calculating the exposure stemming from a transaction is not always straightforward. Internal discussions about credit exposures can be frustrating because in many cases assumptions must be made and uncertainty about outcomes remains. As financial transactions are more and more complex, the exposure report, which summarizes the credit portfolio of an institution, contain increasing amounts of fine print. Risk managers must take the time to discuss with senior management the limitations of the numbers they produce. If the situation underlying the transaction evolves differently from expected, the actual exposure can be very different from what is anticipated.

Let us mention a few things to be aware of in terms of credit exposure:

- The methodology to calculate the exposure is specific to each product and, as such, has to be clearly documented. An annex to the guidelines, which can be updated from time to time, is an ideal place to document the methodology.

- As precise as guidelines can be, they cannot anticipate all aspects of transactions in real life, particularly for new product areas or for one-off transactions. In these cases, the credit risk assessment team then decides on the methodology used to allocate the credit exposure on an ad hoc basis.
- For certain transactions like long-term supply agreements or derivatives contracts, the exposure cannot be observed easily and necessitates the use of statistical models. We introduce a common methodology in Chapter 5.

Which Exposure Number to Use?

As we saw in Chapter 3, all firms establish credit limits they do not want to exceed. The exposure generated by a single transaction eats up the aggregate capacity the company has for a counterparty. It is, therefore, essential to allocate a reasonable number to each transaction. The challenge for the risk management team is to arrive at values that are both economically meaningful and take practical considerations into account. There is not one but several related exposure numbers that can be used.

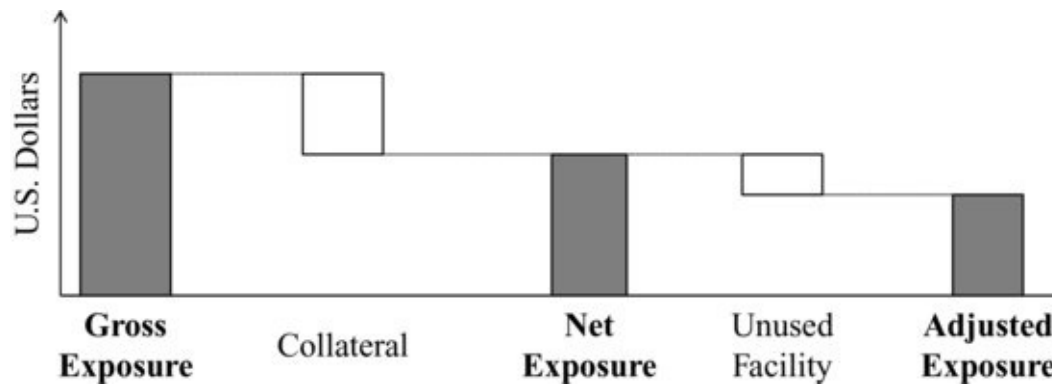
Being conservative and avoiding surprises by using a high exposure number has the advantage of rarely underestimating the exposure. However, overestimating credit exposures is not efficient. First, establishing credit limits is an expensive process that may involve buying third-party data, travel, desktop research, production of detailed reports, and presentations to senior management. If exposures are measured conservatively and do not correspond to actual business and revenue, deploying these large resources cannot be justified. Second, business opportunities can be lost. No one wants to reject deals due to the lack of available capacity, whereas a finer analysis would reveal that the approved limit was adequate.

We now introduce three concepts that can be used to set exposure numbers. They are:

1. GE = Gross exposure
2. NE = Net exposure
3. AE = Adjusted exposure

GE, NE, and AE are calculated with a three-step process, as shown in [Figure 4.1](#).

Figure 4.1 Gross, Net, and Adjusted Credit Exposure



In most cases, GE is the worst-case scenario, that is, the absolute amount at risk. Notable exceptions are long-term supply contracts of physical commodities, and derivative contracts, in which the GE does not actually represent the worst case, as we will see in Chapter 5. GE represents the amount of money due by the counterparty and, therefore, the money at risk in case of bankruptcy.

For most transactions, the calculation is straightforward, because the GE is the notional amount of the transaction with the counterparty. When a company sells \$100 worth of goods, the corresponding GE for the client is the value of the trade receivable, \$100. When a bank lends \$100 to a client, the PE is \$100 + expected interest payments over the term of the loan.

Gross exposure may also include a time dimension. A loan made to a borrower for two years is clearly more risky than an equally sized loan made to an equal-risk borrower for one year, even if the borrower's credit quality does not change over time. While GE captures the potential amount of money that can be lost, unless it includes a dimension for exposure tenor, it should not be used on a stand-alone basis to rank the exposures to obligors. To monitor how exposures are distributed across obligors within a portfolio, a tenor-based exposure is useful, such as a duration-weighted or maturity-weighted exposure metric.

Net exposure (NE) is defined as GE minus the amount of collateral pledged. The idea is that, if one entity has collateral to secure a transaction, GE should be adjusted to reflect the fact that the sale of the collateral assets would reduce a credit loss. If a creditor is comfortable with the value of the collateral posted, there is no reason not to adjust the exposure accordingly. However, one has to be careful with the real value of collateral and pay attention to four fundamental checklist items:

1. Who owns the collateral in case of bankruptcy? This is a sensitive legal issue if more than one creditor claims ownership. Only collateral whose ownership is not disputed should be taken into account.

2. Can the collateral be valued? Unless the collateral is cash, valuation could present challenges. In case of uncertainty over the value, a discount or “haircut” to the notional amount of the collateral has to be applied. For instance, if the collateral is an asset worth \$100 but whose value fluctuates, the creditor may apply a 20 percent haircut and credits only \$80 worth of collateral to the transaction's NE. Overestimating the collateral's value underestimates the amount of credit risk.

3. Can the collateral be sold? Collateral should consist of liquid instruments that can be sold easily. A good example of illiquid collateral is real estate. It is customary for banks to receive a lien on a property as part of a loan facility. If the borrower defaults, the lender has the right to repossess the property. This can be close to worthless in time of widespread real estate crisis such as what happened at the beginning of the 1990s, when a commercial real estate crisis hit Japan. Banks ended up owning hotels and golf courses that were impossible to sell and did little to reduce the financial losses from the credit exposure.

4. Is the collateral correlated with the underlying exposure? If this is the case, collateral can be worthless. In one such transaction, a loan facility to a company was collateralized in part by shares of its parent company. The default of the subsidiary led to the default of the parent and the lender's collateral was worthless.

Adjusted exposure (AE) is the NE multiplied by the expected usage given default (UGD). Adjusted exposure is also called exposure at default (EAD).

What UGD captures is the expected rate of utilization of a facility in case of bankruptcy. Some transactions allow the counterparty to use a credit facility only partially. If the creditor has hard data showing that credit facility utilization is below the full amount most of the time, it can be reasonable to adjust the NE number downward by a certain ratio. Doing so reduces the need to review and approve large underutilized credit limits.

A good example of UGD in practice is a certain kind of commercial bank loan known as a revolver. It is structured around the ability of the borrower to draw and pay back money based on its needs. Borrowers pay a fee based on the notional amount, the GE, and an interest rate for the amount they draw. To maintain financial flexibility, large companies arrange multiyear facilities, regardless of whether they need the money. Banks that are competing for business are rather generous for this product and grant large capacity on

relatively easy terms. As a result, the average usage rate in normal economic times is low, around 15 to 20 percent.

The challenge, for the lender, is to allocate a credit exposure. Should we consider the full notional amount (that is to say, the GE), which is hardly used, or should we adjust the amount based on the borrowing history of the client or similar clients? In the real world, it is typically the latter. Banks consider that they will almost never be exposed to the notional amount and report exposure with a standard 20 percent usage assumption.

The decision is a difficult one to make for several reasons:

- Because borrowers can draw at any time at no cost (except the interest rate), their behavior is not predictable. If they need to finance an acquisition in a short period of time, they may draw 100 percent of their line. The bank would experience a sudden jump in the reported credit exposure.
- Revolvers can have long tenors, up to 10 years. External circumstances can modify the behavior of otherwise predictable borrowers. For instance, in 2007 when liquidity became scarce, refinancing facilities and access to the capital markets became virtually impossible. As a result, some companies drew on their revolvers, and as of early 2012, at the time of print of this book, they had not yet repaid these facilities and were still holding the money on their balance sheets. Although they don't need the cash, they don't want to again experience the uncomfortable situation in which traditional lenders were turning their backs. In this recent situation, historical usage data was irrelevant. Banks experienced a similar situation with individual borrowers and home equity lines of credit (HELOCs). Given uncertainty about their job security, individuals drew on their HELOCs to secure liquidity to pay their expenses in the event that they lost their jobs.
- As the name “usage given default” Household debt excludes mortgages. indicates, what is meaningful for risk managers is the usage factor at the time of the bankruptcy, not in normal circumstances. Even if loan facilities contain provisions to prevent distressed companies from borrowing (refer to Chapter 14 about risk mitigation), there can be situations in which borrowers can be able to draw on their facilities shortly before they default. An historical average of 20 percent can become 100 percent when the company defaults.

The conclusion is that, although it is legitimate to reduce the NE amount by a reasonable amount for certain transactions, setting the number requires circumspection and care.

We have introduced three ways to estimate the credit exposure stemming from a transaction. The relevance of these numbers is to allocate the approval authority and to provide the necessary input for quantitative analysis (more in Chapter 10). It is up to each firm to decide whether it wants to use GE, NE, or AE. The choice is dictated by both the underlying business and the risk management philosophy. There is not a good one or a bad one, just options with pros and cons. As we have seen so far, and we will continue to see, risk management is not an exact science; it draws on human judgment even more than quantitative analytics.

DEFAULT PROBABILITY

The *probability of default* (PD) is a statistical indicator that, as the name indicates, represents the likelihood that a counterparty will default during some future time period. Note that, in practice, the terms PD and *default rate* (DR) express the same concept. There are a few fundamental notions to know about default probabilities:

- It is never zero. Very strong entities have little chance to default, but one can never be sure. There is always a possibility that an otherwise reliable entity fails to generate enough revenues to honor its financial obligations due to management blunders, accidents, or changes in the competitive landscape. Not too long ago, the prevailing wisdom was that some companies, like General Electric, or countries, like the United States, were just too strong to default. These perceptions have clearly disappeared today. Similarly, the recent crisis has disabused us of the notion that some companies are simply too big to fail, meaning that their default would create so much damage to the economy that a solution will always be found to prevent it. Large banks were supposed to be immune from bankruptcy due to the fear of a domino effect, that is, systemic risk that would bring down other institutions across the globe. One of the largest American financial institutions, Lehman Brothers, failed and was liquidated overnight, with its creditors losing tens of billions of dollars.
- As this book goes to print, the ability of highly rated governments to pay down their debt is in question. The common thesis was that governments could not default because they have power to raise taxes and to reduce expenses to generate the necessary funds to honor their financial commitments. Yet there are more and more countries, even in the developed world, which relied too much on borrowed money and had to be bailed out by other countries or international institutions. Iceland, Ireland, and Greece are good examples. This is even the case for governments having their own currency, as we remember from the Russian default in the not-too-distant past. Who knows what will happen to Japan or the United States in the future?
- It increases with time. Financial strength of borrowers tends to deteriorate over time, and companies have a higher chance of defaulting in the long term than in the short term. An implication of this observed pattern is that a

PD has meaning only when it is defined for a given time period. It is not correct to state that an entity has a 0.3 percent chance of default. Rather, the same entity can have a 0.3 percent chance of default within two years and, say, a 2 percent chance within five years.

How does one calculate a default probability? There are several competing methodologies and all have one thing in common: reliance on a lot of assumptions. As such, they have to be manipulated with caution. On a related point, credit analytic vendors sell data on default probabilities, and, for the same reason, these cannot be taken at face value. It is not that the data themselves are inaccurate, but how they are applied requires understanding the methodology used to compute the probabilities.

In this chapter, we will focus on the most commonly used methodology to assign a default probability to a counterparty. In Chapter 7, we will describe other ways that can be used in addition to, in conjunction with, or instead of this methodology.

Since default probabilities are not readily observable, they are typically determined by a two-step process:

Step 1: Analyze a counterparty's financial strength and assign a rating to it that represents its perceived financial strength.

Step 2: Using historical data, observe the default frequency of entities with similar ratings. The observed relative frequency is the estimate of the PD.

Step 1: Rating of a Counterparty

A credit rating is not an absolute measurement of financial strength but a relative one: an entity with a good grade is supposed to have a better chance to pay than one with a lower grade.

The idea is to analyze a company's operating environment, the strength of its management, its financial statements and other drivers of its financial strength, and then to assign a grade, either a letter or number, that summarizes its expected ability to face its financial obligations. For instance, a scale from 1 to 10 can be used. Strong companies are assigned an R-1 and weak companies an R-10 ("R" for rating).

Own or Internal Rating

The best way to assign a credit rating is with one's own internal credit assessment team. This is a resource-intensive activity that many large firms can afford to do but many small firms cannot. Large financial institutions have their own proprietary methodologies and their own rating scale. They employ specialized professionals whose main job is to perform credit assessments and assign ratings to their counterparties, based on publicly available as well as any private information they compile.

In Chapter 6, we review detailed criteria to take into account when assigning a grade to a corporate entity. In Chapter 8, we review criteria to take into account when assigning a grade to a noncorporate entity, such as a structured finance vehicle.

Rating Agencies

Most of the following discussion focuses on the role that ratings play for corporate borrowers, but note that rating agencies provide ratings for literally hundreds of thousands of entities, including sovereign countries, supranationals, municipalities and public finance borrowers, most large companies around the world, and many structured finance vehicles. They provide an independent opinion of the credit quality of an entity, and they are used to support credit decisions such as lending money, loan pricing, or selling a product.

Rating agencies focus on companies that issue public debt because of the large demand from investors around the world for an independent opinion about the credit quality of the firms raising money. Importantly, rating agencies are paid by the entities seeking a rating because, without such a rating, issuing the debt would be, at a minimum, more difficult and, at worst, not possible. The agencies then publish their methodologies and ratings for all rated entities on their websites.

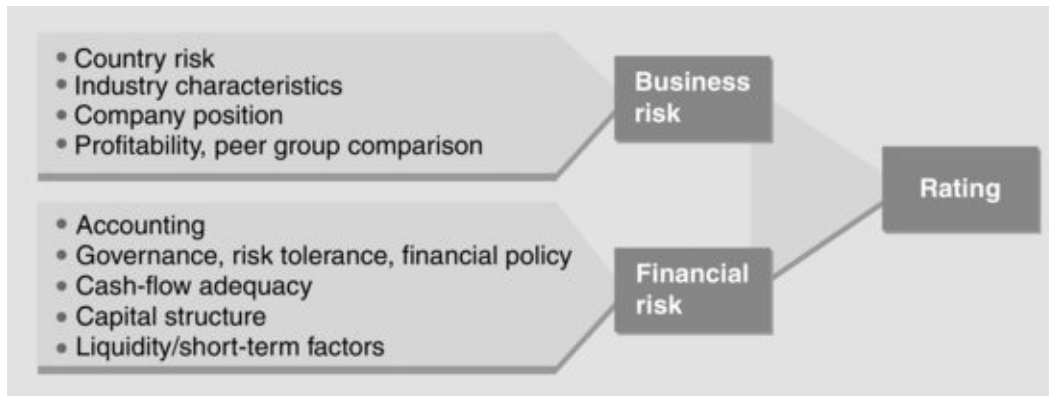
Although there are many rating agencies, some of which are highly specialized by industry or location, the significant global rating agencies are:

- Moody's Investors Services, owned by Moody's (U.S.).
- Standard & Poor's, owned by McGraw-Hill (U.S.).
- Fitch Ratings, owned by Fimalac (France).

In addition, other rating agencies—both newly formed, such as Kroll, and existing, such as Morningstar—have begun to rate credit. [Figure 4.2](#) shows the typical process followed to allocate a corporate rating. It is in line with the best practice that we review in Chapter 6.

Figure 4.2 Standard & Poor's Risk Factors for Corporate Ratings

Source: Standard & Poor's, "Guide to Credit Rating Essentials," August 12, 2010. Standard & Poor's Financial Services Corp.



The main strength of the rating agencies is that they have dedicated analysts specialized in industry sectors who follow a relatively small number of companies. They have offices around the world to be close to the companies they are rating. Their desktop research is complemented by direct access to the executive officers of the firms. Ratings are so important that all CFOs of large companies issuing debt in the capital markets dedicate a good amount of time to support the rating agencies' due diligence processes.

In contrast, an analyst working for a financial institution or for an industrial company may not always have the luxury to speak with the company's management or to receive more information than what is made available publicly, in particular if the company is not a leading lender, vendor, or supplier.

Ratings are reviewed periodically—minimally each time financial statements are made available and more often if an event that may have a financial impact of an entity occurs. It is also customary for a company contemplating a major acquisition to inform the rating agencies prior to closing the transaction. They want to get an informal sense of what their reaction will be. If a rating agency would be skeptical about an acquisition and indicate a high likelihood of a downgrade, raising money to finance the transaction may become more costly, potentially jeopardizing the economics of the deal.

Rating agencies also pay attention to the competitive environment of the companies and can downgrade a company if they think that an external event may reduce profitability. For instance, when some European countries faced financial difficulties in early 2011, large banks that had a retail-banking network in these countries or that owned a sizeable amount of sovereign debt were downgraded.

Over time, the agencies have developed different types of ratings to recognize differences between various types of financial obligations. The most important rating is the long-term “issuer” rating that corresponds to the assessment of an

entity to meet its obligations maturing in more than one year. It is the most frequently used rating because it describes the general creditworthiness of the entity independent of a particular obligation, although it is understood to mean the senior unsecured credit rating because these obligations get first priority and because most creditors are exposed to this kind of obligation. The agencies also provide ratings on particular obligations, called “issue” ratings, which are distinct from the “issuer” ratings.

The major rating agencies' assessments are summarized by a letter system. [Tables 4.1](#) and [4.2](#) shows Standard & Poor's (S&P) and Moody's general ratings categories with their summary descriptions and how they generally correspond to each other. Note that S&P may further modify its letter grades with a [+] or [-] and Moody's with a number [1, 2, 3] to further distinguish the credit quality of obligors within a particular letter grade. Subcategories are known as notches. If a company is downgraded from A to A- or from Aa3 to A1, it is downgraded by one notch.

Table 4.1 Standard & Poor's Long-Term Issuer Credit Ratings

Source: Standard & Poor's Ratings Portal RatingsDirect, February, 2012. For expanded descriptions of each rating please see “Understanding Standard & Poor's Ratings Definitions,” February, 2012, available at http://img.en25.com/Web/StandardandPoors/S_P_Ratings_Definitions.pdf.

AAA	Extremely strong capacity to meet financial commitments.
AA	Very strong capacity to meet financial commitments.
A	Strong capacity to meet financial commitments, but somewhat susceptible to adverse economic conditions and changes in circumstances.
BBB	Adequate capacity to meet financial commitments, but more subject to adverse economic conditions.
BBB-	Considered lowest investment grade by market participants.
BB+	Considered highest speculative grade by market participants.
BB	Less vulnerable in the near term but faces major ongoing uncertainties to adverse business, financial, and economic conditions.
B	More vulnerable to adverse business, financial, and economic conditions but currently has the capacity to meet financial commitments.
CCC	Currently vulnerable and dependent on favorable business, financial, and economic conditions to meet financial commitments.
CC	Currently highly vulnerable.
C	A bankruptcy petition has been filed or similar action taken, but payments of financial commitments are continued.
D	Payment default on financial commitments.

Table 4.2 Moody's Long-Term Obligation Ratings

Source: Moody's Standing Committee on Ratings Practice and Definitions, “Ratings Symbols and

Aaa	Obligations rated Aaa are judged to be of the highest quality with minimal credit risk.
Aa	Obligations rated Aa are judged to be of high quality with very low credit risk.
A	Obligations rated A are considered upper-medium grade and subject to low credit risk.
Baa	Obligations rated Baa are subject to moderate credit risk and are considered medium grade and as such may possess certain speculative characteristics.
Ba	Obligations rated Ba are judged to have speculative elements and are subject to substantial credit risk.
B	Obligations rated B are speculative and are subject to high credit risk.
Caa	Obligations rated Caa are judged to be of poor standing and have very high credit risk.
Ca	Obligations rated Ca are highly speculative and are likely in or very near default, with some prospect of recovery of principal and interest.
C	Obligations rated C are the lowest rated class and are typically in default, with little prospect of recovery of principal and interest.

One of the frequent criticisms of the rating agencies' production is that they are actually too slow to react. It can take several months before a company is downgraded, whereas the capital markets are expressing their opinion much more quickly by requiring higher interest rates on corporate bonds or selling the equity. This is certainly true, but the agencies are quick to point out that their credibility is based on stability. Their decisions have so much impact on the issuers' debt that they prefer to take the time to fully analyze a trend rather than to react quickly to events that may turn out not to be that relevant.

Once a company has been downgraded, getting back to the same rating is unlikely in the short term. Many companies that lost large amounts of money during the 2007 crisis were downgraded not only because their capital base had been eroded, but also because the agencies were disappointed by the magnitude of the bad decisions they had made. As of early 2012, more than four years after the crisis had started, few large downgraded companies had regained their precrisis ratings.

There has been a lot of negative publicity for rating agencies after the crisis and some have even suggested that their actions played a key role in the debacle we experienced. It is fair to comment, though, that the criticism has been directed toward the structured finance, rather than the corporate ratings.

The agencies themselves recognized that they indeed lost their way. At one point in time, Standard & Poor's was rating only four industrial companies AAA, the highest rating, whereas roughly 50,000 structured finance vehicles enjoyed the same coveted rating! In other words, the agencies considered that household names like Procter & Gamble, rated AA-, or IBM, rated A+, companies which

had been around for decades, were more likely to default than obscure “special purpose vehicles” of all kinds created to facilitate the distribution of mortgage debt. As we all know, P&G and IBM are still very healthy companies, whereas thousands of vehicles previously rated AAA defaulted and generated billions of losses to investors.

To make things worse, few among the general public were aware of a rating agency's business model and discovered it after the crisis. The agencies are for-profit organizations. Their revenues come primarily from the entities that want to be rated and from clients buying their ratings. When the mortgage market was booming, investment banks were pressuring the agencies to get fast and favorable ratings for the vehicles they were structuring. For the rating agencies, which are paid only a few tens of thousands of dollars by a corporation to get a rating, this provided a huge opportunity to increase revenues and profits. When the housing bubble collapsed and the AAA rated vehicles defaulted in large numbers, the actions of the rating agencies were heavily criticized, and observers and legislators called for more regulation.

The fact is that rating agencies have implemented major changes, including management reorganization and greater transparency, in an effort to regain credibility among investors. Corporate and sovereign ratings processes have remained reliable and intact, and, today, in the postcrisis era, these ratings remain a key and reliable element of credit decisions made by corporates, banks, and asset managers.

Scoring Systems for Smaller Companies

Companies dealing with smaller counterparties have to find alternative ways of assessing the credit quality since the rating agencies do not rate these smaller entities.

The first challenge is to access financial data. Since 2000, public companies, under Regulation Fair Disclosure (Reg FD), must disseminate their financial statements and any other material information, including nonfinancial information, in a simultaneous fashion to the investing public, usually involving a combination of press releases, open conference calls, and website postings. However, nonpublic companies, many of which are small to medium size, do not provide such disclosure, so finding information on them is more difficult. In many countries, annual disclosure is required even for private companies, and some nonpublic U.S. corporations do make their financials available. Data vendors collect this information, format it, and make various adjustments to promote consistency, and then make it available for sale. The main data providers are:

- Dun & Bradstreet (U.S. focus), www.dnb.com.
- Bureau Van Dijk (European focus), www.bvdinfo.com.
- Teikoku Data Bank (Japan), www.tdb.jp.co/english/index/html.

The second challenge is to exploit the data. Although companies can analyze the information and prepare credit reports similar to what rating agencies do, when dealing with thousands of counterparties, which is not unusual for financial and industrial institutions, this process is prohibitively time and resource consuming. The practical alternative is to populate one's automated scoring systems with the data. The idea is to compute key ratios and weight them by coefficients to arrive at a number that summarizes financial strength.

Although this methodology lacks finesse, it is an efficient way to provide a first opinion of a counterparty, and it is unlikely that a creditworthy company would receive a low score or that a troubled one would receive a high score. More sophisticated systems can complement the numerical assessment with subjective information input by the analyst, such as management strength or the economic environment.

These types of scoring systems are actually extremely popular. The first widely publicized score was developed in the late 1960s by Edward I. Altman, then an Assistant Professor of Finance at New York University. It is called the Z-score,

and the formula is still widely used.

Some vendors that sell raw data complement the data they sell with their own scoring system. In addition to the ratio-based calculation, they can take into account other information such as payment history. The largest vendors are again Dun & Bradstreet, Bureau Van Dijk, and Teikoku Data Bank.

Some companies prefer to develop their own models, making use of their judgment and experience dealing with defaulted counterparties. In that case, they buy data from the vendors mentioned earlier and populate their own systems with the supplementary information to generate ratings. One can also buy existing IT systems such as Moody's RiskAnalyst that provide the platforms for incorporating the supplementary information with the basic financial data.

Hierarchy and Mapping

The final step in assigning a rating to a counterparty is to define a methodology to deal with multiple ratings sources. For the same counterparty, a firm can have its own internal rating in addition to different ratings by the three major rating agencies. The goal is to obtain only one exploitable rating that will be the input of Step 2. There are three things to consider:

1. Establish a hierarchy. If a firm produces an internal rating, this typically ranks higher than the external ratings. The analyst does take into account external vendors' opinions but has full authority to assign the final rating. If a counterparty is not rated internally, then a hierarchy between the sources must be established. It is not unusual to place the three major agencies' ratings ahead of the other values when available. The rationale is that the ratings from the ratings agencies benefit from human judgment, whereas other methodologies rely on automated processes.
2. Deal with inconsistencies. What to do when external vendors have different views? In such a circumstance, called a split rating, firms normally adopt a conservative posture and select the lowest indicator. For example, if a company is rated AA– by Standard & Poor's and A1 by Moody's, the lower of the two ratings, A1, is retained.
3. Map the internal ratings with external ratings since, in the final analysis, the rating agencies have the historical data on the relative frequency of default, which is the basis for estimating the default probabilities, as we will see next. It is, therefore, necessary to map one's own internal rating with the agency rating whose historical data will be used. If we again take our example of an internal rating scale of R1 to R10, a firm may decide to have R1 correspond to AAA/Aaa, and R2 to AA/Aa, and so on.

Step 2: Use Historical Data

Once a counterparty has been assigned a rating, the next step is to deduce a probability of default or PD. For establishing the PD, the idea is to observe the historical default frequency, made available by the rating agencies, of companies with the same rating.

It is straightforward and works the following way: If a company is rated AA today and historically AA rated entities experienced a 0.5 percent default rate after five years, one can logically state that the probability of default of an AA

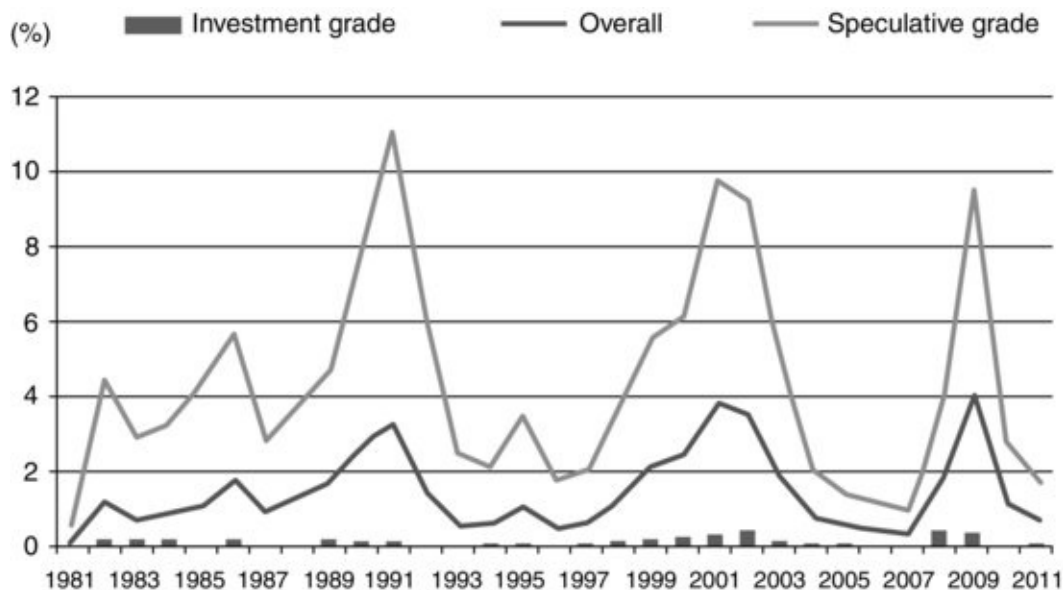
rated entity is 0.5 percent in the next five years.

Moody's and Standard & Poor's, regularly publish updated data on defaults enabling risk management teams to better understand the likelihood of a counterparty defaulting and to select the best estimator for the PD.

Importantly, default frequency is not stable across economic cycles, as can be seen in [Figure 4.3](#). As one expects, recessions generate more defaults. When the economic environment is more favorable, defaults are scarce. The challenge is, therefore, to pick a PD that is representative across economic cycles.

Figure 4.3 Global Default Rates: Investment Grade versus Speculative Grade

Source: Standard & Poor's, "2011 Annual Global Corporate Default Study and Rating Transitions," Chart 1, March 21, 2012.

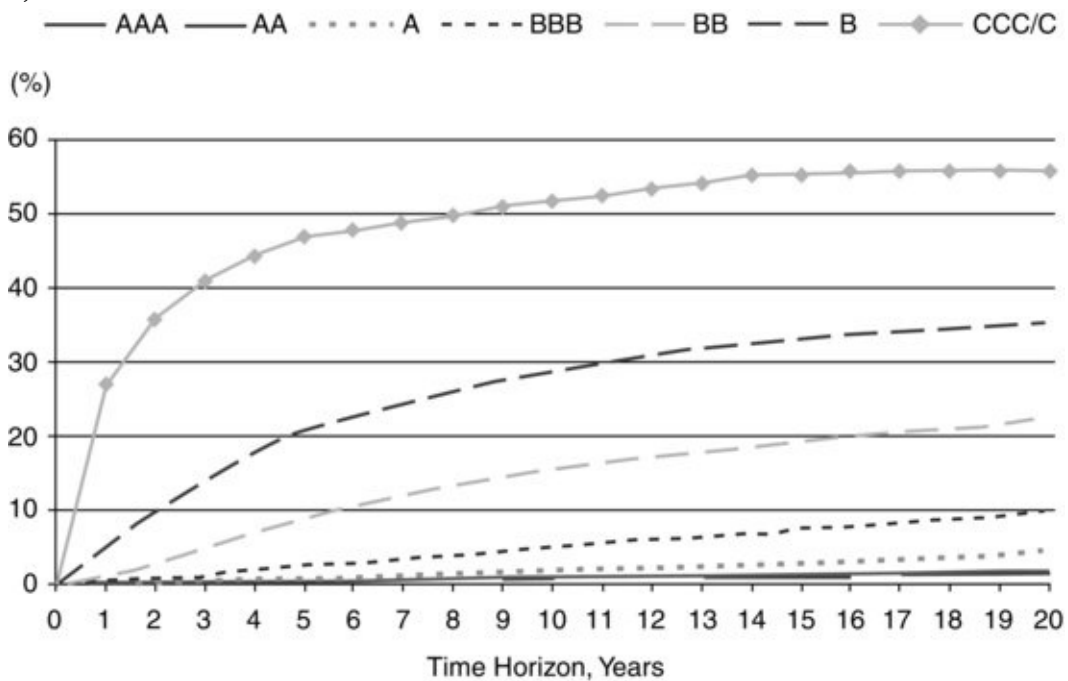


Equally important to note is that cumulative default frequencies increase with time. Although the frequency of defaults among A-rated corporate borrowers may be close to zero in the subsequent year, in 5 years the frequency is not close to zero, and it will be even higher after 10 years. The rating agencies publish both the one-year default frequencies by rating categories as well as the cumulative default frequencies over various elapsed time periods. [Figure 4.4](#) shows default frequencies over time; note that default frequency rises for all rating categories over time. The single A borrowers have virtually no defaults over a short (one-to two-year) horizon, which grows to somewhat over 4 percent over a 20-year period. For BBB borrowers, the cumulative default frequency reaches about 10 percent over a 20-year period.

Figure 4.4 Global Corporate Average Cumulative Default Rate by Rating, 1981–

2011

Source: Standard & Poor's, "2011 Annual Global Corporate Default Study and Rating Transitions," Chart 4, March 21, 2012.



The two-step methodology we described is widely employed in the industry. In fact, since rating agencies refrain from stating that a particular rating corresponds to a probability of default, they publish all the necessary data to allow users to make this connection, thereby allowing each firm the flexibility to work with the numbers most relevant to its own analysis.

THE RECOVERY RATE

The recovery rate is the amount of money recovered upon default, expressed as a percent of the gross exposure. Rarely do credit losses result in the entire amount of the nominal exposure. Upon bankruptcy, creditors vie for residual assets and the legal structure of their claim influences the amount they ultimately recover. In Chapter 14, we discuss recovery dedicated to structural mitigants in more detail.

For the time being, let us mention the major elements that influence the amount of recovery:

- The total amount of assets available.
- The seniority of the position. Some financial instruments receive their share in priority. They are called senior creditors. Some rank second, and they are called the junior creditors. The more senior the creditor, the greater the recovery.
- The security package: Some loans or bonds benefit from a lien on some assets. In case of default, these instruments take possession of the pledged assets, and other creditors only benefit when the secured creditors are fully repaid. The recovery rate is usually estimated at transaction inception, and it affects the risk appetite of a firm toward a transaction that depends not only on the exposure level, but also on the amount that is expected to be lost on default. Because highly secured transactions have a high expected-recovery rate, firms can take on more exposure to these than to unsecured loans.

Recovery rates are estimated with historical data, also published by rating agencies. For example, many institutions exposed to credit risk having the equivalent to senior unsecured exposures consider that an acceptable recovery rate is between 40 percent and 50 percent. Additionally, Standard & Poor's and Moody's are now selling recovery ratings for specific transactions, reflecting primarily their analysis of the collateral package obtained by the lenders.

Note that a widely used concept and term is *loss given default* (LGD), which is defined as one minus the recovery rate times the exposure. This reflects the net loss after recovery.

THE TENOR

Risk managers do not like long-dated transactions for two reasons: First, the long-term financial strength of a borrower is much harder to predict than its short-term financial strength, and second, as we now know, the default probability of a counterparty increases with time. In the discussion of guidelines in Chapter 2, the regular approval process is usually reserved for transactions with a tenor of up to three to five years, with longer dated transactions needing a higher approval level. In most cases, determining the tenor is straightforward because most financial arrangements have a clear end date. If a sale has a payment term of 60 days, the tenor is 60 days. If a loan must be repaid after 10 years, the tenor is 10 years.

There are naturally some exceptions that require adjustments. This is the case when transactions have a contractual tenor but experience shows that the repayment can be expected more quickly. If there is sufficient data available to support reducing the tenor, it is prudent to do so because otherwise sensible transactions might be rejected because they appear too risky. We will see later on that price and capital requirements for a transaction are highly influenced by the default probability. Being too conservative with the tenor translates into requiring a higher price than necessary and having to set aside too much capital, both of which could make the transaction uneconomical for either the lender or borrower. Setting a realistic tenor for a transaction is part of the common sense expected from a risk manager.

The most common example of the gap between contractual, or legal, tenor and expected tenor is residential mortgages. When individuals buy houses, they typically take out a long-dated, 30-year mortgage. Experience shows that few mortgages are paid according to the original schedule and that most of them are repaid within 10 years because of refinancing or a sale of the home. Estimating the prepayment rate of a pool of mortgages is absolutely necessary when analyzing transactions like mortgage securitization. Specialized software available on Bloomberg or Intex enables analysts to estimate an expected tenor with a good amount of predictive accuracy.

DIRECT VERSUS CONTINGENT EXPOSURE

Financial institutions sometimes distinguish direct credit exposures and contingent credit exposures. The difference is whether money or goods have actually been exchanged or if there is just a commitment to do so. For example, funded loans are direct exposures because the cash is already out. Letters of credit (details can be found in Chapter 15) are contingent exposures because the bank makes only a commitment to disburse cash if certain well-defined events occur. Events are typically related to the performance of the obligor, such as finishing a contract on time and within budget.

If it is difficult to predict the probability of a commitment to become a funded position, there is no reason to treat direct and contingent exposures differently. Both must be considered as exposures of the same nature and follow the same approval process. However, if reliable data on usage exist, an adjustment to gross exposure (GE) can be made as described earlier.

What happens often is that, even if on the surface they look unrelated, the events that can transform a contingent exposure into a direct exposure and the financial distress of the counterparty are correlated. For a long time, a letter of credit (LoC) can remain undrawn as the counterparty is performing well. Then, when the counterparty starts facing financial stress and the quality of its operations declines, the LoC is drawn. Now, at the time of bankruptcy, the bank that issued the LoC is fully exposed. Thus, the notional exposure is the amount that matters when deciding whether to approve a credit line.

THE EXPECTED LOSS

Some of the concepts explained earlier are used to compute the expected loss of a transaction. Although we said in the introduction that the riskiness of a transaction cannot be summarized by a single number, the expected loss provides a number that takes into account the exposure, the default probability, and the recovery rate, and it is calculated in [Figure 4.5](#).

Figure 4.5 Drivers of Expected Loss

	Driver 1		Driver 2		Driver 3
Expected loss	= Exposure	×	Default probability	×	(1 – Recovery rate)

Note that the expected loss is a statistical measure that, on a stand-alone basis, does not provide much information about a transaction. However, expected loss is critical for pricing transactions and has an important role in portfolio management. Although any one transaction is unlikely to produce the expected loss, on a portfolio basis, across many homogeneous transactions, the expected loss will be a fairly predictable number under certain restrictive conditions. We will defer our discussion of portfolio effects and statistical concepts as they relate to losses and the dispersion of losses around the expected value until later chapters (Chapters 5 and 10, primarily). However we conclude this chapter with the statement that a single statistic cannot predict the loss behavior of any transaction.

CHAPTER 5

Dynamic Credit Exposure

Unlike most loan facilities and other traditional transactions, certain financial arrangements generate a credit exposure whose amount is not a fixed number known at inception but, rather, one that changes over time. Two typical examples are derivative transactions of all kinds and long-term supply or purchase agreements of commodities. The credit exposure is not fixed because it will fluctuate with the value of an underlying product on which the financial arrangement is based. These exposures are known as dynamic credit exposures. A variety of transactions generate dynamic credit exposures and it is impossible to describe them all in detail. However, they typically share some key features:

- They involve transactions of financial instruments such as foreign exchange, interest rates or equities, or goods whose values fluctuate (e.g., commodities such as oil and sugar).
- They have a long tenor, typically several years.
- In some cases, there is no exchange of cash or goods up front.
- Both parties commit to make a payment or to sell/buy a product in the future, at terms determined in advance.

What creates the dynamic credit exposure is the difference between the predetermined conditions and the prevailing ones at the time of the expected payment or sale/purchase. The following two sections introduce the two most common families of transactions generating dynamic credit exposure: long-term supply or purchase agreements of physical commodities and derivatives transactions. We acknowledge that some of the concepts presented here are not immediately intuitive. Thus, we introduce them with examples rather than with theory.

The challenge for the credit analyst is to assign a credit exposure at the inception of the transaction because we want to know if the firm has credit capacity to enable the transaction. The common methodologies used for this are mark-to-market (MTM) and value at risk (VaR).

LONG-TERM SUPPLY AGREEMENTS

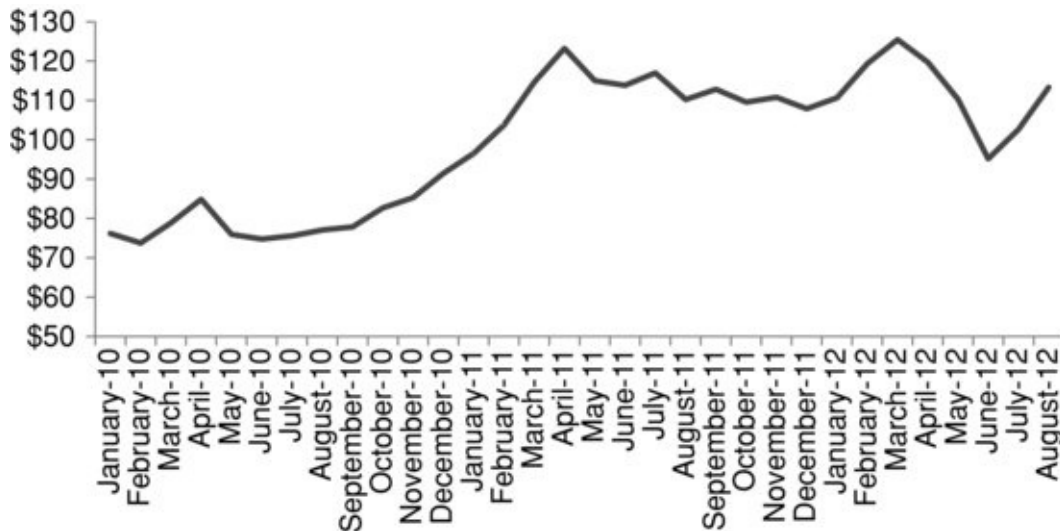
Long-term supply agreements involve one party committing to sell a product

like oil or sugar for a long period of time and another one committing to accept deliveries and to make payments. The price is set at the inception of the agreement and is valid until termination.

Let us illustrate long-term supply agreements with a concrete example. Utility companies, say, for example, Utility Corp., generate electricity from power plants they own and sell it to individual and industrial customers. They build power plants, which are expensive, and require long-term financing, typically no less than 10 years. The financing faces the major challenge of forecasting expenses and revenues over a long period of time. Lenders need to be comfortable with the stability of the expenses, primarily the costs of operating the plant, and of the revenues generated by the sale of electricity to customers. A major portion of the operating expenses stems from the purchase of oil, a commodity. Prices of commodities fluctuate a lot, as shown in [Figure 5.1](#), because they are influenced by rapid changes of macroeconomic conditions or by the occurrence of political events.

Figure 5.1 Prices of Brent Crude Oil, January 2010 to August 2012

Source: The International Commodities Exchange



To avoid being exposed to the volatility of prices, which would make financing nearly impossible, utilities enter into long-term contracts with commodity producers and traders, like Traders & Co. In exchange for the commitment to be delivered a given quantity of oil, Utility Corp. agrees to buy a predetermined amount from Traders & Co. for a set price over a long period of time. In doing so, they eliminate their exposure to the fluctuations of the market price and their cash outflows are known in advance, which satisfies their financiers. The contract between Utility Corp. and Traders & Co. is known as a

long-term supply agreement.

Let's examine the consequences of signing a supply contract for both companies if the basic features of the contract are:

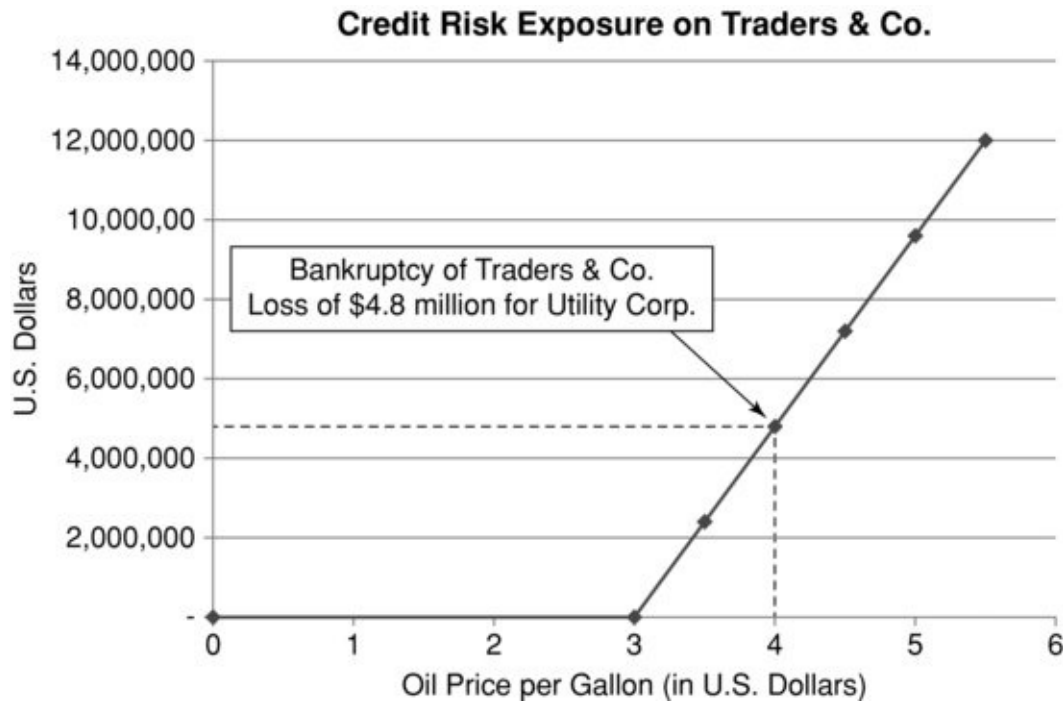
- Traders & Co. will provide Utility Corp. 100,000 gallons of oil per month.
- The agreed price is \$3 per gallon.
- The contract is valid for five years.

From a cash-flow perspective, it is straightforward: Each month for the next five years, Utility Corp. will pay \$300,000 to Traders & Co. and will receive the oil it needs to run its power plant.

Now let's imagine the following situation: Due to a strong economy, the worldwide consumption of oil increases, which drives its price up. One year after the inception of the contract, the price per gallon goes to \$4. Utility Corp. made a good deal as it pays \$3 for a gallon whose market price is now \$4. Traders & Co. was caught off-guard by the large price increase and, due to a high volume of speculative bets, is going out of business and stops all deliveries immediately. Utility Corp. has no options but to find another supplier to replace Traders & Co. for the next four years. The new agreement reflects the prevailing market price of \$4 per gallon instead of the \$3 they used to pay to Traders & Co.

The financial loss for Utility Corp. generated by the bankruptcy of Traders & Co. is fairly easy to calculate. Each year, the extra cost is: $100,000 \text{ (gallons)} \times 12 \text{ (months)} \times (\$4 - \$3) = \1.2 million . Ignoring, for the time being the time value of money, the loss for the four remaining years calculated at that particular moment in time, totals $\$1.2 \text{ million} \times 4 = \4.8 million . The dollar loss for Utility Corp. according to the prevailing oil price can be seen in [Figure 5.2](#).

[Figure 5.2](#) Loss for Utility Corp.



The supply contract, therefore, generated a credit risk for Utility Corp. because, when Traders & Co. defaulted, Utility Corp. suffered a financial loss. Three main parameters influenced the magnitude of the loss:

1. The agreed price (\$3).
2. The remaining lifetime of the contract (four years).
3. The market price at the time of Traders & Co.'s default (\$4).

With the first two points alone, the situation would not be much different than from a bank loan. The notional amount of the loan and the amortization schedule is known at the time of the closing, so the credit exposure, which diminishes as time goes by, can be quantified at any time. What creates the dynamic exposure is the fact that the magnitude of the credit exposure depends on the market price at the time of the default. Each time the price of the product underlying the agreement changes, the credit exposure changes. The credit exposure can be calculated at any time, as we did before, and it fluctuates with the price of the underlying product. That's why it is dynamic. It cannot be calculated in advance, and its value will change frequently and can experience large swings in a short period of time.

This creates a serious challenge for a credit risk manager who is asked to sign off on the exposure to the counterparty. In addition to the long-term nature of the contract, which generates a high degree of uncertainty around the evolution of the credit quality, the risk manager does not know with certainty the amount of

credit risk his firm will be taking over the lifetime of the contract. We will present in the following sections the most common approach to deal with this situation.

DERIVATIVE PRODUCTS

Derivatives are financial instruments that companies use to hedge against risk or to speculate on price movements. The most common derivatives involve interest rates, foreign exchange, equities, and commodities (e.g., oil). They are technically very similar. In most cases, there are no exchanges of cash at the inception (e.g., start date) of a derivative contract. However, the simple fact of entering into a contract generates a credit risk for the two parties involved.

We will use the example of an interest-rate swap to explain where the credit exposure comes from. In order to facilitate the presentation, we simplify some technical aspects of the transaction. Thus, what we describe will not perfectly represent the actual financial products sold by banks. Our goal is to make our readers understand the fundamental principles of dynamic exposures, and details have been omitted for this purpose.

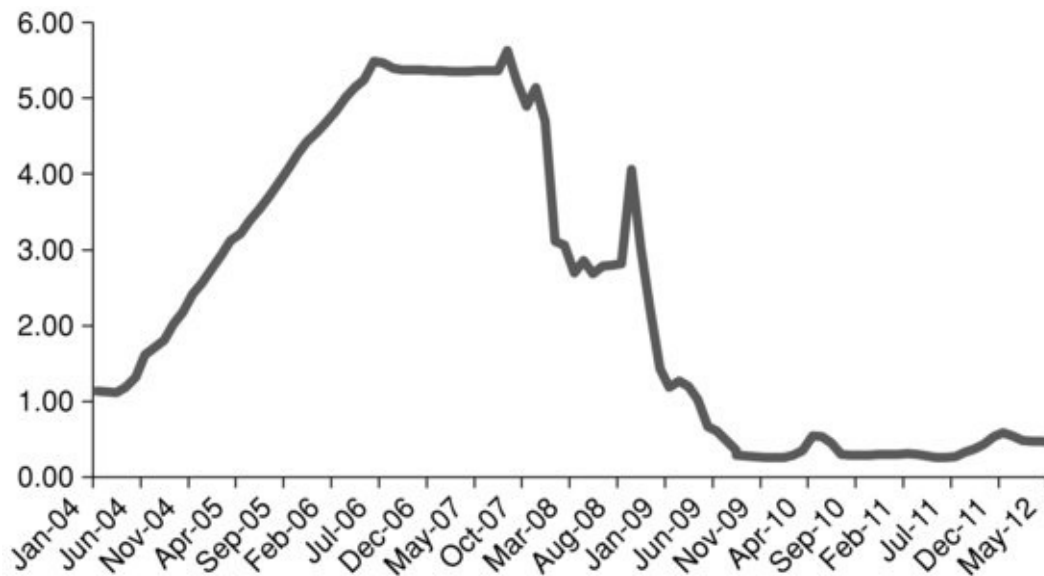
Big Corp. needs to refinance an existing loan and borrows money from Large Bank. The main terms of the loans are the following:

- Loan amount: \$100 million.
- Maturity: five years.
- Interest Rate: three-month LIBOR + 1.2 percent per annum.
- Frequency: five yearly payments at the end of each anniversary year.

The interest rate is not fixed but floats and varies according to the value of the London Interbank Offered Rate (LIBOR). LIBOR for a given term (e.g., 3 months) is an average rate at which large banks, like Large Bank, borrow money from each other to finance their operations. Its value changes daily. If, for example, LIBOR is 1 percent, Big Corp. will pay an interest rate of 2.2 percent. If LIBOR goes to 2 percent, the rate will become 3.2 percent. [Figure 5.3](#) displays historical LIBOR rates for selected terms.

Figure 5.3 Three-Month LIBOR, January 2004 to May 1, 2012, Quoted as Annual Percent

Source: British Bankers Association.



Big Corp. does not like the uncertainty around the interest rate it must pay on its loan, but it has no choice because all commercial banks lend money at floating rates and not fixed rates so as to match the cost movement in their funding sources with the return movement from their loans. Fortunately, Big Corp. also has a relationship with an investment bank, Lemon Bank, whose trading desk is active in the interest-rate derivative market. Lemon Bank is willing to transform Big Corp.'s floating interest rate of LIBOR + 1.2 percent into a 5 percent fixed rate.

The two parties, therefore, enter into an interest-rate swap. This is a separate agreement from the loan between Big Corp. and Large Bank. Lemon Bank is not involved in the contractual relationship between Big Corp. and Large Bank.

The main characteristics of the swap are:

- Notional (usually loan balance at the time the swap is entered into): \$100 million.
- Maturity: five years.
- Payer: Big Corp. pays fixed rate of 5 percent per annum (swap rate).
- Receiver: Lemon Bank pays floating rate of LIBOR + 1.2 percent per annum.
- Frequency: five yearly payments.
- Original Cost: \$0.

Entering into an interest-rate swap removes the uncertainty about the fluctuations of LIBOR for Big Corp. They know that their expenses will be exactly \$5 million per year until the maturity of the loan, regardless of the evolution of LIBOR. The payment they will receive from Lemon Bank will

match exactly the interest payment they owe to Large Bank.

Each year, the exchange of cash will be:

- Big Corp. pays to Lemon Bank: $\$100 \text{ million} \times 5 \text{ percent} = \5 million .
- Lemon Bank pays to Big Corp.: $\$100 \text{ million} \times (\text{LIBOR} + 1.2 \text{ percent})$. For instance, if, when payment is due, LIBOR is 4.8 percent, the payment is $\$100 \text{ million} \times 6 \text{ percent} = \6 million . *(Note that in practice, Big Corp. and Lemon Bank will exchange on a net basis, so only one check is written at each settlement period. In this case, Lemon Bank will pay Big Corp. \$1 million.)*
- Big Corp. pays Large Bank: $\$100 \text{ million} \times (\text{LIBOR} + 1.2 \text{ percent})$. In our example, the payment is \$6 million.

Unfortunately, at the end of the first year and just before the first interest payment from Big Corp. to Large Bank is due, Lemon Bank faces some financial difficulties and is liquidated. As a result, the interest-rate swap with Big Corp. is canceled. To make things worse, the LIBOR has increased to 5.8 percent. The yearly interest payment on the loan from Large Bank is now \$7 million, whereas Big Corp., thanks to the interest-rate swap, expected to pay \$5 million. Big Corp., still interested in transforming its floating rate payments to Large Bank to fixed rate payments, in order to remove the uncertainty about the amount of its yearly payments until the maturity of the loan, replaces Lemon Bank with another bank, but now pays an interest rate of 7 percent instead of 5 percent.

Big Corp.'s financial loss due to the bankruptcy of Lemon Bank can be estimated, again, ignoring the time value of money, at \$2 million per year for five years = \$10 million. By entering into an interest-rate swap, Big Corp. took a credit risk on Lemon Bank. As shown in the example, they lost money due to the inability of Lemon Bank to honor a financial obligation. Similar to the example of Utility Corp. in the previous section, the magnitude of the financial loss they incurred was not known in advance. It depended on:

- The agreed swap price (the fixed swap rate, 5 percent).
- The remaining lifetime of the contract (5 payments).
- The value of the LIBOR at the time of Lemon Bank's default (5.8 percent).

For a derivative transaction, the credit risk exposure cannot be estimated with certainty at the beginning of the contract. In addition to the agreed swap price and the time left on the swap, the prevailing LIBOR when the credit exposure is calculated has a major impact.

THE ECONOMIC VALUE OF A CONTRACT

The two examples just given illustrate the two main families of business agreements that generate a dynamic credit exposure. The fundamental thing to remember is that, once a contract has been signed, there is a possibility that one party loses money if the other party defaults, even if there is no exchange of cash or products at inception. As a consequence, the simple fact of entering into a transaction generates credit risk. The only case in which there would not be credit risk is if the market price of the underlying product were somehow constant, which naturally does not happen in real life.

As we saw in the previous examples, the amount of money that can be lost at any time is what it would cost to replace a defaulted counterparty. This is why the credit risk exposure is the replacement cost of the counterparty. It represents the economic value of the contract and corresponds to the MTM value of the contract.

Mark to market is a fundamental concept in finance. Within the context of this book, the most important meaning of MTM is that it corresponds to the valuation of the credit risk at any time, taking into account the prevailing market conditions. Note that there are other consequences of MTM that we will review later on in this chapter. We will explain more about MTM in the following section.

Our two examples were, purposely, fairly intuitive because both companies had entered into long-term contracts to protect a business need, that is, to hedge the cost of oil and hedge the floating interest rate on a loan. There are situations in which the economic value of contracts is a little less easy to understand, especially when seeing a derivative transaction in which no money has been borrowed or no products yet sold. Let us illustrate this:

Going back to the example of Big Corp. and Lemon Bank, this time, let's take the point of view of Lemon Bank and let's assume that Big Corp. defaults when LIBOR is at 3 percent. The floating interest rate is now 3 percent + 1.2 percent = 4.2 percent. Legally speaking, the bankruptcy of Big Corp. is a termination event of the swap and releases Lemon Bank from its obligation to honor the terms of the swap. It is, therefore, tempting to conclude the following: Because Lemon Bank did not lend money to Big Corp, the termination of the swap simply means that both parties are released from their obligations and there is no further settlement to consider. Lemon Bank will not receive \$5 million per year from Big Corp. but will not have to pay \$100 million \times (LIBOR + 1.2 percent) at

prevailing LIBOR value over what would have been the remaining term. There is a loss of future revenues, but Lemon Bank cannot do anything about it.

This way of thinking is not correct. Big Corp. and Lemon Bank had entered into a derivative transaction and, at the time of the bankruptcy, Lemon Bank was expecting, at current LIBOR level, to have a net cash inflow of \$800,000 (\$5 million – \$4.2 million) per year. Because there were five payments remaining, the MTM value of the contract or the economic value of the contract was, assuming expected future values of LIBOR to remain constant, \$4.0 million.

Even if Lemon Bank did not lend money to Big Corp., they were expecting to make money on the contract, thanks to the favorable evolution of the LIBOR value. They had a credit exposure on Big Corp. that materialized at the time of their default. From an economic point of view, concluding a supply agreement or a derivative contract is strictly equivalent to lending money. Losing money that was lent and did not come back is exactly the same as not receiving an amount of money that is expected.

To make it clearer, let's present the situation of Lemon Bank in a different way. Let's assume that Lemon Bank did not have appetite for the interest-rate swap but just wanted to develop a commercial relationship with Big Corp. To cancel out their risk, at the same time they concluded the swap with Big Corp., they entered into the same swap, but in the opposite direction, with Better Bank. They committed to pay to Better Bank the fixed rate of 5 percent and Better Bank committed to pay them the floating rate of LIBOR + 1.2 percent. At the time of Big Corp.'s default, Lemon Bank owed \$5 million to Better Bank, and Better Bank owed \$4.2 million to Lemon Bank. Without the payment from Big Corp., Lemon Bank incurs a net cash loss of \$800,000 and faces the potential to continue losing money until the maturity of the swap. However, whether Lemon Bank hedged their swap position did not matter. At the time of default, they incur an economic loss of \$4.0 million, generated by the bankruptcy of Big Corp.

MARK-TO-MARKET VALUATION

We made a few shortcuts when calculating the financial losses of Utility Corp. and Big Corp. due to the bankruptcy of their counterparties. The purpose of the previous examples was only to explain at a high level the concept of dynamic credit exposure and MTM. For most credit risk managers, what is really

important is to identify when transactions generate a credit exposure and to have a general understanding about its nature. The actual valuation of dynamic exposures is very complex. It is another science that typically involves sophisticated quantitative models. Thankfully, there is really no need to be able to calculate an MTM exposure to be a good credit risk manager. Naturally, the more one knows, the better, though.

In this section, we will endeavor to provide additional context around MTM so that our readers develop a good feel for the concept. To repeat ourselves, marking to market a contract means calculating its replacement cost, taking into account the prevailing value of the underlying product. In other words, how much money a company would lose if they would have to replace their counterparty by another one that would apply the prevailing market conditions.

There are three major parameters that influence the mark-to-market value of a contract and thus the credit risk it generates:

1. The predetermined conditions of the contract (e.g., \$3 per gallon).
2. The time left in the contract. All things being equal, the longer the time, the larger the value.
3. The prevailing conditions at the time the computation is performed.

Let's review some key aspects of MTM calculations.

Time value of money is captured in the MTM calculation because the expected exchange of money or product takes place over time. Thus, we need to use the present value of future cash flows, and not the notional amount, which is a nominal figure that does not account for time value of money.

The MTM calculation can be done at any time, not just when a counterparty defaults. When one computes an MTM, the fact that the counterparty could default in the future has to be taken into account. There is some probability that the counterparty could default over the time period in question, and this possibility affects the economic value of the contract. So, in addition to the fact that prices vary since contract inception, the chance of default over the contract period is also a variable that influences economic value. This is what introduces complexity in MTM calculations. Reviewing and comparing the mathematical models used for these calculations would not bring much value to this book so we will refrain from covering them.

MTM is a zero sum game for the two entities involved. If, at one point of time, the contract is worth \$10 million for one entity, it is actually worth -\$10 million for the other party.

If a transaction is entered at prevailing market conditions, the MTM value of the deal is zero at inception.

The MTM value of a transaction declines over time, all else being equal, since fewer and fewer payments will occur. This is known as the amortization effect. In our previous example, we made a rough calculation of MTM as a loss in a single year multiplied by the number of remaining years until the end of the contract. Again, this methodology was crude but enables us to understand that the shorter the remaining life of the transaction is, the smaller the MTM value. Ultimately, at the end of the contract's term, the MTM is zero, regardless of the prevailing market conditions, because there are no more payments expected.

MTM can be positive or negative. From a credit risk management perspective, only positive credit exposures are relevant. If a counterparty defaults when the MTM is negative, there is no financial loss, so negative numbers can be ignored. When exposure reports are prepared, only positive numbers are retained, otherwise the value is reported as zero.

MTM is more than a credit risk management concept, it is also an accounting one. The accounting standards (like the U.S. Generally Accepted Accounting Standards [GAAP]) require that some contracts have to be marked to market and distinguish which do not have to be. The important thing to remember is that MTM valuations have an impact on the P&L statements of a company. Mark to market on contracts has to be reported as positive or negative revenue at the same level as the other operations of a firm. It may sound bizarre or irrelevant, but it just reflects the fact that some transactions involving products with fluctuating variables have an economic value similar to other value-creating or value-destroying activities of a company.

In a trading environment, MTM is computed daily, and, thus, the profitability of trading desk operations can be assessed on a real-time basis. The rationale is that a bankruptcy is not necessary to terminate a supply agreement or a derivative contract. It can be done on a voluntary basis if the contract is not needed any longer or for many other reasons. When a party decides to unwind an MTM-sensitive transaction, the other party may or may not accept, but if they do, they ask to be compensated at the market value level. It is logical since the counterparty may want to replace its partners and, to repeat ourselves, if they do so the new arrangement is done at the prevailing market conditions. They want to be paid for what it would cost them to replace their counterparty if they need and/or want to do so.

In case of bankruptcy of a counterparty, the positive MTM value of a contract

is added to the list of liabilities at the same level of other senior unsecured financial obligations. The party that had a contract with a positive value with an entity that defaults is entitled to receive its share of the amount that will be made available to all creditors. Derivatives counterparties are considered senior unsecured creditors. This shows, again, the economic value of a contract.

Note that in many publications, the MTM value of a contract is defined as the present value of the future expected cash flows. The problem with this definition is that it makes sense only for transactions in which there is an exchange of cash flows, such as interest-rate swaps. The example of the supply contracts illustrates it, because there is no exchange of cash flows; one party provides a commodity, and the other one pays for it!

No doubt that the MTM value of a contract is an important number. It represents a good estimation of the amount of money that a company would lose at a particular point in time in case of default of the counterparty. That's why all banks, trading firms, or utilities like Utility Corp. have developed automated systems to compute MTM at least every day. When the financial markets close, the proprietary mathematical models are fed with the new data, and within a few hours, all MTM positions are available. The firms have access to the profitability of their business and, as far as we are concerned, to the credit exposures on all their counterparties.

For credit risk managers, the list of MTM values provides an overview of the exposures they have to manage. Those values have to be compared with the approved limits to make sure that the risks taken are in line with the firm's appetite. Furthermore, when a default occurs, many people inside a firm, such as senior management and compliance officers, and outside the organization, such as regulators, rating agencies, and equity analysts, want to know immediately what the financial consequences are. In an era when everybody is accustomed to receiving information on a real-time basis, risk managers need to have the MTM numbers handy all the time, for all contracts and on all counterparties.

VALUE AT RISK (VaR)

Alas, the computation of MTM values in quasi-real time is far from being enough for a credit risk manager. Mark to market is a snapshot of a credit risk exposure at the time it is computed. However, because the exposure is dynamic, the MTM methodology does not provide any information about what the range

of exposure could be in the future. For risk managers, this range is what counts when deciding whether to enter into transactions, because they have to sign off on the credit exposures until they expire.

Imagine that there is a surge in commodity prices one day. When the credit risk manager arrives in her office the following day, she discovers that some exposures have jumped by 10 percent compared to the day before. What does she do then? Try to figure out if it is still reasonable to face such high exposures on the weakest counterparties? Isn't it too late?

The price surge that triggered higher exposures may be impressive for one day but commodities are volatile, and it is neither the first nor the last time it will happen. Would not it be better if, at the time a new contract is considered, risk managers could have a methodology to assess, within a level of certainty, how high the credit exposure may reach during its lifetime? Couldn't we extrapolate historical data to simulate how the new contract may behave as the price of the underlying product fluctuates? It would be imperfect, because future prices may differ from past behavior, but within a quantifiable level of certainty, we would have a reasonable estimation.

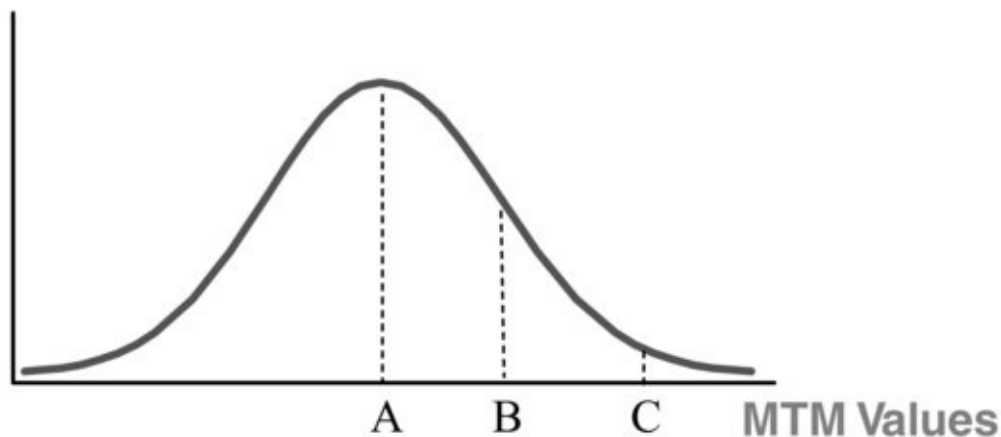
As you may have figured out, estimating the amount of future credit exposures that can arise from current contracts, that is, the range of MTM values, is a focal point of the credit risk management function. The range can be estimated statistically, and the outcome is a probability-weighted distribution of exposures from which the value at risk or VaR can be extracted. The VaR is the gross exposure (GE), as described in Chapter 4, attached to a transaction generating a dynamic credit exposure.

With MTM, we calculate the economic value of a contract based on the prevailing price, and we arrive at a point estimate. The idea behind VaR is to add a probability dimension to the MTM concept. What is the likelihood that the price reaches a certain level and, if so, what is the corresponding MTM value of the contract?

For a particular product like oil or interest rates, historical price data are widely available for a long period of time, which gives us the relative frequencies of these prices. With enough data points on prices, the relative frequencies represent true probabilities, and, if plotted where the y-axis represents the relative frequency of occurrence and the x-axis represents the corresponding MTM value, we are able to generate probability distribution as in [Figure 5.4](#). For many physical and financial products, MTM values (prices) are normally distributed, consistent with the graphic in [Figure 5.4](#).

Figure 5.4 Probability Distribution of MTM Values

Probability



The area below the curve represents the probability associated with all possible outcomes scenarios, which is 100 percent by construction. At a given MTM value, the area below the curve, up to that point, represents the probability of the product's MTM value being at or below that amount. For example, point A represents a 50 percent probability that the product's MTM will be at or below \$65, and point B represents a 75 percent probability that the product's MTM will be at or below \$90.

What risk managers are most interested in is the tail of the distribution, since values in the tail correspond to unfavorable outcomes. Risk managers are interested in knowing what the MTM values might be in the more extreme and rare cases, say 1 percent of the time or less frequently. Suppose the contract in question creates more credit exposure as prices rise. In [Figure 5.4](#), risk managers are most interested in point C, which corresponds to the 99 percent probability of MTM values being at or below \$100 million. Risk managers can, therefore, conclude, using the commonly used vocabulary, that the VaR of this contract, with a 99 percent confidence interval is \$100 million. What it means is that there is only a 1 percent chance that the credit risk exposure on the counterparty generated by this contract will be more than \$100 million.

In the real world, risk managers have to choose a confidence interval that fits their risk appetite. If a high value is chosen, there is a good chance that the risk manager will never be surprised by bad news. However, this strategy has opportunity costs because the transaction is assigned a high GE and consumes a lot of the scarce credit capacity that a firm allocates to a counterparty. Other profitable transactions would be rejected due to lack of available capacity on the

same counterparty, whereas the likelihood of reaching the high credit exposure with the derivative transaction is small. In actual practice, many financial institutions set the confidence interval at 99 percent (corresponding to a 1 percent chance of experiencing losses beyond this point).

You may remember the concept of GE explained in the previous chapter. We mentioned that for transactions generating a dynamic credit exposure, the GE had to be computed using statistical methodologies. We also said that GE, for dynamic credit exposures, was not representing the worst case scenario. That is what we meant. Most markets have, in theory, unlimited price limits. For instance, in recent history, oil prices have risen above \$100 per barrel and the all-time high is \$142. However, oil prices are, in principle, without limit, and the probability of reaching extremely high MTM values is close to zero but not zero. There is always a small chance that oil prices reach, say \$500 per gallon, which would lead to an extremely large MTM.

Let's not forget that, for most products, the big price moves will occur over time rather than suddenly. It gives a chance to risk managers to take actions such as asking for collateral, buying credit protection, or unwinding the contract.

In most institutions, MTM and VaR calculations are performed outside the credit risk management team. Estimating and managing VaR exposures is the realm of what is known as market risk management. A market risk manager's job is, among other things, to define and implement methodologies to forecast future MTM values. The result of that work is then forwarded to the credit risk management team, which, before the conclusion of a contract, signs off on the methodology and judges if the associated GE is compatible with the firm's appetite. Once the contract is in the book, market risk management provides daily credit exposures for all dynamic transactions.

CHAPTER 6

Fundamental Credit Analysis

A basic requirement for any career in credit risk management is being able to perform a fundamental credit analysis. Within the credit risk management function, counterparty risk assessment employs the most professionals. Credit analysts work at the entry level within this function and their responsibilities are to review the financial strength of entities, which in turn, is used to establish credit limits and approve transactions.

Senior executives also must know the basics of credit analysis because they are the ultimate decision makers in credit committees. They must be able to quickly understand the credit reports produced by risk managers, to ask relevant questions, and then, to make informed decisions using their judgment and experience.

The credit analysis of a company revolves around the knowledge of:

- Its political, economic, regulatory, and competitive environment.
- Its management, products, and operations.
- Its financial status, such as liquidity, leverage, profitability, and cash flow, much of which is knowable through analysis of its financial statements.

In this chapter, we will focus on fundamental concepts of credit analysis.

The deliverable of the work of a credit analyst is a credit report that summarizes the financial situation of an entity and that outlines its strengths and weaknesses. To be able to produce a credit report, analysts must have several essential skills:

- A strong understanding of the relevant accounting rules, such as U.S. Generally Accepted Accounting Principles (GAAP), or International Financial Reporting Standards (IFRS) used to prepare the numbers.
- Ideally, the credit analyst will have an accounting background strong enough to be able to perform some investigative analysis on the financial statements, not dissimilar to what a forensic accountant engages in.¹
- A strong understanding of the macroeconomic, industry, and regulatory environment in which the entity operates.
- A strong willingness to be curious, skeptical, perseverant, and to ask questions when meeting senior managers of a company.

Imagine that a company is deriving most of its revenues from a product that is

gradually becoming obsolete or for which its market share is slipping to stronger competitors. Or, suppose a pharmaceutical company is about to lose its patent protection on a key product. A company's financial statements are backward looking and may not reflect or predict these events; the credit analyst must look forward to understand the company's future profitability. In particular, large organizations not only employ a team of credit analysts, but also organize the team to allow the analysts to specialize by industry.

The relationship between a chief financial officer (CFO) and a credit analyst can be like a cat and mouse game. Some CFOs are very clear, but others can be purposefully enigmatic so as not to disclose much for a variety of reasons. CFOs of public companies are prohibited from disclosing material information unless it is done simultaneously to the general investing public; most CFOs choose to limit disclosure for competitive reasons and to err on the side of saying less rather than more. This facet of the credit analysis—the ability to glean additional information from a one-on-one with the CFO, is an integral component of the credit analysis, permitting a deeper investigation into the company's financial statements.

In practice, credit analysts often refrain from asking the tough questions. In an effort to maintain an ongoing relationship with the CFO, they are accommodating; yet, at the end of the day, if the analyst is unable to describe what a company's main risks are, she has failed at the key goal of the job. We will present more detail of the accounting aspects of credit analysis in Chapter 12 and will review key principles of the financial analysis next.

ACCOUNTING BASICS

There are three essential financial documents needed to analyze the financial situation of a company:

1. The balance sheet.
2. The income statement, also called the profit and loss statement (P&L).
3. The cash-flow statement.

The balance sheet is a snapshot of an entity's financial situation (what it owns, what it owes, and how it was financed) at a particular past point in time. It does not say anything about its current or future profitability.

The P&L summarizes the profitability of the activities during a certain period of time like a quarter, half a year, or a full year. On a stand-alone basis, it does not say anything about the financial balances of the company. For instance, the amount of debt it raised to finance the assets that are necessary to operate.

The cash-flow statement reflects sources and uses of cash to the company and thus captures the cash elements of the P&L and any changes to the balance sheet than impact cash balances.

At a very high level, the balance sheet reflects financial robustness, the income statement, or P&L, reflects profitability, and the statement of cash flows reflects a company's liquidity management. The credit analyst needs to work with all three documents as they form three pieces of a puzzle. They mean only so much on a stand-alone basis, and their simultaneous analysis enables the credit analyst to get a sense of the way the company performs.

Often more important than the three documents are the notes that accompany the financial statements. The balance sheet, P&L, and cash-flow statement represent only a few pages of the financial reporting package, whereas, in contrast, the notes, often numbering over a hundred pages, constitute the bulk of the financial report, providing detail and critical information needed to understand the three documents.

Any company that secures external financing will be audited by an external firm. The external auditor's job is to verify that the financial documents are reported according to the accounting rules in place and that the financial numbers are representative of the company's situation. No investor would agree to lend or invest in a company for whom it did not secure an independent opinion of the accuracy of the financials. Thus, any company for which a credit

analysis is being performed is likely to be audited. The biggest auditors are known as the Big 4: Deloitte Touche Tohmatsu, Ernst & Young, KPMG, and PricewaterhouseCoopers (PwC). Auditors must sign off on a company's financial statements, that is, they must sign a letter confirming their opinion that the financial statements give a true and fair view of the company's financial circumstances based on the information presented to them. If auditors have doubts about the data quality underlying the financial numbers, about the adherence to accounting rules, or about the ongoing viability of a company, they will qualify their opinion when signing off on the audit.

Financial statements are prepared for each legal entity. If an entity owns other entities, consolidated statements are presented in which the numbers of all entities are aggregated to present a comprehensive picture of the parent company. One important element in consolidated financial statements is that all intragroup transactions are eliminated in order to present the true economic picture of the business done with outside clients.

The Balance Sheet

The balance sheet presents, on a particular date, the assets that an entity owns, and how those assets are financed, either by liabilities or equity.

In principle, the balance sheet changes each day, due to activities such as sales of products, sales or purchases of assets, or changes in financing. In the real world, though, the balance sheet is prepared at the end of each quarter, primarily for companies having a legal obligation to do so, for example, for those listed on a stock exchange. For nonpublic companies, the balance sheet is usually prepared less frequently, say once to twice a year, since it is a time consuming process. In addition, there is a long lag between the evaluation date and the day of publication—usually several months—which presents the analyst's first question: “What has happened between the date of the balance sheet and today?” Some balance-sheet events may be publicly known but some may not, so this is always a good first question to ask.

Assets

The assets are broken down into two main categories:

1. Current, or short-term, assets, which are assets the entity does not intend to own more than a few months or which can be transformed into cash quickly. Examples are trade receivables, i.e., invoices sent but not yet collected, raw materials, inventories, and liquid financial instruments like cash or marketable securities.
2. Long-term assets, which the entity intends to own for a long period of time. Examples are physical assets like an office building, a plant, or equity participation in another company.

The reason to separate current and long-term assets is to distinguish between what is owned temporarily as a result of the day-to-day operations and what is purchased with a long-term view. Because short-term assets and long-term assets are not financed the same way, this distinction is important to the credit analyst.

The credit analyst will attempt to adjust or revalue the assets to reflect what they would sell for if needed, that is, to value them on a fair-market value basis. There are several challenges with this.

First is goodwill. Goodwill, sometimes called cost in excess, represents the premium paid during an acquisition for assets in excess of their book value. There may be legitimate reasons to pay more than book value for the acquired company's assets, such as cost savings that may result from the business combination. However, if the company had to sell some of these assets, it would receive fair value only. For transparency reasons, companies must separately report the fair value of the hard assets they acquired, and must revalue goodwill every year, writing down the value of this if necessary. A good example of this is when the consumer products company Procter & Gamble recorded a \$1.5 billion charge in the fourth quarter of 2011 (the company's second quarter of its fiscal year) due to a write-down of the goodwill carried for Wella (hair-care) and Gillette, two companies they had acquired in the mid-2000s. Procter & Gamble justified its write-down by lower expectations for sales and profits.

Second, other intangible assets must be adjusted to reflect fair market value to the extent possible, such as patents.

Third, property, plant, and equipment are carried at amortized cost, which may be unrepresentative of fair market value. During the real estate bubble, some real property was undervalued on some companies' balance sheets. As this book goes

to print, real estate property acquired by companies during the bubble would likely be overvalued. Finally, the valuation of invested and other financial assets must be scrutinized. In the United States, with the introduction of Financial Accounting Standards Board's (FASB's) FAS 157 guideline, the analyst's job has been aided by companies now reporting financial assets into classification Levels 1, 2, and 3, which reflect the degree of liquidity and valuation robustness. The balance-sheet valuation of assets classified as Level 3 must be understood to be only an estimate of what the assets could actually sell for in an orderly transaction.

Liabilities

The liabilities are monies owned to third parties that expect to be paid back often with interest. Here again, one distinguishes two familiar subcategories:

1. Current liabilities that are supposed to be paid back within a few months. Examples are payables, that is, invoices received from suppliers or short-term debt, such as commercial paper.

2. The long-term liabilities, primarily long-term debt such as bank loans or bonds.

Long-term liabilities include not just long-term debt and loans but all expenses associated with contracts through the current reporting period that can be reasonably expected in the future, such as pension liabilities, which must be a particular focus of the analysis.

Shareholder's Equity

Shareholders' equity represents the residual interest in the company, meaning what would be left after all liabilities are extinguished. As owners, shareholders have a claim on the profits made, and they absorb losses in the event that that company has negative profits. The source of the equity is both paid-in capital, which represents the cost of the equity issued by the company in an equity offering—that is, what shareholders put into the company directly—and retained earnings, profits that were not paid out as dividends. Equity is the primary loss absorption mechanism for the company and of particular importance to the creditor. The larger the equity base, the more loss absorption capacity the company has and, thus, all else being equal, the more financially strong the company is from a credit perspective.

The P&L (Income Statement)

The P&L shows two main categories: revenues and expenses. The outcome is either profit, if revenues exceed expenses, or losses, if expenses exceed revenues.

The income side shows primarily all sales recorded during the reporting period. The main expenses categories are selling, general, and administrative (SG&A); interest on debt; amortization/depreciation; and taxes.

Two key accounting notions about the P&L:

1. The accounting recognition of revenues and expenses is not related to an exchange of cash. For instance, the definition of a sale is a product or service that changes ownership (e.g., leaves the warehouse of a manufacturer). The sale of a product appears as revenue even if the customer has not yet paid or even if the product has not been delivered. The same holds true for supplies. They are recognized as an expense at the time the product is delivered and not when the supplier is paid. The rationale is that the P&L reflects the economic activity of a firm and not the way it manages its cash.

2. Some activities are not recorded in the P&L and trigger only balance-sheet entries. The main examples are the issuance or repayment of debt principal and the investment in plant and equipment. The reason again is that the P&L is meant to show the profitability of a firm's operations and not the investment needed to produce profits. Notably, what is found in the P&L is the interest paid on the debt because it is deemed to be an operating expense. Depreciation and amortization of long-term assets are also expenses, which we will explain below.

The Cash Flow Statement

The cash flow statement is meant to represent all the movement of cash during the same reporting period as the P&L. There are two formats for this schedule: the indirect method and the direct method. Companies can choose either or both methods for reporting. In the indirect method, the schedule begins with net income that is taken directly from the P&L. The statement of cash flows adjusts the P&L for all noncash entries to reconcile net income to net cash flow produced from operations because the P&L contains many noncash items. Noncash elements recognized in revenue are subtracted from net income and noncash elements recognized in expenses are added back to net income to arrive at cash flow from operations. In the direct method, cash flow from operations is arrived at directly, that is, from the sources and uses of cash rather than from making adjustments to the income statement. In both methods, cash flow from operations is one piece of the cash equation, supplemented by cash flow from investing and cash flow from financing. Net cash flow is then added to cash balances at the beginning of the reporting period to arrive at the net cash balance at the end of the reporting period. This end of period cash value will then match the cash balance as reported on the balance sheet.

- Cash flow from operations is the amount of money generated by the day-to-day operations of the business, such as collecting the proceeds of sales and paying for supplies, salaries, and other expenses. Sales recorded in the P&L represent products that were sold and services performed. As long as clients are paying on time, sales amount correspond to cash inflows with a 30-or 60-day delay corresponding to the payment terms. Typical in a competitive environment is that a company extends its payment terms to maintain market share. Now, a wedge between revenue and cash inflow from sales has occurred, and net income overstates cash flow on a more pronounced basis, all else being equal. Working in the other direction are noncash expense items such as the amortization of goodwill and depreciation, which reduce reported profitability but not the cash balance of a firm.
- Cash flow from investing is the amount of cash generated by investment activities. For example, cash used to purchase a capital good is an outflow, and cash generated from the sale of plant or equipment is an inflow.
- Cash flow from financing is the third category on the cash flow statement and reports cash generated by financing activities, such as repaying debt

(cash outflow), borrowing money from the bank or issuing shares (cash inflow). The dividends paid to shareholders and the buy-back of shares also appear in this category, whereas, somewhat counterintuitively, interest income paid on a bank loan is reported in cash from operations.

What's notable about the cash-flow statement is that, although generally speaking, more cash is better than less, a company's increase in cash over a period is not necessarily a good thing, and a decrease in cash is not necessarily a bad thing. For example, a company can underinvest, which would manifest itself in lower cash outflow, and cash balances would increase, all else being equal. A company could take on too much borrowing, and cash inflow would rise, and this increase is not necessarily a good thing. As for cash from operations, companies that are growing rapidly have large appetites for working capital (the need to pay suppliers before collecting sales revenues) and are likely to have negative cash flow from operations, but this is a good problem. Companies that are in a state of decline could be selling goods from inventory, and not growing, in which case the cash flow increase reflects the decline.

Smell Test

Even before knowing the details of a company's financial statements, an experienced analyst is able to quickly form an opinion about a company. To do this, he would rely on a few key indicators that provide a high level gauge of credit quality. These are:

- **Size:** The bigger the sales the better. Although not all large companies are financially strong, large companies tend to be healthier than small ones. Medium-sized companies, even profitable ones, are usually niche players that can be vulnerable in an economic downturn, are more susceptible to losing their competitive advantage, and may not have the market power to secure adequate pricing. In addition, corporate governance is normally more robust in large firms. Compare this to small-and medium-sized companies that may still have family roots or governance tightly woven in the local community and, in both situations, are slow to reorganize when the profitability decreases. Finally, large companies normally have multiple bank relationships, and, thus, greater access to financing, which is especially helpful in times of stress.
- **Profitability:** The primary indicator of profitability is net income. Making money on a regular basis is a good sign of financial health. However, most companies are not immune from the broader economy and, from time to time, hit bumps in the road. A one-off drop in income or even negative income is not necessarily a bad sign; the key is to understand why. A one-off disposition of a loss-making unit, a reversal of a tax assets, and reorganization charges are usually not indicative of a sustained reduction in profits.

A company like Caterpillar, a manufacturer of heavy equipment for the construction and mining industry, was averaging close to \$45 billion of revenue and \$3 billion of net income prior to 2008. Then in 2009, due to the global recession, Caterpillar's revenues dropped to \$32 billion and net income to \$900 million, before rebounding to the pre-crisis level in 2010. This is typical of a well-managed firm: Although susceptible to events it cannot control, the management team is able to respond.

What is more problematic and yet hard to spot are those companies that have been profitable and then record a bad year due to bad decisions, which

should be of concern to analysts, because this calls into question such companies' long-term abilities to generate enough profits to meet their financial obligations. A company like Research In Motion (RIM), the manufacturer of the BlackBerry handset, is a good example. Once a leader in the telecommunication industry, it lost its edge by missing the demand of consumers for smart phones over basic cellular phones. As a result, RIM's profitability collapsed and stayed at a low level for several years.

- **Rating:** The firm's rating(s), either external (such as Moody's or Standard & Poor's) or internal (company proprietary), should reflect the counterparty's strengths, and such ratings are good predictors of a company's creditworthiness.
- **Debt/equity ratio:** Assets of an entity are financed using borrowed money and/or by funds provided by shareholders. Modern corporate finance practice encourages leverage, that is, the use of debt (borrowed money) versus equity to fund assets, since it provides a tax shield and, in addition, is thought to lower a company's weighted cost of capital given that debt is nominally cheaper than equity. Note that modern corporate-finance practice conflicts on this particular issue with modern corporate-finance theory, which posits that a company's cost of capital is invariant to leverage (in the absence of taxes). On this issue, we are on the side of the theory, since, from a credit perspective, high leverage translates into more credit risk, and, thus, a higher cost of credit. There is no free lunch.

Although there is no fixed rule for the threshold that separates too much leverage from an acceptable amount, and because each company's situation is unique, for a rule of thumb, a one-to-one ratio is not a bad starting place. This means that the shareholder's equity should be at least equivalent to the amount of long-term debt provided by banks and bond holders. This proportion is usually indicative of a conservative financial structure.

- **EBITDA:** EBITDA stands for Earnings Before Interest, Taxes, Depreciation, and Amortization. It is a relatively easy value to calculate from the P&L, and it represents a proxy for the cash generated from operations (since depreciation and amortization are noncash expenses) before payments are made for interest and taxes. EBITDA provides a good indication of the amount of money available for finance, investment, and other charges, and it is usually compared to items like the amount of interest payment. This concept is explained more fully later. The main difference between EBITDA and cash flow from operations is that

the former does not take into account uncollected sales revenues and unpaid expenses during the reporting period. For a company operating with stable growth, these uncollected and unpaid items do not introduce much distortion between the two measures.

- **Market capitalization:** For public companies, this is a relevant credit indicator on two fronts. First, a company's access to equity markets makes it more creditworthy since equity is an important form of financing, and from a creditor's perspective, the best form of financing since equity has only a residual claim on a company's assets. Thus, if two companies in the same industry have similar earnings, the company with the higher market capitalization is likely to be financially stronger, both because the equity markets have signaled that they believe that profit growth is there, and also because companies with high market capitalizations relative to their earnings can raise equity more cheaply (i.e., with less dilution to existing shareholders), both of which benefit the creditors.

Second, equity financing necessitates equity analysis, which is useful for the credit analyst (much as the work of a credit analyst is helpful to the equity analyst). Equity analysts try to forecast the future profits of the company, and in assessing this earnings power, they take into account the same risk factors that are relevant in a credit analysis.

The caveat with equity analysis is the potential for exuberance on the part of the analyst. In strong equity markets, the future of companies looks bright and ultimately may fall short of the analyst's expectations. The equity markets have proved to be exuberant and badly wrong on a regular basis. Think of the bad calls made on dot-coms, telecommunications, and more recently on the housing market. On the contrary, credit analysts are not predisposed to making optimistic forecasts since the creditor has limited upside.

A TYPICAL CREDIT REPORT

Many firms with a credit-analysis function develop their own format for presenting credit reports to ensure consistency across analysts and uniformity in reporting to make decision making easier for senior management. We sometimes hear discord about standardization, and that credit analysts should emulate equity analysts who produce more idiosyncratic reports to catch their reader's attention. On the contrary, we do not recommend allowing analysts to present reports the way they want because rigor and discipline are fundamental to the credit-analysis process. Professionals involved in the credit assessment should agree on a format and stick to it.

Although credit analysis relies heavily on interpretation of the numbers presented in the financial statement, the qualitative assessment of a company is not less important. Good analysis relies equally on qualitative and quantitative reviews. Numbers tell only one part of the story. Moreover, the numbers reflect the past, not the future, and a credit decision, such as whether to lend money, is made with a five-year horizon, sometimes more. The analyst must be convinced that the company will be able to meet its obligations in the future.

We have presented a template here for the structure of a credit report. A typical credit report will contain the following sections: General information, including an executive summary on the background on the company; the transaction; the industry and competitive landscape; a qualitative assessment including the company's strategy, ownership, management, and environmental risks; and a quantitative assessment that includes a detailed analysis of the company's financial statements.

General Information

Background of the Company

This first section presents an executive summary of the company including:

- A summary of the company's history, activities, and key financial and operational numbers.
- Recent significant news such as management changes, new products, mergers and acquisitions.
- The internal rating or scoring, if any; otherwise, external ratings.

The Transaction

This section presents a summary of the transaction contemplated with the counterparty, if it is what motivates the production of a credit report. If the submission is a regular review and renewal of a credit limit, this is what must be indicated.

The description of the transaction must be relatively short but detailed enough so that readers understand the main parameters. At a minimum, the following must be presented: overview and purpose of the deal, other participants (if any), pricing, and covenants.

Relationship and Approval Process

In this section, the history and profitability of the relationship is presented together with an explanation of the approval process, based on the guidelines. For instance, if for company ABC, that has an R2 rating, a limit is sought for \$160 million with a tenor of four years, from a capacity point of view, approval is delegated to the credit committee of the Investment Banking department with a compulsory recommendation from the credit risk assessment unit.

Rating and Recommendation

The final part of this section is the internal rating, the rationale for its assignment, and a recommendation about the transaction and/or the credit line.

Qualitative Assessment

Performing a qualitative assessment is like playing with Google Maps. You start at the global level and zoom in until you reach the CEO's office in the headquarters of the firm. The analysis must contain at least the following four sections.

Political, Economic, and Regulatory Environment

More and more companies have global operations, so analyzing the country risk today is not as straightforward as it used to be. The review should at least cover the largest and most strategic markets, as well the potentially problematic areas. If a company relies for growth on emerging markets, a thorough review of the risk landscape is a must. For all markets, the main questions are the three following:

1. *The political situation.*

What credit managers like is a stable political environment in which strikes, riots, confiscation of assets, bans on currency transfer, and other such events are very unlikely.

2. *The macroeconomic environment.*

Is the fundamental demand for the product growing or not? If it is, how fast? Are the credit markets able to supply attractively priced credit on attractive terms?

3. *The regulatory risk.*

Can the company be affected by new compulsory rules that would impact its profitability? This is a growing area of concern for many companies because, in many industries, regulators are more and more active. In the United States alone, constraints like the Volcker rule (interdiction for banks to use internal resources to speculate in the capital markets) clearly modifies the earning power of financial institutions.

4. *Other operational factors.*

Can the company be affected by events such as catastrophes, natural disasters, and product or environmental liability? For example, the 2011 floods in Thailand exposed the operations of many companies to material weaknesses in their supply chains causing business interruption, lost revenue, and higher costs of production.

5. *Industry/competition.*

This section gives an overview of the structure of each industry in which the company operates. If a company is present in several markets, each one should be studied separately. Examples of what is covered include the size of the market, market growth, product and customer segmentation, the number of key players, the pricing trends, barriers to entry and exit, and the drivers of revenues. A critical component of this overview is thorough a review of the competitive landscape.

Then, for each market, one must describe the positioning of the company and its strengths and weaknesses. This type of analysis has been employed commonly since the 1970s using the famous SWOT paradigm, which stands for the assessment of strength, weaknesses, opportunities, and threats. Other techniques beyond a SWOT analysis work as well, as long as they capture the same facets of the company's relative positioning in its industry.

Strategy and Key Risk Factors

This section presents a thorough review of the company's strategy, both at a high level and specific strategic initiatives. Annual reports and investor conference presentations, made available on the investor relations pages of a company's website, provide a lot of information as well. For smaller companies, a meeting with the senior management is a must to understand better what the priorities are and how the company is preparing its future.

It is a good idea to perform a thorough review of the risk factors and to check how they are addressed by the company's strategy. If an analyst meeting a company executive really wants to ask the most famous question in risk management, “What keeps you awake at night?” this is the time!

Ownership Structure

The ownership structure is critical to credit risk management since the shareholders of the company are agents of the creditors, as outlined at the end of this chapter. Debt holders and lenders having no governance rights cannot force the hand of shareholders if a company needs a capital injection to stay afloat. The interests of the lenders and shareholders are not aligned, and the value of the debt is directly affected by the amount of equity the company has issued. Thus, understanding the ownership structure permits the credit analyst to understand nuances of the trade-offs between the values of debt and equity, who has the incentive to take risks, and who bears the downside of a risky strategy. Although many aspects of credit quality are a function of the industry, the quality of the management team, the competitive positioning, and so forth, credit quality is also a choice variable for the shareholders. Therefore, understanding their point of view is a key aspect of a credit analysis. A stable group of long-term investors with a clear strategy is, from a credit point of view, preferable. Their tenure signals that they are fairly risk adverse, a risk preference more closely aligned with that of the debt holders.

An equally important aspect of the ownership is the overall quality of the directors, who directly represent the interests of the shareholders. Given the complexity of the operations of today's corporations, the directors must be up to the task of providing well-informed and well-executed oversight with teeth, in addition to strategic direction, none of which is an easy task.

Management

Just as shareholders are agents of the debt holders, management is an agent of shareholders. Just as there is a misalignment of interests between debt and equity holders, a similar misalignment exists between shareholders and the agents. First and foremost, the compensation plans of the senior and upper management must be well understood to know what is motivating them. For example, a compensation plan heavily weighted toward out-of-the-money warrants will tend to give management incentive to take excessive risk (since only “home runs” trigger a payday), beyond what the shareholders desire, which is itself beyond what the debt holders desire. A plan weighted toward a comfortable but predictable salary feels a lot more like what the debt holders' pay-off looks like, and these managers might be more inclined to not take big risks. Typically though, directors set compensation of the senior management team to resemble the pay-off of shareholders—warrants are large parts of the compensation scheme, and together with deferred bonuses (plus, typically, large salaries) the management team's pay-off will look similar to a shareholder's.

An equally important aspect of management is the overall quality of the team. Experience, turnover, succession plans, and track records are knowable, which capture signals regarding the quality of management. A management misstep can easily squander a company's fortunes, even if that company has a history of making money and a strong competitive position in a growing industry. A good recent example of this was Hewlett Packard, which had a distinguished track record of innovation and profitability until it entered the personal computing business by acquiring Compaq. To replace Carly Fiorina, and to right the ship, it hired Leo Apotheker, who had a highly-credentialed vitae, including having headed software giant SAP as CEO. After a series of communication missteps, both internally and externally, the marketplace lost confidence in the company, and the new CEO was quickly ousted.

It is well within the credit analyst's job to offer an opinion on the quality of management even without much to go on. In the case of Hewlett Packard, the credit analyst may have noted that Leo Apotheker's long career heading technology enterprises was both software-focused and earned outside the United States. This suggests that he may have lacked the touch to lead a California-based company with its West Coast culture and hardware pedigree. The credit report is the venue in which the analyst can and should be encouraged to speak

up.

Quantitative Assessment

The last part of the report is dedicated to the analysis of financial statements. In this area, there is no shortcut. The analyst must have access to the most recent documents in an understandable language. It can be a challenge for companies located in foreign countries and the assistance of a professional knowledgeable with the local accounting principles and language may be required.

A common challenge is dealing with private companies that do not publish results. It is hard to imagine a credit analyst providing a recommendation without having the ability to perform a basic review of the financial statements.

In the real world, there are a number of large but private companies that do not share documents with their business counterparties. It is often a power game between the company and its counterparties; the company makes exceptions for banks since they supply much needed liquidity lines but deny access to other creditors like suppliers or insurance companies. Some companies give access to a data room in their headquarters. There, analysts can consult documents but are not able to make copies. In extreme cases, computers are not allowed and only handwritten notes are tolerated. It is up to each creditor to decide if such high level of privacy, even with business partners, is acceptable or not.

Financial Statement Summary

A summary of the financial statements must be prepared either as an introduction to this section or in an appendix. It is also helpful to have the latest audited (annual) report as an addendum to the report for easy reference. Again, standardization across the assessment function helps here, allowing the most commonly used numbers and ratios to be easily found. Key balance sheet, P&L, and cash-flow statement numbers will comprise the bulk of the financial-statement summary.

Figures for at least four fiscal years are recommended to enable a review of the company's performance over a meaningful period of time. A creditworthy company will have fairly consistently performance over time. Less solid companies may experience ups and downs or a negative trend, detectable by comparing the performance over a number of years.

Summary statistics may include those that we already described (size, profitability, rating(s), debt/equity ratio, EBITDA, and market capitalization) and those we will expand on later, together with some other metrics that we find to be appropriate across most industries and countries.

Capital Structure

In addition to the debt/equity ratio that we mentioned earlier as part of our smell test, there are other indicators to pay attention to:

- (Goodwill + intangible assets)/total assets. Intangible assets represent patents, trademarks, and other sources of franchise value, such as brand recognition. Should the company have to monetize these assets, it would be unlikely to monetize them anywhere near the carrying values, and shareholders' equity would be reduced accordingly. This is why this number is important, because equity represents the company's loss absorption capacity. If the loss absorption capacity is actually smaller than the nominal value of equity, this fact needs to be highlighted, and this ratio helps to do just that. One example is Reynolds American Inc., a large U.S.-based tobacco company, whose goodwill + intangible assets to total asset ratio was, at the end of 2011, in excess of 65 percent, one of the highest among U.S. public companies.
- Off-balance-sheet obligations. Accounting governance bodies (such as the FASB) have made significant progress recently regarding disclosure of off-balance-sheet obligations from such items as derivatives and future lease obligations. Yet, some future obligations, particularly contingent obligations, are still not reflected in the financial statements of a company. A good example of this is derivative transactions. Some of these may lead to cash outflows in the future if the underlying products evolve in a nonfavorable direction. Thankfully, in most accounting jurisdictions, companies now report these types of contingencies in the notes accompanying the financial statements. It is the job of the credit analyst to have reviewed and understood the financial consequences of these transactions.

Liquidity and Cash Flow

A company's liquidity position has become a centerpiece of most credit reports. In the recent past, the analyst would just look to see that the maturity of the various debt facilities was spread over time and that the cash flow from operations was sufficient in the event of refinancing difficulty.

The start of the 2007 crisis was a real turning point. Many companies took refinancing for granted, almost an administrative task. As we all know now, this was a severe miscalculation. Investors simply refused to lend to certain entities and industries. The financial sector, which was massively relying on short-term funding due to its low cost, was hit particularly hard. The inability to refinance short-term instruments like commercial paper (generally described as debt maturing within 270 days) led directly to the bankruptcy of Lehman Brothers. The bank, like many others, was overly dependent on the willingness of investors, including other banks, to buy its debt each day.

A similar phenomenon was observed in the fall of 2011 when several European countries were on the brink of defaulting. Investors, concerned by the exposure of banks to the countries primarily affected by the crisis, lost appetite for their short-term debt instruments. This was especially true in the United States, where money-market funds stopped buying debt issued by major European banks, which, as a result, were forced to announce to their clients that they would reduce loans denominated in dollars because they had difficulties supplying dollars. Worse, in October 2011, the French and Belgian governments agreed to dismantle the bank Dexia, which also faced a liquidity crisis. At the time of the decision, the short-term financing needs were close to \$100 billion. If, on average, the maturity of the debt was six months, the daily refinancing needs were close to \$500 million! This was not sustainable, all the more so because funding was primarily used to finance a bond portfolio whose yield was much lower than Dexia was paying on its debt (a position known as negative carry in finance).

These examples show the vulnerability of banks that rely on wholesale funding (i.e., funding from lending institutions and institutional investors) as opposed to retail deposits. The lesson for credit analysts is to scrutinize their counterparty's liquidity sources, and secure confirmation that, at any point in time, the company's cash balance is sufficient to cover most expenses, that, more importantly, they have extended the maturity of the debt to prevent a refinancing

wall in any single year, and that they draw on large bank facilities committed on their behalf. For large banks, which are heavily reliant on short-term debt, one must assess if the amount of debt being refinanced every day is in line with the appetite of the capital markets.

The internal and most important source of liquidity for most companies is cash from operations. We can observe cash flow from operations from the cash-flow statement, using historical cash flow as a gauge and making necessary adjustments based on any changes to payment terms and so forth. A stricter gauge of liquidity is free cash flow, which is simply cash from operations less the cash required for capital expenditure to sustain the business. Both amounts should be compared with what the company needs to meet its contractual financing obligations.

Debt Service

In principle, the debt/EBITDA ratio computes how many years it would take a company to pay off its debt. The numerator is the debt and the denominator is the repayment capacity, that is, the cash income available for debt service and taxes. Notably, various types of debt can be included or excluded from the numerator. A conservative approach would include senior, subordinated, and other liabilities to capture total debt. Or, the debt value can be the net of the company's cash position to arrive at net debt.

In many financial institutions, this ratio is used to size the maximum amount of debt that a company can support. A limit can be set at, say, 2.5 times for investment-grade companies, and banks, typically, do not lend money to companies with ratios in excess of 2.5.

The EBITDA/interest expenses ratio is known as a coverage ratio. It shows how many times the amount of interest due is covered by the profit from operations. As interest expenses are not the only source of cash outflow from EBITDA (note taxes), the ratio is expected to be large for investment-grade companies.

Other leverage ratios of interest are the funds from operations (FFO) to total debt, and the debt to total capital ratio. [Table 6.1](#) shows indicative ratios used by S&P to assess a company's financial risk profile for purposes of assigning an issuer rating.

Table 6.1 Financial Risk Indicative Ratios (Corporates)

	FFO/Debt (%)	Debt/EBITDA (x)	Debt/Capital (%)
Minimal	greater than 60	less than 1.5	less than 25
Modest	45–60	1.5–2	25–35
Intermediate	30–45	2–3	35–45
Significant	20–30	3–4	45–50
Aggressive	12–20	4–5	50–60
Highly leveraged	less than 12	greater than 5	greater than 60

Source: Standard & Poor's, Table 2, "Criteria | Corporates | and Emmanuel Dubois-Pelerin, Standard & Poor's Financial Services LLC, May 27, 2009.

Profitability

No surprise that the net income is the most relevant indicator of profitability. What is interesting, though, is to break down the profitability into several categories to assess the cost structure of a company. To this effect, the most useful ratios are:

- **COGS/sales:** COGS stands for cost of goods sold so this ratio indicates the amount of raw materials, labor, and manufacturing expenses (aside from depreciation) going into the products sold. Companies in mature markets and price-sensitive industries are expected to have a high ratio, which translates into thin profit margins. Companies in high-tech industries typically have a low ratio and, as a consequence, high margins. *Gross margin* is a term that conveys the same information and is defined as $1 - \text{COGS/sales}$.
- **SG&A/sales:** SG&A stands for selling, general, and administrative (expenses). This ratio reflects general overhead such as salaries, rent, and advertising. The objective of this ratio is to indicate how efficient the operations of a company are. A high ratio shows expensive operations and is not favorable. A low ratio demonstrates that the company is efficient and cost conscious, saving funds on behalf of investors.
- **Operating income** is defined as $\text{revenues} - \text{COGS} - \text{SG\&A} - \text{depreciation}$. It is also called EBIT, which stands for earnings before interest and tax. This metric recognizes that, although depreciation is a noncash expense, it serves as a proxy for the capital expenditure that the company must make, on average over time, in order to remain competitive and, thus, must be considered for in the claims on the company's cash flow.

Pro-Forma Financials

Whenever possible, we recommend making projections of the financial statements and ratios for future years. The projections would be made using best estimates of the key drivers of the key variables, such as sales and cost of goods sold, together with a financial model that allows business variables and metrics to interact with each other. The great value of the projections is that they permit sensitivity analyses, so that the credit analytics can be made more valuable by considering a base case, a downside case, and a worst-case analysis.

Competitor Ratios

In addition to gathering numbers and computing ratios for the company being analyzed, preparing a summary of key ratios for its major competitors is a valuable output. For instance, if the company being analyzed has a SG&A/sales ratio of 22 percent, this number become much more meaningful if the ratio typically seen across its competitors is 18 percent. One might conclude that the company has a potential cost issue, which increases its credit risk because less money is available for debt service.

AGENCY CONFLICT, INCENTIVES, AND MERTON'S VIEW OF DEFAULT RISK

Thus far, we have discussed credit risk as a feature of an obligor's financial wherewithal, such as profitability, leverage, growth prospects, and other indicators of creditworthiness. However, the corporation's managers, working on behalf of shareholders, are making decisions behind the scenes. Their decisions directly impact the corporation's credit risk profile. Incentives play a large role in the decisions managers make, and this human element may be as important as the inanimate features of the company in terms of its credit risk profile.

We end this chapter by characterizing creditors as having what's known as an “agency” conflict with shareholders. The conflict stems from creditors having virtually no control over the strategic, financial, or day-to-day decisions of managers, or over the shareholders who are represented by the managers. Coupled with this, the conflict arises from creditors and shareholders having different incentives. Their incentives are different because their risk/return profiles are distinctive, and this distinction arises from the capital structure of the firm. We all know that the capital structure of the firm is a key piece of a firm's risk profile. However, the question is really “risky for whom?”

We outline the incentives of the creditors and shareholders that give rise to the fundamental agency conflict between the two groups. Understanding their different incentives is a critical element of a fundamental credit analysis, as we have explored, thus far, in this chapter. Another critical element of a fundamental credit analysis is an understanding of how a corporation's capital structure affects the risk/return profile of shareholders and creditors and, thus, impacts the

creditworthiness of the company.

Understanding the agency conflict sets up an alternative way of thinking about credit risk as first postulated by Robert Merton, a Nobel laureate, in 1974. Later, we introduce what's known as the Merton Model, which provides the foundation for alternative estimations of credit risk that we cover in Chapter 7.

The Agency Relationship

In normal circumstances, creditors are neither directors nor officers of a corporation, and, thus, they have no governance rights over the corporation that they lend to. Creditors' rights are sometimes nonexistent (e.g., receivables, derivative transactions) or narrowly stipulated in the covenants of the lending agreements only.

The company's directors and officers, who represent, first and foremost, the interests of the shareholders who appointed them, make decisions that affect creditors. Thus, shareholders (themselves represented by the Board of Directors and management) can be considered an agent of the creditors. Although creditors have not technically hired shareholders to act as an agent, they understand that, by virtue of extending credit, shareholders will make decisions that impact them. The decisions that shareholders make range from new product development, R&D investment, key hiring decisions, and the corporation's capital structure. Since these decisions affect the corporation's profitability and risk profile, they affect the value of the debt, and, thus, they impact creditors directly. If shareholders make a decision that impacts creditors negatively, creditors cannot force their hand; they have to take a back seat.

Acknowledging the agency relationship is a good starting point when evaluating whether to assume credit risk on a counterparty. At the end of the day, shareholders will make decisions in their own interest. If their interests are aligned with the creditors', then there is no problem. However, this alignment of incentives is the exception, not the rule, to this relationship.

Misalignment of Incentives

What separates the incentives of the shareholders from those of the creditors is a disparate risk/return profile. They share neither losses nor gains in a proportionate way. When losses occur, shareholders pay first, with the losses eating into retained earnings or paid-in capital. Creditors, in contrast, would not experience losses until shareholder's equity is exhausted. When gains are made, shareholders get all the upside, with creditors receiving a prenegotiated capped amount, that is, the par value of what is owed and interest. Thus, the shareholder's pay-off profile is highly asymmetric; they can lose their total investment but they have tremendous upside. The pay-off profile for lenders is also asymmetric, but less so, and less dispersed with effectively no upside and a smaller chance to lose their total investment.

Thus, shareholders' incentives are influenced by two main forces.

1. Shareholders are highly incentivized to take risks since this has the potential for large gains.
2. Shareholders are in a first-loss position, so any new capital they inject into a company with precarious finances is prone to being lost.

Thus, shareholders have less incentive to make investments when their companies are in need of capital, since the investment may end up going directly to paying off the creditors.

To illustrate the first point, suppose that a manufacturing company can move its operations overseas where costs are significantly lower, which would double margins. However, in so doing, they run the risk of disrupting their supply chain, since doing business overseas is an untested strategy. Management, acting on behalf of shareholders, may elect to undertake the risky strategy since this has the upside but runs the risk of not panning out, whereas the status quo would safely cover the obligations to creditors. Note that creditors have far less to gain from this risk taking and are more prone to losses.

To illustrate the second point, suppose that a company needs a capital injection of \$50 million to repay debt and stay afloat. Without new equity, shareholders will realize their equity losses and creditors will face losses of \$50 million. Shareholders can elect to inject \$50 million, and in so doing, ensure that creditors get paid. However, there may be no assurances that the company will make future profits to recover their invested equity thus in the minds of shareholders, the new capital injection may be tantamount to throwing good

money after bad. Creditors want the equity capital injection; shareholders may be unsure of the value of this strategy.

The creditor is most interested in being repaid. There is no upside and only downside, thus the preference for the status quo—that is, for no volatility. The creditor extended credit on some basis, and thus wishes this basis to persist. New strategies, M&A activity, alterations to the capital structure (new borrowing) are all causes for alarm, and many lending covenants prohibit such activities, since these activities present opportunities for losses to occur.

Part of the risk manager's job is not just to evaluate credit risk, but also to assist the line manager with not-no-but-how approaches to enabling transactions that create value. Knowing up front what the company's management is likely to want and how this will impact the company's probability of default is a key input to the negotiation and structuring of a credit transaction.

Capital Structure

Capital structure refers to the amount of debt and equity that the corporation has to fund its assets. The corporation's capital structure is a key determinant of its credit profile and directly impacts the value of its debt. Simply, the greater the amount of equity relative to debt, the higher the value (price) of the debt. Similarly, less equity means a lower value (price) of debt. A large equity base means that there is a large layer of funds to absorb losses before the losses attach to the debt, since equity is in the first-loss position. Thus, more equity means that the debt is more likely to be repaid, which reduces its risk and thereby enhances its value.

Thus, understanding the ownership structure permits the credit analyst to understand nuances of (1) the trade-offs of risk and return in terms of the values of debt and equity, (2) who has the incentive to take risks, and (3) who bears the upside and downside of a risky strategy, particularly as it relates to the creditors being able to exert very little control.

This understanding also sets the stage for thinking about credit risk in a novel way, known as the Merton Model.

Merton Model

Robert Merton, together with Stanley Black and Myron Scholes, pioneered options pricing back in the 1970s. A significant contribution to finance theory as it relates to their work on options pricing was Merton's model for pricing a bond's default risk. In his paper ("On the Pricing of Corporate Debt: The Risk Structure of Interest Rates," *Journal of Finance* 29, no. 2, May 1974), Merton expresses owning equity stock in a company as equivalent to simultaneously owning a European call option and selling a put option on the company's assets, with the strike price being the value of the company's debt. Note that the option portfolio (own a call and sell a put on the firm's assets) has the identical pay-off as owning the equity outright. Thus, for an investor, buying equity is effectively buying an option on the underlying assets of the company.

At maturity, the value of the assets will be either greater than, less than, or equal to the debt. Since the call option's strike price is the value of the debt, if assets are worth more than the debt, the debt can be paid off (i.e., the option is struck) and the equity holder claims the assets. Yet, if the value of the company's assets is below the value of the debt at maturity, the call option is worthless and expires without being exercised. That is, shareholders simply walk away, leaving bondholders with debt that cannot be extinguished with the company's assets, i.e., defaulting on the company's obligations.

This framework puts shareholders' incentives in perspective. Unless their option is in-the-money, they will not exercise it and, thus, will walk away from their obligations to creditors. Because shareholders enjoy limited liability, they can effectively stick their losses on creditors. Therefore, default amounts to what is effectively an economic decision by the shareholder based on cold facts. Note that "sticking" losses to the creditors is sometimes referred to colloquially as "putting" losses to the creditors, in the sense of exercising a put option (which, incidentally, can create confusion over what the Merton Model says).

Merton sees default simply as arising from the value of the company's assets falling short of the value of debt at maturity. As a consequence, credit risk is a function of the likelihood that debt will exceed assets at maturity. This likelihood of default is determined by three variables, plus a discount factor: the time to maturity (lessens the likelihood), the volatility of the company's operations (increases the likelihood), and the existing distance between assets and debt (lessens the likelihood). The greater this positive distance, or "in-the-money,"

distance, the lower the chance that at maturity the assets value will fall beneath the debt value. This is where capital structure comes into play. If the company has significant equity funding relative to debt, the larger is the distance to default and, thus, the lower is the chance of default.

If we could model which companies are likely to have the value of their assets fall below the value of the debt between now and the time that the debt matures, we would know which companies are likely to default. Other researchers have filled in some missing pieces, such as estimating some unobservable variables such as the volatility of a company's operations and the market value of the firm's total assets, which has given the credit risk manager new tools to estimate default risk.

FINAL WORDS

The relationship between creditors and shareholders, the misalignment of incentives, and risk/return profiles as impacted by the capital structure, are each central to the credit risk manager's evaluation of an obligor's risk profile. In addition, they are also central components to Merton's characterization that default is a rational and deliberate decision made by shareholders if their equity stake is worthless. In addition, Merton's corporate bond pricing model expands the ways in which default risk is estimated. Pioneering the new ways were Kealhofer, McQuown, and Vasicek, who developed the KMV model for estimating default risk. They picked up where Merton left off, doing the empirical research that allows the default drivers in Merton's model to be mapped to usable probabilities of default. In Chapter 7, we explore further how the KMV approach, now Moody's Analytics, and others like it have introduced alternative estimations of credit risk.

¹ For readers who would like to learn more about basics of accounting, we recommend *Essentials of Accounting* by Robert N. Anthony (Boston: Addison Wesley, 2000).

CHAPTER 7

Alternative Estimations of Credit Quality

Predicting default is a high-stakes exercise for any entity taking credit risk. An underestimate means the difference between profit and significant losses. An overestimate means a foregone profitable opportunity. Fundamentally, the assessment of default risk drives the yes/no decision about entering a transaction. If the risk is deemed acceptable, the strength of the counterparty dictates the type of transaction, the exposure, the tenor, and, last but not least, the price.

We saw in Chapter 2 that the most common methodology for summarizing credit quality is the use of a rating, based on an internal review, a rating agency, or a credit-scoring specialist. Then, a default probability can be mapped to the quality assessment using the historical default data compiled by rating agencies like Standard & Poor's or Moody's. This way of estimating default probability is the oldest and the most widespread on a global basis. What has changed over time, though, is that methodologies used have become more sophisticated, and data are more plentiful (e.g., historical, peers).

In parallel, the development of quantitative research in the past few decades and the advent of the computer have opened new possibilities. Since the early 1990s, considerable resources have been devoted by researchers and companies of all kinds, from start-ups to large banks, to develop alternatives to human-judgment-driven ratings.

In this chapter, we describe alternatives to the traditional methodologies that have been embraced by the financial sector and, to a much lesser extent, by industrial corporations engaged in credit generating activities. What these alternatives share is a reliance on capital markets information. Many people used to think that there was little to learn from the markets about fundamental credit issues. We know now that it was a mistake. Credit and capital markets are too often like neighbors who do not talk to each other although they have a lot in common. We can now extract data from traded instruments, such as stocks or bonds, to estimate a probability of default. Given the global growth in the credit default swap (CDS) market, we can extract valuable and fairly precise information, on a real-time basis, about the perceived credit quality of companies.

In the following sections, we review the most compelling alternative

techniques.

THE EVOLUTION OF AN INDICATOR: MOODY'S ANALYTICS EDF™

Moody's Analytics Expected Default Frequency, or EDF™, is one of the most popular alternative indicators used in the financial industry to estimate the probability of default of counterparties. Most banks and insurance companies in the world subscribe to a Moody's service called CreditEdge™ that provides EDFs™ on 35,000 publicly traded companies in the world. The penetration of CreditEdge among industrial corporations is marginal primarily due to the high cost and less coverage of their counterparties.

In order to rely on EDFs™, it is indispensable to have at least a basic understanding of the methodology behind its estimation process and to be aware of its limitations. The methodology has its foundation on Merton's seminal 1974 paper presented in Chapter 6, that we review, at a high level, in the following section.

The Merton Model Foundation to Moody's Analytics EDF™

A significant contribution to options pricing and finance theory was Merton's work in describing how a shareholder's equity stock can be expressed as a call option on the firm's total assets. Going back to our comments in Chapter 6, we described shareholders as agents of creditors and default as essentially a choice variable for shareholders. In the Merton Model, if the market value of the firm's assets is below the market value of the outstanding debt at maturity, the call option is worthless, since the strike price is the value of the debt. Owing to the limited liability that shareholders of corporations enjoy, meaning they cannot be sued as the result of actions taken by the corporations' officers and directors, the shareholders effectively have a put option for the outstanding value of the debt in excess of the market value of assets, meaning they can stick debt holders with losses without ramification.

There is a significant amount of financial mathematics underlying the theory, but there are two basic theoretical pillars from Merton's paper underlying the EDF™ approach. The first is to express equity as a call on the firm's assets. As

we introduced in Chapter 6, we know that if the market value of the firm's assets falls below the outstanding value of the debt, the equity owners will walk away, that is, default on their debt obligation. Thus, if we could model which firms are likely to have the value of their assets fall below the value of the debt between now and the time that the debt matures, we would know which firms are likely to default. The trick is knowing the market value of the firm's total assets since these are not directly observable; only the book value of total assets are (and the market value of equity and the book value of debt, which get us only partially there).

The second pillar uses Black-Scholes options pricing theory to find the market value of a firm's assets. In Black-Scholes, under a set of assumptions, an option's value can be determined by five key variables: (1) the value of the underlying asset (the market value of the firm's total assets), (2) the volatility of the market value of total assets, (3) the option's strike price (the outstanding value of the debt), (4) time to expiration on the option (the debt maturity), and (5) the risk-free interest rate. We know (3), (4), and (5), we know the value of the option, so we could solve for the market value of the assets if we only knew the volatility of the market value of assets. This, too, is estimable (albeit mathematically intensive), and thus we can solve for the market value of assets. What's of ultimate importance is that market value of assets is modeled as a random variable that changes over time, and there are numerous values that it can take.

The credit analyst worries about those cases in which the firm's asset value could fall below its debt value. Thus, the analyst is interested in a tool that estimates the possible values and their likelihoods that assets can take at maturity, that is, a distance measure that tracks the gap between asset and debt values. This need gave rise to the pioneering work of what's now known as Moody's Analytics EDF™.

Expected Default Frequencies

In the late 1980s, a good 10 years after Merton had published his research paper, there was no commercial application of the Merton Model. Analysts may have used it, but it required additional research, data collection, and an IT application developed from scratch. At the same time, financial institutions around the globe were managing growing credit portfolios due to the concentration of the banking industry and the development of the asset management business. Three individuals with academic and asset management backgrounds, Stephen

Kealhofer, John (Mac) McQuown, and Oldrich Vacisek, anticipated the market demand for alternatives to rating agency ratings and created KMV Corporation.

Their best idea was to recognize that financial institutions did not need one more consulting firm hired to develop internal systems. They realized that the smartest strategy was to provide clients with a tool that simply directly delivered probabilities of default. The KMV founders thus performed fundamental research, collected data, and calculated the EDFs™.

KMV developed its own version of the Merton Model and spent a lot of time studying defaulted companies in order to transform the distance to default into a default probability. They did so using econometric methods that estimate and parameterize how actual defaults correlate to technically modeled defaults.

They then sold their clients a subscription to the EDFs™ that were updated monthly. The last piece of their vision was unparalleled customer service. A hotline was to be staffed 24 hours a day, and customers were invited to visit the company's chaotic offices located in a former warehouse of the Dole food company, where the three founders made themselves personally available.

The main advantage of the product is that it provides a default probability directly. Unlike other methodologies, there is no need to develop additional formulae or to manipulate data. One just has to enter the name of a company into Moody's CreditEdgePlus™ platform and up pops the current EDF™ as well as its recent trend ([Figure 7.1](#)). The drivers behind the EDF™, namely asset volatility and equity volatility, are also plotted as can be seen from the example of Rite Aid Inc. in [Figure 7.2](#).

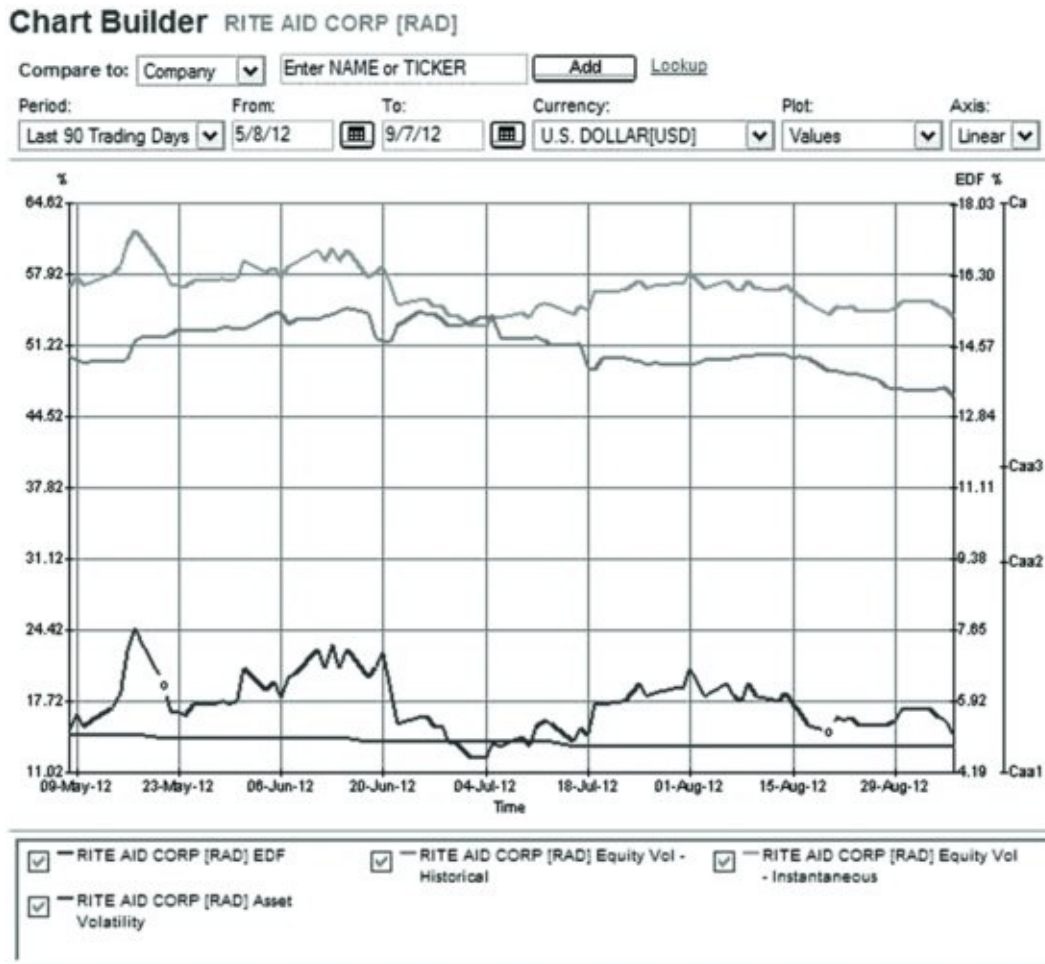
[Figure 7.1](#) Moody's EDFs™ for Rite Aid Inc.

Source: Moody's Analytics.



Figure 7.2 Drivers of EDFs™ for Rite Aid Inc.

Source: Moody's Analytics.



Despite the high price of the product, the company met immediate success. From the mid-1990s, no sizeable bank could avoid being a KMV customer. The interface delivering EDFs™ was installed on the computers of thousands of credit professionals all over the world. Additionally, KMV developed a portfolio management application that was equally successful.

Thinking that the company had reached its growth objectives and could face competition, the three founders, who were the majority shareholders together with senior executives, sold their company in 2002 to Moody's for \$202 million. They handed over the management to former employees and Moody's executives and gradually left the company. Today, EDFs™ and other related products are sold by Moody's Analytics and delivered online.

Pros and Cons of EDFs™

More than 15 years after their introduction, Moody's Analytics EDFs™ remain widely used and highly relevant to estimate the default probability of a company.

The main advantages of EDFs™ are the following:

- Expected default frequencies are a neutral numerical estimation with a forward-looking view. The main driver of the EDFs™ is the market value of equity, which aggregates the entire market's view on the company's balance sheet, and future prospects.
- Expected default frequencies are a bridge between the credit and equity markets. Expected Default Frequency metrics, therefore, benefit from the collective judgment of innumerable market participants about companies' abilities to generate cash flow in the future. A negative perception of equity investors generally translates into a higher EDF™. This makes sense since poor equity performance typically reflects less earning potential and low flexibility to raise money if needed.
- Expected default frequencies are updated every day and, therefore, reflect all information available in the markets, including up-to-the-minute information. By comparison, it is extremely rare for a rating agency to downgrade a company immediately even after a noteworthy event. They first place the ratings under review, which can take several weeks before leading to a downgrade. Expected default frequencies are recalculated and disseminated every day. Moody's Analytics regularly publishes case studies showing that the EDFs™ are much quicker than the rating agencies to forecast the difficulties of a company that eventually defaults.

There are also well-known shortcomings to the EDF™ approach, and users need to know them. They are:

- Some of the fundamental principles behind the calculations are proprietary and not transparent to users. The expression “black box” is often heard regarding EDFs™. First, some mathematical concepts used to calculate the market value of assets are not revealed. Second, the ultimate EDF™ is the result of mapping the distance to default, essentially an index value, to a probability. The mapping makes use of empirically generated estimates of probabilities given distance measures, meaning actual default rates are observed and mapped to modeled distance measures. The mapping, as with any statistical procedure, has sampling variability, and users are not given much the insight into the sampling variability and statistical estimation techniques employed. One can understand that Moody's Analytics competitive advantage stems in part from the development of proprietary techniques, and they have an excellent predictive track record, which they highlight. However, some professionals are not comfortable with the idea of

basing credit decisions on unknown parameters.

- The EDFTM population contains many companies with high default frequencies, yet they can survive for months or even years. To a large extent, this reflects the nature of default forecasting, where the future can never be known with certainty.
- The EDFTM methodology relies on the book value of debt. At best, companies publish new numbers on a quarterly basis. The first consequence is that Moody's Analytics can misestimate a company's financial situation if the level of debt changes considerably between reporting periods.
- The equity market is volatile, so EDFsTM will be volatile as well. It can be argued that some events that move the stock price of a firm may not be relevant from a credit perspective. Credit decisions, like lending money or buying a bond, are generally made with a long-term perspective so this volatility is not a desirable characteristic. This is one of the judgments that experienced credit professionals must make when using metrics like EDFsTM.
- By its nature, the EDFTM public firm model only works for publicly traded companies that comprise a small segment of the entire universe of companies. To address this issue, Moody's Analytics has developed a private firm model called RiskCalc.

EDFsTM represented a breakthrough in credit analytics. Their appeal is in being forward looking, reflective of mostly current market information, accessible, and easy to use. They are limited in use to analyzing companies that are publicly traded and, as with most market-based metrics, are susceptible to perhaps more volatility than the fundamentals of the credit exposure merit.

From EDFsTM to Ratings

Expected default frequencies are expressed as a default probability within a certain time horizon. As can be seen in [Figure 7.1](#), Rite Aid has a 4 percent EDFTM within a one-year time horizon. Many analysts prefer to summarize creditworthiness with a rating versus a default probability, and, thus, the default probabilities can be expressed with ratings equivalents. Using historical data, Moody's Analytics translates EDFsTM into ratings. In essence, if this company's one-year EDFTM is 4 percent and the average population of companies with a 4 percent one-year EDFTM has a rating of Caa1 then this particular company has an Caa1 equivalent rating. A screenshot of the EDFTM implied rating is seen in

[Figure 7.3](#). Note that the Moody's Analytics ratings-equivalent EDF™ does not necessarily match the company's rating by S&P or Moody's. The Moody's Analytics rating equivalent is a forward-looking measure for a company that could be different from its current, actual rating. The Moody's Analytics rating equivalent is based on an EDF™ whose inputs were described earlier. In contrast, the rating agency's rating is based on a detailed analysis of the firm's financials, its operations, the quality of management, and a qualitative approach overall in which human judgment plays a key role.

Figure 7.3 Moody's EDF™ Implied Rating for Rite Aid

Source: Moody's

Company	Rite Aid Corp (RAD)										
	1 Yr	2 Yr	3 Yr	4 Yr	5 Yr	6 Yr	7 Yr	8 Yr	9 Yr	10 Yr	
EDF (Annualized)	5.69%	4.79%	5.02%	5.16%	5.25%	5.30%	5.34%	5.38%	5.40%	5.42%	
Implied Rating (Moody's)	Caa1	Caa1	Caa1	Caa1	Caa1	Caa1	Caa1	Caa1	Caa1	Caa1	

Other Vendors

Moody's Analytics EDFs™ is the most popular product in the market due to its long and successful history. Other vendors have similar products. One such vendor is the Kamakura Corporation (www.kamakuraco.com), which has a default probability estimator called the Kamakura Default Probability (KDP).

CREDIT DEFAULT SWAP PRICES

At a high level, a credit default swap (CDS)¹ can be thought of as insurance against credit risk, although the CDS is executed as a derivative transaction and not with an insurance policy. Purchasers of CDSs buy protection against the risk of default of an entity. If the entity defaults, the CDS buyer receives a certain amount of money from the CDS seller.

CDS prices, therefore, reflect the buyers and sellers views on the creditworthiness of an entity. The higher the perceived credit risk, the more expensive the price. In addition, CDS prices reflect the other market conditions, such as the overall supply and demand for protection in the marketplace. Other factors influence CDS prices as well, such as the credit risk of the seller, the liquidity risk of the CDS instrument itself, and the mark-to-market (MTM) risk of the CDS. Notably, unlike a bond, the movement of interest rates has no effect on the CDS prices since there is no cash-flow or funding component to the

transaction.

The liquidity risk is the inability to exit the position if needed. Large broker-dealers typically provide a market to buy and sell CDSs and there is an unwritten understanding in a CDS contract that both counterparties can, in normal economic circumstances, unwind (i.e., cancel) the transaction at any time.

The MTM risk is described in Chapter 16. In short, CDSs, like other derivative instruments, have to be valued every day, and this daily valuation can generate unrealized gains or losses. Since the seller must hold capital to support that risk, the CDS price includes a (small) provision for market risk.

Where to Find CDS Prices

Credit default swaps are not traded on exchanges but are traded over the counter, meaning they are bilateral contracts between two parties. The nature of the transaction implies minimum price transparency but, in order to develop the market, major dealers provide price indications with data vendors. In addition, some contracts are processed through independent clearinghouses that record the prices of the transactions they clear.

There are four main sources of prices:

- 1. Investment banks and dealers:** If a firm already has a relationship with a bank or a broker active in CDS trading, it can ask for a quote or at least a price indication. This constitutes the most reliable source since they would likely indicate a level at which they would be ready to trade.
- 2. FitchSolutions,** part of the Fitch Group, provides daily CDS prices on bonds, loans, and asset-backed securities.
- 3. Markit Group Ltd:** Markit is a company owned by major banks that performs various roles in the CDS markets, mostly supplying information on CDSs and other capital market instruments to its customers. Markit publishes on its website daily CDS prices on 1,000 active single name CDSs, as well as on a few CDS indices. These data are available free of charge on its website (www.markit.com).
- 4. Bloomberg L.P.:** Bloomberg is a subscription service that provides global information and data of many varieties plus selected trade support services for many traded instruments. It publishes CDS bid and ask quotes for companies, sovereign debt and structured securities, as well as other information relevant to the CDS market, namely tenor, terms, and volume, some of which is sourced from third-party vendors such as the Markit Group

Ltd.

[Figure 7.4](#) shows selected corporate CDSs as of July 20, 2012.

Figure 7.4 Three Corporate CDSs as of July 20, 2012

Source: Fitch, Inc.

TICKER	CREDIT	SENIORITY CURRENCY	CURRENCY	RESTRUCTURING TYPE (W-WITH, E-NO REST., M-MODIFIED, X-MOD MOD)	TENOR	(M)ID/ (R) ECOVERY LIQUIDITY INDICATOR	INDICATOR (L-LIQUID, S-SEMI-LIQUID)	SPREAD, BASIS POINTS	STD DEV	DATE
GPS	Gap, Inc. (The)	SEN	USD	M	5Y	M	L	215.37	4.16	2016-07-21
IR	Ingersoll-Rand Company	SEN	USD	M	5Y	M	L	47.07	2.74	2016-07-21
RAD	Rite Aid, Inc.	SEN	USD	E	5Y	M	L	837.37	19.77	2016-07-21

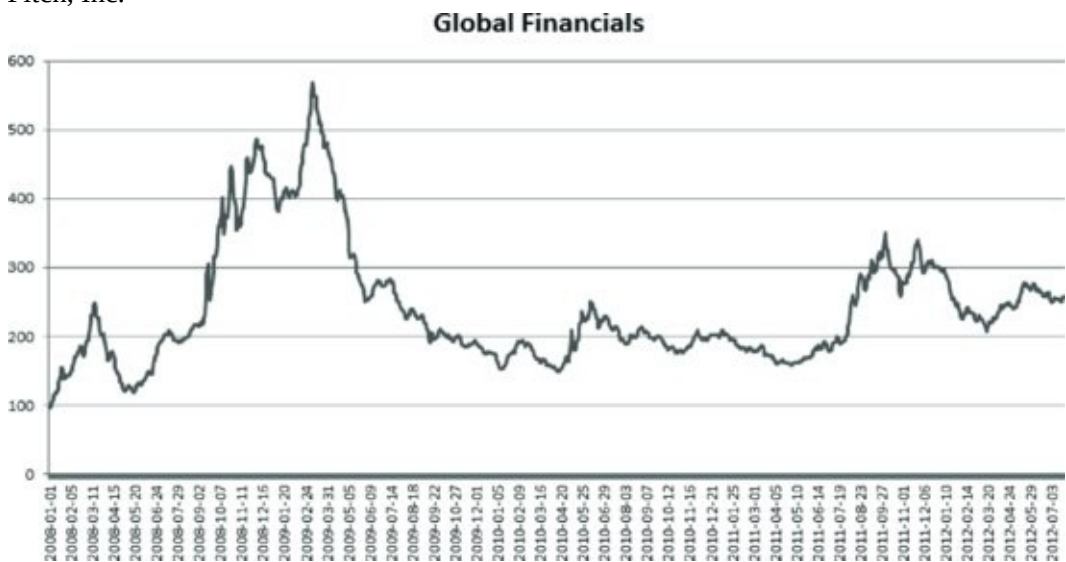
Source: Fitch CDS Pricing Service Data, FitchSolutions. Data calculated by Fitch Solutions based on actual contributions received from market participants as of COB 07/20/2012.

What to Do with CDS Prices?

Credit-default-swap prices are helpful tools and serve several functions. They take the pulse of credit markets by reacting to overall macroeconomic conditions, sending most prices up when the economy slows and down when conditions improve. In [Figure 7.5](#), pricing on a basket of five-year CDSs for global financials is shown from January 2008 to June 2012. Note how the basket has trended down since 2009 with the overall recovery, with volatility and intermittent spikes coming from the market's reaction to the euro crisis.

Figure 7.5 Basket of Global Financials, Five-Year CDS, January 2008 to June 2012.

Source: Fitch, Inc.



For individual credits, CDS prices also are essential tools for credit analysis, as described next.

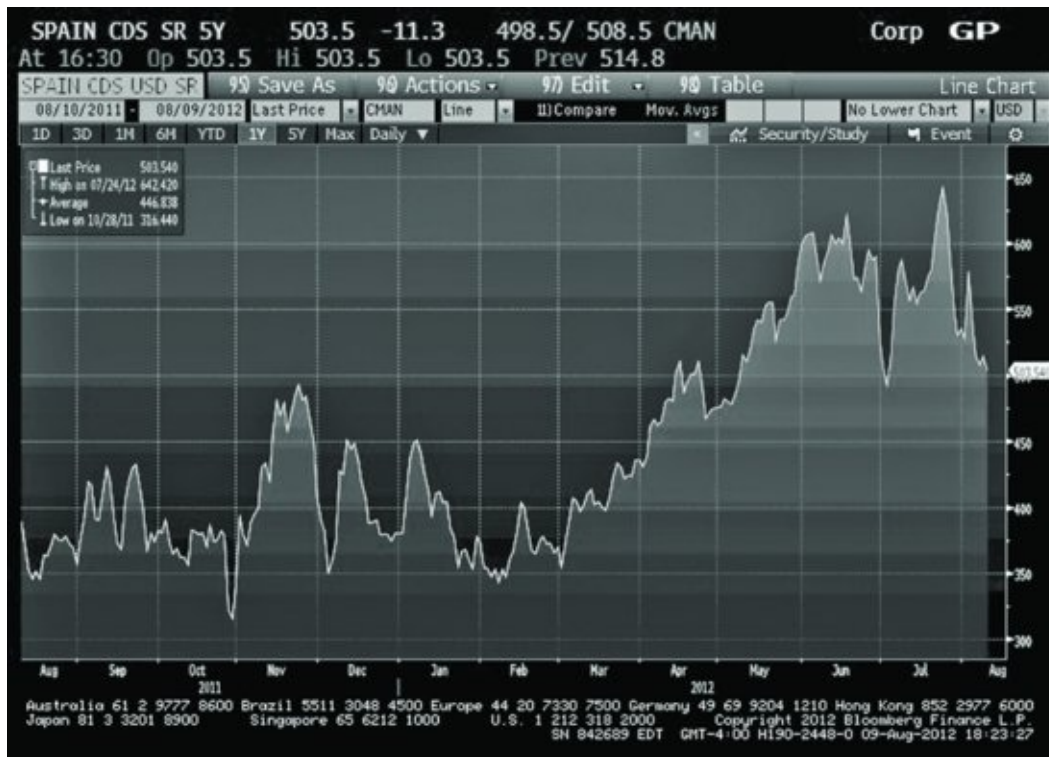
Provide Early Warnings

Credit default swap prices react quickly to market news and reflect the instant view of capital markets participants on a specific company. Because these transactions do not involve funding, namely any large advances of cash, sellers can sell contracts quickly and buyers can buy them quickly. As a consequence, CDS prices are highly sensitive to the perceptions of the actual and prospective buyers and sellers, and the prices move quickly. CDSs can be used as part of the surveillance efforts to raise immediate attention on entities that may face problems. In most cases, CDS prices will react much more quickly than rating agencies' ratings changes and, thus, they constitute early warnings signals of problems that may be coming. In large financial institutions, surveillance departments set up automatic downloads of CDS prices on a daily basis and receive alerts for price movements exceeding a threshold, for example, +/- 5 percent in a single day.

Take, for example, the financial crisis in Spain. Credit default swaps for Spanish sovereign debt reflected the market's growing uncertainty about the creditworthiness of Spain. [Figure 7.6](#) is the CDS price for Spanish sovereign debt; one can see that the decline in credit quality is reflected in the evolution of the CDS price.

Figure 7.6 Price of Five-Year CDSs on Spanish Sovereign Debt

Source: Bloomberg L.P.



In addition, when contemplating a new credit transaction, researching the past and current values of CDS prices can be helpful. Imagine that two potential counterparties have the same internal rating, the same external rating, yet very different CDS prices and or price histories. Although there may be supply and demand drivers of the pricing discrepancy, as we will see later, there may be some fundamental reasons already known by capital market participants not yet recognized by the handful of (ratings) analysts who follow the company.

Pricing

The best thing about a CDS is that it provides an actual price. Pricing credit is a complex task and having access to what major financial institutions are comfortable charging for the credit risk of a company on a stand-alone basis is extremely useful. As a matter of fact, many firms use the CDS price as a benchmark and would not consider entering into a credit transaction at a price below the CDS market.

We will digress for a moment to mention that comparing a CDS price with a credit transaction of a very different nature has caveats:

- The tenor can be different. The most liquid CDS contract has a tenor of five years. For some names, it is possible to find a price for one, three, or seven

years. Transforming a 5-year CDS price into a 2.5-year CDS necessitates developing a methodology and employing assumptions, both of which introduce uncertainty.

- The recovery rate can be different. We saw in Chapter 2 that a key parameter of a credit transaction is the expected recovery rate, which is the proportion of the notional amount of the transaction not expected to be lost in case of bankruptcy. CDS contracts work off a senior unsecured reference security, which will experience some level of recovery, and the expected recovery is built into the CDS price. If a credit transaction has a different estimate of recovery, the CDS benchmark would need to be adjusted to reflect the differential in the recovery rates.
- CDS transactions are small, typically \$5 million or \$10 million. A much larger credit transaction would deserve a higher price if it uses more of the risk taker's credit capacity for that name.

Caveats When Using CDS Prices

In the late 1990s, when the CDS market started growing in earnest, companies that had specialized in the sale of credit opinions, such as the rating agencies or KMV Corporation, were concerned that CDS prices would become the undisputed market benchmark making their products and services obsolete. The same way that stock prices are freely available, there was a sense that CDS prices would replace all other information sources.

Even though the CDS market became a cornerstone of the financial markets as anticipated, CDS prices have not replaced other sources of information. They are viewed as complementary to ratings, but no serious institution would ignore ratings and replace them by real or implied CDS prices, for the following reasons:

- Very few entities have actively traded CDSs. The universe of active companies does not exceed 1,000, and there are a few dozen sovereign entities and a handful of structured securities with CDSs. The market is dominated by a handful of large dealers like J.P. Morgan, Deutsche Bank, and UBS, who concentrate on the same names. There is not enough demand for credit protection on smaller companies for these large institutions to develop a significant market.
- Given the narrowness of the market, some vendors extrapolate information from the CDS market to present implied prices for entities for which a CDS

market does not exist. However, this process requires so many assumptions and approximations that we can only recommend a good level of caution in using implied prices. Entities may present a very similar profile in the implied pricing methodology yet have very different creditworthiness.

- CDS prices can be greatly influenced by noncredit events and be distorted to a point that they do not reflect default risk. They may be influenced by technical factors as well, that is, the economic environment of buyers and sellers. Let's illustrate this by two examples:

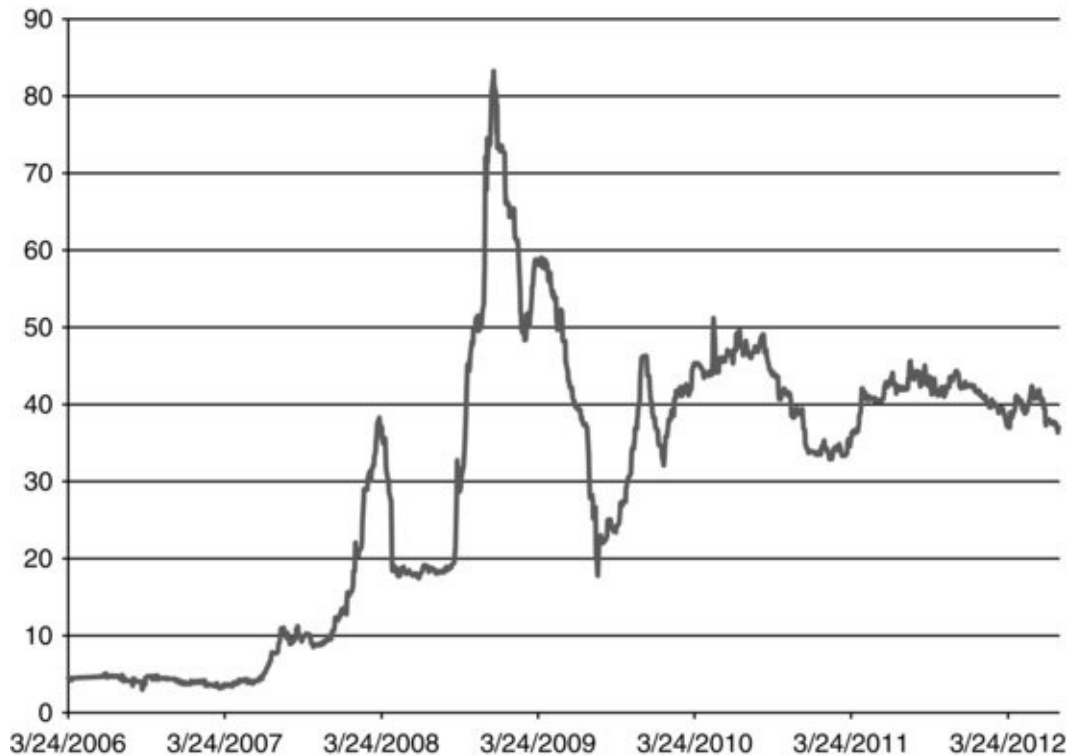
1. When an issuer hits the market with a large bond issue, some investors may want to buy the bonds but not keep the credit risk attached to them. To protect themselves, they buy a CDS contract. All of a sudden, there is a surge in demand for CDS contracts that drives the price up, to a point that it does not reflect the true credit risk. The price increase is the result of a momentary imbalance between buyers and sellers of protection and it has nothing to do with the fundamental strength of the issuer.

2. Before the crisis hit the financial markets in 2007, financial institutions had a lot of capital to deploy. They took risk at unsustainably low prices, conveying the perception that credit risk was much lower than what it actually was. The gap between credit risk estimates extracted from CDS prices, which were low, and the ones expressed by traditional ratings, was very wide. Then, when the crisis hit, many institutions scrambled to buy CDSs, and drove up their prices at a time when sellers stopped selling. CDS prices went for abnormally low levels to abnormally high levels before stabilizing at adequate levels.

This volatility in CDS prices, which captures a great deal of market noise, is illustrated in [Figure 7.7](#). Here we show the CDS of Johnson & Johnson, Inc. which holds the coveted AAA credit rating. Note the spike in its CDS from October 2008 to August 2009, during the darkest days of the crisis; the CDS has since retreated to about 40 basis points per annum higher than its precrisis level, yet stable. Johnson & Johnson enjoyed a stable rating over the same period, and although the macroeconomy around the company was in jeopardy, its fundamental credit characteristics arguably did not change much.

Figure 7.7 Price of Five-Year CDS for Johnson & Johnson

Source: Fitch, Inc.



BOND PRICES

Investors in corporate bonds take a direct credit risk on the issuers. When a company has financial difficulties, it defaults at the same time on all financial obligations including bank loans and bonds. It is, therefore, legitimate to try to extract credit risk information from the prices at which bonds are sold in the market. There are, however, a few major obstacles that we summarize here:

- The biggest problem is that bond investors take more than credit risk, first and foremost, interest rate risk as bonds are typically denominated in fixed interest rates. When interest rates go up, bond prices fall. They also take liquidity risk, that is to say the ability to sell the instrument quickly and without much discount to a quoted price. Finally, bonds may have embedded options, such as early redemption, that can heavily influence their values.

Bond prices, therefore, include risks of a very different nature. Even if the credit risk of an issuer does not change, its bond price may change. The price of a bond alone is not a reliable indicator of credit risk. To obtain the credit-risk premium contained in a bond price, one has to develop a methodology to isolate the credit risk component from the observable price.

This requires a somewhat involved methodology usually beyond the wherewithal of corporations with limited analytical resources that need to make credit decisions using more straightforward tools.

- Any given bond may be illiquid in that it is not traded frequently. Bond investors tend to be institutions such as pension funds, endowments, and insurance companies with a longer-term view and with lower turnover. There are so few transactions that it is unusual to have pricing data that adjust on a daily basis.
- Bond prices are not transparent. Hand-in-hand with the infrequency of trading, price discovery is an issue for bonds; at any one time it's unclear what the current market value of a bond is. Bonds are still traded bilaterally through brokers, not traded on an exchange. Note that large commercial and investment banks are initiating efforts to trade bonds on an organized exchange, largely in response to new U.S. banking regulations that may disallow banks from trading bonds on a proprietary basis.
- In summary, extracting credit information from the bond market presents challenges. Yet with the rapid development of the CDS market, the need to exploit bond market prices declined considerably since the CDS market offered a substitute. However, extracting pure credit prices from the bond market data is always possible, and those prices can be used and interpreted in the same way as CDS prices.

FINAL WORDS

Although consensus may exist for many companies regarding their credit quality, which is often the case for the strongest and weakest firms, ratings agencies and EDF methodologies can deliver very different opinions about the relative quality of companies falling between. This is no surprise given that the two methodologies are completely different. To repeat ourselves, rating agencies are, by choice, slower to react than the capital markets because they need time to fully analyze and incorporate news and structural trends, and ratings are designed to be invariant to the economic cycle. They also have a downward bias, meaning that downgrades are more frequent, and once downgraded, it is hard for a company to be upgraded. The capital markets react quickly and can reverse their point of view quickly and symmetrically. How many times has a company's stock fallen after an announcement only for the share price to recover after a few days when investors realize that the news is not as bad as they thought? The

discrepancies resulting from the different approaches offer an opportunity for the credit analytics team to pay closer attention to them.

As we saw in Chapter 2, firms must establish a hierarchy of available indicators of creditworthiness so that credit decisions are made on a rules basis as opposed to a discretionary basis. Whatever the chosen hierarchy, the information in a credit report must include all available indicators.

¹ Chapter 16 is dedicated to credit default swaps. For readers not familiar with CDSs, we recommend reading Chapter 16 before going through this section.

CHAPTER 8

Securitization

We begin with a definition: Structured credit is a type of product in which the risk of loss for investors or lenders has been stratified into nonproportional amounts. As an example, if a bank makes a loan and holds the loan on its balance sheet, and the borrower defaults, the bank assumes the loss net of any recovery. This credit product is straightforward and not structured. Other financial products, like asset securitizations covered in this chapter, involve techniques like the pooling of assets and the creation of credit-sensitive instruments in which investors do not share the losses proportionally. This is what is called structured credit.

Structuring credit risk allows for a more precise and efficient matching of lenders' risk appetites with counterparties' needs for risk transfer, and allows for pricing that can be better discriminated. Most securitizations involve the structuring of the credit risk, and, hence, these two terms are used interchangeably. However, note that some securitizations are not commonly considered structured credit, such as mortgage pass-through securities, since investors in the securities face proportional risk; yet these securities do possess many characteristics similar to structured credit transactions, such as third-party entities providing credit enhancement, a large role played by servicers, and overall deal complexity. However, going forward, we describe structured credit in the context of securitization and use these terms interchangeably.

From the 1970s to the onset of the recent financial crisis in 2007, asset securitization was a major technology used by financial institutions to fund assets. Securitization gained its foothold in the mortgage market in the 1970s and today, the mortgage-backed securities market is the largest single fixed income asset class in the world after U.S. Treasuries (and exceeded U.S. Treasuries until recently). Basically, since the 1970s, when a bank wants to lend money to a borrower to buy a house, it sells the note on the borrower into a large pool of similar mortgages that are combined, standardized, and divided into units (the securities) that are then sold to investors, who, in turn, pay cash that the bank uses to make the loan. There are a few remaining banks who provide mortgages on a “buy and hold” basis, meaning, they fund the mortgages via traditional banking sources (deposits) and retain the mortgage loan for their own

balance sheet; rather, most mortgages and other consumer assets like credit card receivables are financed almost exclusively by securitization.

In the aftermath of the financial crisis, securitization activity came to a halt. With many securities defaulting, investors became reluctant to put money into new transactions. By 2012, transaction activity started picking up, but the volume remained far from its historical level. This explains why consumers have faced difficulty refinancing mortgages and obtaining financing for other assets.

It is too early to tell what the future of securitization holds. Some observers think that it will take years before investors are again interested; others believe that the need to fund consumer assets will favor the resurgence of securitization sooner rather than later. The extent to which securitization resurges may also be a function of new accounting guidelines on consolidation of special purpose vehicles (SPVs) and similar entities. We discuss both de-recognition and consolidation guidelines in Chapter 12, but, in summary, the accounting benefit of securitization has largely gone away. Given that regulatory capital generally rises in tandem with the amount of assets on a bank's balance sheet, the regulatory capital benefit will also go away. In fact, the FDIC has granted U.S. banks extra time to comply with regulatory capital requirements precisely because of the change in U.S. Generally Accepted Accounting Principles (GAAP) guidelines on consolidation.

Whether securitizations resurface aggressively, modestly, or somewhere in between, credit risk managers should understand the basics of asset securitization, since they are likely to be exposed to these transactions.

ASSET SECURITIZATION OVERVIEW

Asset securitization refers to the creation of securities that are used to fund asset purchases and borrowing, such as residential and commercial mortgages, auto loans, and student loans. In a typical asset securitization scheme, the following sequence of events takes place:

1. Investors buy securities called asset-backed securities (ABSs).
2. The proceeds of the sale of the securities are used to lend money to a pool of borrowers to purchase a specific asset (e.g., cars).
3. The borrowers make regular interest and principal payments according to a schedule.
4. The interest payments made by the borrowers are used to pay interest to the investors in the ABS.
5. The principal repayments are used to either gradually amortize the securities or to fund new loans to borrowers to replace the ones that have been fully repaid.

Asset securitization is a technique that enables both the funding of loans and the transfer of the associated credit risk to capital market investors. The initial attraction of securitization for banks was that they could originate and make profits on loans without actually holding these capital-intensive assets on their balance sheets—they simply sold them to investors, whose proceeds were used to fund the loans. Because investors in turn have either minimal regulatory capital requirements (e.g., mutual funds, pension funds), or no regulatory capital requirements (e.g., hedge funds, individuals), this arrangement is more capital efficient. In addition, banks are able to maintain client-lending relationships but without the drag of the capital cost. In many securitizations, the bank also retains the servicing rights to the loans and thus maintains an additional touch point with clients, who may be unaware that their loans have been sold.

The mechanics of the securitization involve a *special purpose vehicle* (SPV), which issues the securities. Although the loans are on the SPV's balance sheet, because of new accounting rules, the SPVs must be consolidated somewhere—they cannot be orphans.¹

Apart from accounting benefits, securitization is truly unique because it isolates different functions traditionally performed by banks—origination, funding, underwriting/structuring, assuming credit risk, and servicing, typically

thought to be un-dissociable, and allows different entities to specialize on what they do best, as described next.

Functions within the Securitization Process

There are several functions within the securitization process that are important to understand, including the following:

- **Origination:** Originating amounts to finding customers who need financing. Retail banks specialize in origination and in maintaining their client relationships by offering clients a suite of products for which the banks do not have a risk appetite, such as building on the checking-account relationship to arrange a mortgage or finance a car purchase. Securitization enables nonbank entities to originate assets as well since there is no need to be able to self-fund these assets to sell a product to a consumer. Prior to the 2007 financial crisis, a good number of mortgages were originated by nonbank institutions, such as Countrywide Financial.
- **Funding:** Funding transactions means finding the cash needed to advance to the borrowers. Traditionally, the monies came from client banking deposits or from loans, bonds, or commercial paper issued by banks. Now, investors specialize in providing funding through investments in ABSs that, in normal economic circumstances, provide them earning stability and liquidity (i.e., they can be easily sold).
- **Structuring/underwriting:** Investment banks structure transactions and receive fees without taking much risk. Structuring and/or underwriting transactions means designing the terms, conditions, and caring for all associated logistical details in a way that aligns incentives among borrowers and all other stakeholders to minimize credit risk and other costs. Since ultimately the credit risk is being borne by many securities holders, as opposed to one entity that underwrites the transaction for its own book of business, the underwriting function has transitioned into a structuring function with many stakeholders' interests considered.
- **Assuming credit risk:** Assuming credit risk means bearing the risk of loss of not being fully repaid by borrowers. Traditionally, banks made profits on this function, by charging interest that more than offset the expected losses and cost of capital. Investors now specialize in taking (a portfolio of) credit risks, which earns them a relatively consistent return in excess of non-risk-bearing investments, such as U.S. Treasuries.
- **Servicing:** Servicing the transaction means collecting interest and principal payments; managing escrow accounts for any taxes and insurance;

complying with various laws and regulations, such as the Truth in Lending Act (TILA); and managing delinquencies, workouts, and recoveries when borrowers do not repay or pay late.

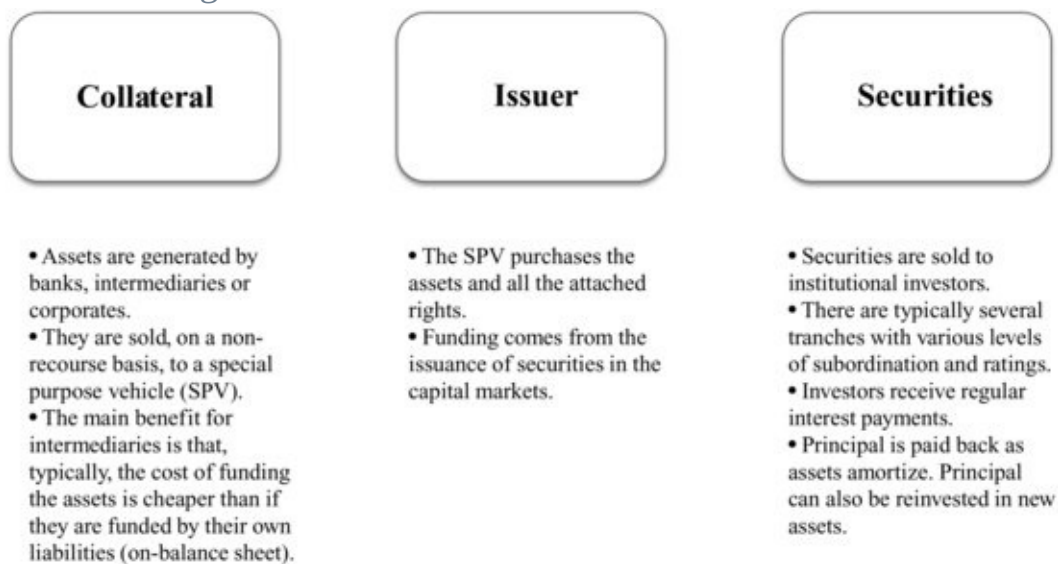
The Building Blocks

Credit risk managers are primarily involved in the analysis of ABSs when their firms are considering investing in these securities. The credit analysis of ABSs requires a review of all aspects of the transaction, which is vastly more complicated than analyzing the financial statements of a corporate borrower.

Securitized transactions are complex in nature because they involve many participants, lengthy and rather complicated documentation, and various cash flows among several parties. The legal documentation provides detailed explanations about the rights and obligations of each party, and each transaction may have its own deal-specific issues, which adds to the complexity. For instance, commercial mortgage-backed securities rely only on the cash flow generated by specific properties to service the debt and not on the general ability of a borrower, individual or corporate, to repay its debt.

The ABSs are issued for the exclusive purpose of funding assets, and the payments made by the borrowers whose loans are part of the transaction are used to make payments on the securities. Investors in ABSs rely on the performance of the pool of loans to be repaid, hence the terminology *asset-backed*. Regardless of the complexities of an individual deal, three building blocks apply to all securitizations, as represented in [Figure 8.1](#).

Figure 8.1 Building Blocks of a Securitization



THE COLLATERAL

The primary purpose of a securitization is to finance individuals or companies seeking to purchase a home, a car, or a piece of commercial real estate. A securitization does not usually involve only one financial asset; that is, one mortgage or one auto loan, but, rather, many assets. A transaction to finance mortgages is built around, for instance, 1,000 mortgages. Assets are normally of the same nature; credit card receivables are not mixed with student loans. The expression *collateral* refers to the pool of assets that are funded.

There are two types of general instruments: secured and unsecured borrowing, or loans. For instance, credit card receivables are not secured by other than the cash flow from the credit cards. In contrast, auto loans are secured assets because the investors have the right to take possession of the auto should the borrower fail to repay.

Thus, the first step of a credit risk assessment is to thoroughly understand the collateral since there are so many drivers that make collateral nonperform and cause default. We saw this during the recent financial crisis in the case of nonagency mortgage-backed securities. Mortgage borrowers first stopped paying because of insufficient funds. This was one driver of nonperformance. Later, borrowers strategically defaulted on their loans because they owed more than the value of the home. This was a second driver of nonperformance. Third, since the homes provided collateral, and the recovery on these homes was far less than 100 percent of the outstanding balance, this was another source of nonperformance. In addition, the documentation in many cases was so poorly prepared and the legal entanglements of the mortgages so complex that servicers had trouble realizing recoveries for securities' investors, which we witness by the inventory of homes that are hung up in the courts and will be ultimately go into foreclosure.

Before investing in ABSs, one must be fully convinced that the collateral is strong enough to generate enough cash flow to service the interest and the principal of the securities. In the following sections, we present a nonexhaustive list of fundamental topics to review and fully comprehend.

Collateral Assessment

The originator is the entity finding the borrowers and structuring the debt product. Historical data show that the performance of ABSs varies greatly by originators. In a same-asset class (e.g., mortgages), originators can experience very different levels of delinquency. Well-established originators such as large banks typically have better results than smaller, less experienced entities, which have a strong need to close business to stay alive and tend to be less diligent when assessing the creditworthiness of a borrower and less thorough when structuring a loan. Since originators of ABSs do not keep the credit risk associated with the loans they structure, it can be tempting to make shortcuts to generate the necessary volume to issue an ABS transaction. Credit analysts must, therefore, review the history and situation of the originator. The risk assessment of an originator includes a review of its:

- Financial strength.
- Background and reputation of its management.
- Loan-underwriting guidelines: How detailed are they? Are they known to employees? Are they systematically respected? Are exceptions granted and properly justified and documented?
- Experience and training of the staff.
- Track record: Quality originators must be able to demonstrate the performance of the assets they structured in the past.
- Access to information: Do underwriters have access to relevant data about borrowers? Do they understand how to interpret the data?
- IT system: How well is the company equipped to handle clients' data?

The product is the type of financial obligation being securitized. There are dominant families of securitized products, such as mortgages, auto loans, or credit cards receivables, but also unusual and less frequent ones. Even among the most frequent types, some subtleties can be introduced, so attention is required. Like any credit transaction, the product that populates the ABS must be thoroughly understood. Ideally, risk managers should interview the originator and review the legal agreements with the borrowers to make sure they fully understand the type of products they invest in.

The crisis of 2007 showed that originators created new mortgage products, called “affordability products,” to attract a new population of borrowers. Not only did investors not fully understand how they worked but, more importantly,

they were so different from the traditional mortgages that historical performance used to analyze the transactions was largely irrelevant.

Marketing information about ABS transactions should include detailed profiles of the borrowers, because their ability to pay the debt in the ABS (and any security the collateral possesses) influences the performance of the ABS.

The risk analysis, therefore, focuses on the borrowers' credit quality, whether they are individuals or corporates. For corporate borrowers, the methods outlined in Chapters 6 and 7 are applicable for the credit quality analysis. For individuals, investors typically rely on scores provided by credit bureaus such as Equifax, Experian, or TransUnion in the United States. The credit bureaus primarily rely on an automated scoring system similar to the one we described for corporations in Chapter 2. The dominant player is a public company named Fair Isaac Corporation (FICO) (www.fico.com), which produces the FICO score. Fair Isaac Corporation summarizes the credit profile of any individual who has a credit history (and Social Security number). Its summary is based on payment history of the frequency and timeliness of payment as well as the amount of credit utilized relative to credit availability. A FICO score of 620 and above is considered to be solid. Below 620, the creditworthiness is more questionable and known as subprime. Subprime mortgage origination became widespread starting in about 2000, and, of course, it was the tipping point for the recent financial crisis. Note that the FICO scores do not reflect any information on the borrower's income. A person of limited means can have a superior score and vice versa.

Leverage, the amount of debt used relative to the equity in a borrower's funding of an asset, must to be taken into account. In the case of an auto ABS, the size of the loan relative to the money put down on the car purchase is an important marker for the credit quality. Similarly, for a home mortgage, leverage is measured by the loan-to-value (LTV) ratio, which measures the size of the loan relative to the size of the asset purchased, with a higher ratio signifying more debt and less equity, which strongly influences a borrower's propensity to repay.

The quality of the security package underlying the debt obligation is also important. Later in this chapter, we will provide some detail on features of the securities themselves that drive credit performance as they relate to ABSs.

The diversification of the borrower pool is also crucial. Diversification avoids a single event jeopardizing the entire transaction. For securitizations involving corporate assets, there are typically limits per borrower (e.g., a single borrower cannot constitute more than 3 percent of the total pool), per industry sector, and

per country. Deals involving individuals are naturally diversified because the borrowed amount per household is small compared to the total size. Typical in mortgage securitizations is geographic diversification so as to reduce exposure to regional economic factors. The experience in Texas in the 1980s and Michigan and Nevada in the late 2000s illustrates the benefit of this tactic. Limits on any one state may be imposed including those with historically higher default rates, such as California. Diversification reduces unsystematic risk, but the borrower pool, no matter how diversified, still faces systematic risks of a macroeconomic nature.

Finally, there are two types of collateral, each of which requires a different approach:

1. *Static collateral:* They amortize over time and are not replaced when they pay off, that is, the proceeds pay back principal on the securities. Mortgages and auto loans fall into this category. Credit analysts must focus on each individual asset present at the inception of the transaction, as they remain in the deal until maturity.

2. *Revolving collateral:* When the underlying assets are short-term (such as credit card receivables), the originator has the option during the revolving period to use the proceeds of the repayments to invest in new assets rather than paying back the securities. This complicates the credit risk analysis, because the original pool that is reviewed at the time of the investment may not reflect the characteristics of the pool at any later time. The performance of the securities primarily depends on the quality of the assets that are purchased over time.

The investment process of the originator must, therefore, be reviewed more thoroughly because the people and processes in place will select future assets. Additionally, some protection clauses are added to stop the reinvestment process on the occurrence of events, which can modify the credit profile of the collateral. When it happens, the transaction enters into early amortization and the proceeds of the repaid assets are used to amortize the securities. The transaction is, therefore, shorter and the securities have a higher chance to be repaid, since assets of lesser quality will not be purchased. Examples of events that can trigger early amortization are a change of ownership of the originator or if key people leave the firm. We review this in more detail in Chapter 14.

THE ISSUER

The issuer is the entity issuing the asset-backed securities. It is not a traditional company but an SPV, or sometimes called a special purpose company (SPC) or special purpose entity (SPE). It is created for the transaction and is dissolved when the transaction terminates. It has a very narrow scope of activities because investors seek to severely limit what it can do to in order to protect the value of their investment.

There are multiple forms of SPVs depending on the type of transactions they are created for. Most SPVs formed in relation with a conventional consumer asset securitization in the United States are incorporated in Delaware, whereas SPVs related to collateralized debt obligations are incorporated in the Cayman Islands. Some have directors, and some do not. It has no real management (operations are usually outsourced) and does not own anything else than the financial assets funded with the proceeds of the sale of the securities.

Technically, investors in ABSs face the credit risk of the SPV since it is the entity that issues the securities. However, since the SPV is a shell company that owns only the collateral, apart from the risk of the collateral, there is little credit risk associated with the SPV as a counterparty.

There are, however, important details to review concerning the structuring of the SPV when performing the credit risk assessment of ABSs, itemized here.

- The SPV must fully own the collateral. This is a legal concept, and lawyers perform the verification for true sale and perfected security interest, which, at a high level, ensure that the SPV has secured all the rights of ownership of the assets and their corresponding cash flows.
- The SPV must be fully isolated so that no one other than the securities holders can claim the ownership of the assets. The legal concept is called “bankruptcy remote.” As the name suggests, it means that the bankruptcy of any entity related to the SPV, even remotely, and the SPV's business must have no consequences on the SPV itself. The SPV must be strictly independent from any other party, especially the ones that contribute the assets. The main situation that has to be avoided is that the creditors of a business partner to the SPV that defaulted claim that they own it or its assets. If the transaction is not properly structured, they may try to access the SPV and its assets to maximize their recovery. This issue is crucial but

routinely performed by the team in charge of the legal analysis of the ABS.

- The SPV does not employ any staff, and all operations are outsourced to service providers. The servicer is an entity hired by the SPV to handle its day-to-day operations related to collateral management. The credit analyst must be comfortable with the ability of the service providers to perform their tasks. The main task is to ensure that borrowers pay what they owe to the SPV and to handle all negotiation and collections when dealing with delinquent borrowers.

The credit analysis of an ABS includes a review of the servicer's financial strength, the quality of its operations, and its track record. The two key aspects of the review are staffing and systems: Do they have enough qualified professionals to handle thousands of assets? Have they invested in an IT infrastructure enabling the constant monitoring of the borrowers' performance? The legal documentation typically includes a back-up servicer who steps in when the servicer fails to perform as expected or disappears. When the financial situation or the performance of a servicer declines, a "hot back-up servicer" is typically activated, meaning that they start receiving the same information as the main servicer and are prepared to step in at any time. This helps to mitigate the loss of experience when the transfer occurs. Change of servicers happens relatively often, especially when servicers are smaller entities.

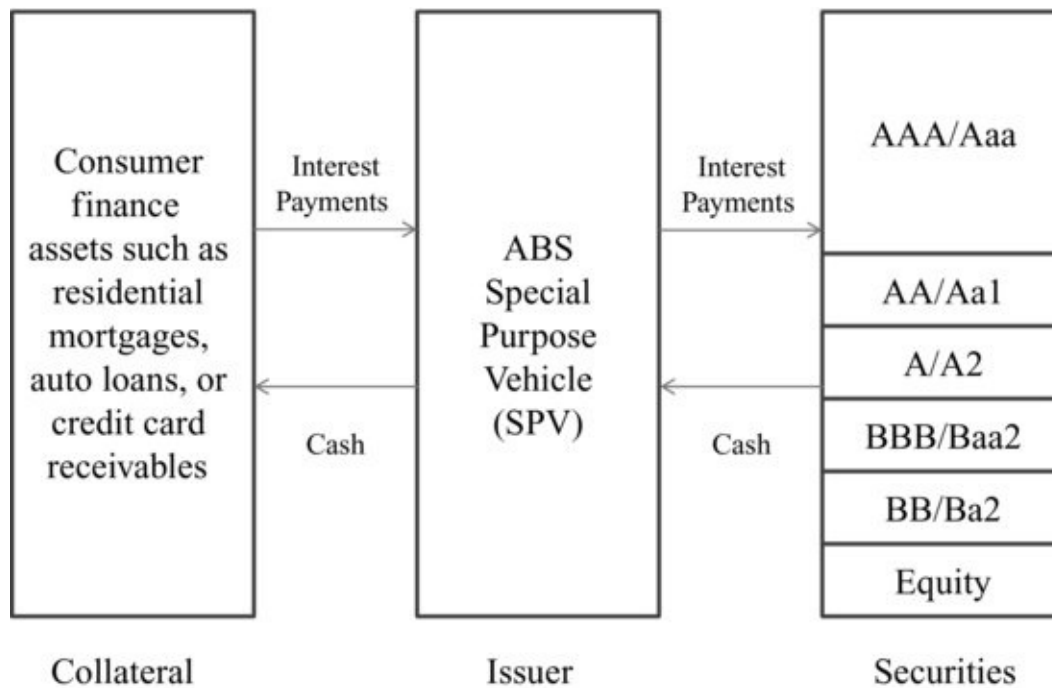
- The trustee is an entity hired by the SPV to perform tasks like verifying that the legal obligations contained in the documentation are met, that the various stakeholders (e.g., investors, rating agencies) are properly informed or that payments to investors are made. Trustees are generally affiliated with large banks and, historically, few credit related issues have emerged.

THE SECURITIES

An entity that invests in an ABS is purchasing securities issued by the SPV. Most securitization transactions involve the issuance of several series of securities, each with different risk profile, in order to reach more investors who have varied risk and return appetites. These series are called tranches, which are at the heart of structured credit transactions.

[Figure 8.2](#) expands the schematic from [Figure 8.1](#) to show (1) the key entities involved: the borrowers associated with the collateral, the SPV that issues the securities, and the investors who purchase the securities; (2) the key instruments, namely the collateral and the securities; and (3) the cash flows associated with the transaction such as the initial funding of the SPV through the investors' purchase of securities and the periodic interest payments from the borrowers to the SPV and then from the SPV to the investors.

[Figure 8.2](#) Basic ABS Structure



Investors choose the tranche they want to invest in according to their investment objectives. What primarily differentiates the various tranches is their position in the subordination hierarchy, also known as the “waterfall,” which prioritizes the payments. When funds generated by the collateral are available, they are distributed in priority to the tranche that occupies the highest position in

the waterfall. When all the money due to that tranche is paid, the remaining funds are used to pay the next tranche, until there are no more funds available. Since the investor expects payments over a certain period, funds collected may not be entirely distributed but may be set aside in a reserve to meet future payments in the event that the assets do not generate enough cash flow to make required payments.

The tranche on top of the waterfall has the lowest probability of default because it receives or has rights to the available funds first. It has, therefore, the highest ratings and, as the least risky tranche, pays investors the lowest spread over treasury yields relative to all other tranches.

It is not unusual for an ABS to offer 10 or more tranches. [Table 8.1](#) shows one example of a \$500 million CMBS securitization offering 6 tranches, which corresponds to 6 distinct bond issues.

Table 8.1 Illustrative Commercial Mortgage-Backed Securitization

Security	Rating	Original Principal	Term	Spread (in basis points per annum)
Class A	AAA/AAA	\$330 million	3.00 years	20
Class B	AA/Aa	\$50 million	4.00 years	30
Class C	A/A	\$50 million	4.75 years	80
Class D	BBB/Baa	\$30 million	5.25 years	120
Class E	BB/Ba	\$20 million	6.00 years	320
Residual/Equity		\$20 million		

The aggregate amount of bond offering (tranches) below any given tranche is known as the subordination amount; this is why the structure is sometimes called senior/subordinated. Subordination is a form of credit enhancement, because it represents the volume of accumulated defaults a transaction must experience before the tranche in question defaults. In the example shown in the table, the Class A tranche benefits from \$170 million of subordination. The total original collateral amount is \$500 million. When the principal repayment starts, the Class A tranche is paid first. As long as there is \$330 million of principal repayments received in the transaction—that is, less than \$170 million of defaults—Class A is fully repaid. For amortizing transactions without reinvestments in new collateral assets, funds are typically used to pay interest to all tranches before it starts repaying principal to any tranche. Because principal on the highest tranches is repaid first, the average life of the high tranches is generally shorter than the lower tranches.

Transactions in which principal repayments are made in the order already described are known as sequential payers. Sometimes, the transaction can be structured with some portion of the repayments being pro rata, at least until a certain point, for instance 50 percent of the principal, but these are rare. In these transactions, lower tranches with higher coupon rates are reduced in size more quickly than the sequential payers. Although this is obviously not favorable to senior investors, the pro-rata structures reduce the cost of funding.

Tranche sizes are a function of supply and demand. Investment banks that structure the transactions have a feel for investors' relative risk appetites. They also have the ratings agencies evaluate the riskiness of and assign a rating to each tranche. They then fine tune the amount of subordination needed to achieve both the targeted ratings and size of the estimated investor demand for each tranche.

Assessment of Securities

The credit risk analysis of an ABS transaction requires a thorough review of the waterfall. The goal is to understand how all the cash received from interest, principal, and credit enhancement is allocated, both in amount and timing, to tranches and to third parties. Each tranche's position in the waterfall is the main driver of the creditworthiness of the securities of an ABS transaction, but there are other structural elements that also influence the credit quality for each security class and those elements kick in if the performance of the collateral is not as expected, which we will expand upon in Chapter 14, in which we discuss mitigation techniques.

Commonly, waterfalls include much more nuances than what is shown in [Figure 8.2](#). A securitization will be comprised of many security types, each with varying principal and or interest timing and amounts designed to meet an investor's appetite or aversion to prepayment exposure. Cash for the securities is received in a highly prescribed order based on the performance of the collateral. Note that a tranche more junior in the waterfall might be paid off sooner than tranches above it. So, in addition to a securities place in the waterfall, credit quality will also depend on the actual security type and how that security is allocated cash.

We cannot stress enough that each securitization or structured credit deal is nonhomogeneous, with the devil lying in the details. We underscore that the securities' prospectus, which captures all these details, is required reading for the credit risk manager.

MAIN FAMILIES OF ABSs

Many types of assets have been securitized in the last few decades, a few with regularity. The securitization market is also primarily a U.S. issuer market. We next discuss those asset classes that credit analysts are most likely to encounter.

Residential Mortgage-Backed Securities

Residential mortgage-backed securities (MBS) is the largest asset class after U.S. Treasuries and, thus, merits our attention. Before the crisis, this asset class was appreciated by investors for its stability, liquidity, and sheer market size. Until the early 2000s, the vast majority of MBS were guaranteed by the federal housing agencies, Fannie Mae, Freddie Mac, Ginnie Mae, the Federal Housing Administration, the Federal Home Loan Bank, and, thus, there was virtually no credit risk in these securities. Although only Ginnie Mae, the Federal Housing Administration, and the smaller National Credit Union Administration were guaranteed by the full faith and credit of the U.S. government, the market treated the other agencies as if they were effectively guaranteed by the government as well. As it turned out, the market's estimation was correct and the financial crisis saw the bailout of Fannie Mae and Freddie Mac and the temporary guarantee and conservatorship of these entities by the U.S. government.

Most of the MBS securities are structured as “pass-throughs” in which there is no tranching, and each security created from the pool of mortgages is treated *pari passu*—meaning on equal footing with all others—to receive interest and principal, and no waterfall of preferential repayments exists.

The early part of the decade saw the explosive growth in MBS not guaranteed by the federal housing agencies, and the bulk of these nonagency guaranteed securities that were created were designed with structured tranches as described earlier. For both the federal housing agencies, which have for decades assumed credit risk on residential mortgages, as well as the investors in this asset class, important underwriting criteria and information critical for credit analysis include the following:

- The type of product: Conventional first lien mortgage versus second lien or home equity line of credit (HELOC).
- If the interest rate is fixed rate or adjustable.
- The credit quality of the borrowers: High FICO scores (prime borrowers)

versus low FICO scores (subprime borrowers).

- The leverage of each mortgage measured by the loan-to-value (LTV) at origination: If a house has a value of \$100,000 at the time of loan origination and the loan is \$70,000, the LTV is 70 percent. If the borrower defaults, the bondholder would lose money only if the house, after foreclosure, is sold for less than the outstanding mortgage balance. The average LTV of an MBS transaction is, therefore, a good indicator of its quality for two reasons: First, a lower LTV means that the house has less of a pricing threshold to meet on liquidation, given default. So, if the housing sector declines, there is more cushion. Second, a lower LTV means a higher down payment by the borrower, who puts more skin in the game.
- Who originated the mortgages, a bank or a specialty finance company.
- The amount of documentation supplied by the borrower: Historically, a special carve out of borrowers was accommodated by mortgage originators for those borrowers who had cash (i.e., undocumented) income—for example, for well-to-do, otherwise-creditworthy families operating cash businesses. The loans were still considered prime (or A quality) but their documentation failed to meet the Freddie, Fannie, or Ginnie underwriting standards. Thus, they were dubbed alternative-A mortgages and had a market acceptance. In the early 2000s, the category was corrupted, and un-creditworthy borrowers were enticed to take out mortgages on houses they could not afford without the onus of supplying information on job income, a pay stub, or a bank statement showing cash reserves.
- Geographic location of the collateral: Although a low LTV provides a cushion against low recovery on losses, given default, if the particular housing submarket is poised for a correction, the cushion, although looking large at origination, may be inadequate. It is important to track a mortgage bond's current market LTV, not just the LTV at origination or only on an amortized basis. The publication of the Case Shiller index (housing prices for major Metropolitan Statistical Areas) as well as FHFA's (Federal Housing Finance Administration, formerly OFHEO) house price index enable the tracking of current LTVs.
- The prepayment option: Well beyond the scope of this book is the prepayment variable embedded in most mortgages, which complicates the analysis of MBS securities, including the credit analysis. Since most mortgages allow borrowers to prepay without a penalty, borrowers can exercise this option, meaning selling or refinancing, if it's in their interest.

Since homeowners often will sell their homes if they are unable to pay the mortgage, the prepayment option will get exercised if a homeowner's finances deteriorate sufficiently. However, if the current LTV exceeds 100 percent, then this option cannot be exercised, and the borrower might, instead, exercise his put option on the mortgage (if there is one, which depends on the jurisdiction), by simply putting the losses on the house (equal to the house value less its debt) back to the bondholder.

Second, when rates fall, the prepayment option becomes in-the-money, but only so for borrowers whose creditworthiness is still strong. Thus, over time, with prepayment, the credit mix of borrowers in the pool is likely to change for the worse. Loan seasoning, or the average loan age, is an important pool characteristic for this reason. Seasoning also affects prepayment; after about 30 months, the rate at which mortgages prepay levels off and becomes more stable. Various investor and investment-manager service providers, such as Bloomberg L.P. and INTEX, sell tools to enable analysis of prepayment and scenario testing.

Commercial Real Estate

Commercial mortgage-backed securities, CMBS, are packages of commercial real estate loans. The structure and the analysis of a CMBS is similar to that of a nonagency MBS because, in both cases, loans are related to real estate collateral values, and the commercial real estate borrowers have their creditworthiness analyzed, albeit with more intensity, along the lines of how a corporate borrower would. A key difference is that most CMBS are not structured to fully amortize but, instead, are designed to be refinanced. Given that little amortization is built in, the LTVs at origination for these bonds tends to be low—for example, 50 percent or 60 percent, as compared to a residential mortgaged-backed bond that conforms to most federal housing agency standards of 80 percent. The lower LTV helps to mitigate the refinancing risk such that, in the event of forced liquidation, full recovery is more certain. Another distinguishing feature is that far fewer loans, but larger loans, are in the collateral pool, and if a loan becomes delinquent or looks as if it may, the servicers are much more proactive in working with the borrowers to closely monitor and manage the repayments.

Other Consumer Assets

Many other assets are packaged into securities. The predominate assets in this category are auto loans, credit cards, and student loans. Securitizations are issued by banks and nonbank financial institutions.

Auto loan securitizations are used to finance car purchases for buyers. Often, car manufacturers use finance subsidiaries to finance auto purchases. The securities in the ABS are typically medium term because the car loans backing them are medium term.

Asset-based securities are the major source of financing of credit card companies. As credit card receivables are short term in nature (most people pay their debt on a monthly basis), this is the main category of revolving collateral. Debt repaid by consumers is used to invest in new collateral.

Student loans are long term in nature because students borrow during their college years to finance their education and repay when they work.

Other Transactions

Securitization has also been used occasionally for more specialized financing transactions when investors had an appetite for a particular asset class.

Future flow transactions cover assets that will be created in the future, in contrast to mortgages or auto loans that are existing financial assets. A typical example is the financing of the infrastructure construction in commodity production, such as mining, which requires a lot of money up front. The company that sponsors such a scheme grants the revenues generated by the output of the mine to the investors in the securities. For example, a mining company receives a loan from an SPV and uses that money to develop a site. When it enters into production, the receivables from the sale of the coal or iron ore are owned by the SPV, and the proceeds are used to service the securities. It is called future flow because the receivables are generated over time but not at the time of origination. This technique is reserved for projects in which the existence of commodities is certain and there is little business risk involved. Because investors need certainty about the sale of the product, the mining company enters into long-term purchase contracts with several clients in order to lock in amounts sold and pricing, and to diversify the sources of revenues.

Whole-business securitization has been used to finance acquisitions, similar to leverage buy-outs, primarily of restaurant chains. The idea is to exploit the regular royalties paid by the franchisees to their company. The expected cash flows are captured by the SPV to service the securities. Well-known examples include Dunkin' Donuts or pub chains like Punch Taverns in the United Kingdom.

Diversified payment rights (DPRs) is a technique that has been used by banks in developing countries to borrow money in hard currencies such as U.S. dollars. There is a regular and relatively predictable flow of money sent by people living in the U.S. to their relatives living in emerging economies. An SPV is established to provide U.S. dollars up front to a bank domiciled, for example, in Turkey. In exchange for the up-front dollars, the Turkish bank gives the SPV the right to collect the dollars sent during a certain period of time by the people living in the United States. Investors in the SPV would have to become comfortable with the ability of the Turkish bank to have enough of its customers receiving money from abroad.

SECURITIZATION FOR RISK TRANSFER

Thus far, we have described securitization as a technique to fund financial assets, which applies to the vast majority of transactions in the marketplace. However, there are notable exceptions in which securitization is used exclusively to transfer risk to the capital market. In these cases, the proceeds of the sale of securities are not used to fund assets.

These transactions work essentially like insurance policies, but the entity purchasing risk protection—that is, seeking risk transfer—does not want to find itself having bought the protection from an entity that itself is unable to pay. Unlike most insurance policies, the securitizations involving risk transfer fully fund the promise to pay, given the prespecified loss event occurs. When the securities are sold to investors, the proceeds are kept in an escrow account (and invested). The protection buyer pays a premium, and this payment, together with the income on the investments in the escrow account, is used to make coupon payments to the investors. If a loss event occurs, the funds in the escrow account are transferred to the protection buyer, and the investors forego some or all their principal. Absent an event, the money is used to make principal payments to pay back the securities' holders.

Essentially, these transactions remove the counterparty credit risk associated with the transfer of another form of risk. The motivated reader will quickly note that not all counterparty risk is eliminated from these transactions. Note that SPV that receives the proceeds normally turns around and invests them, so the SPV faces its own counterparty credit (or investment) risk that is shouldered directly by the protection buyers. If the investments fall in value, the SPV has no other sources of funds to make the investor whole. Often, the SPV elects to enter into a total return swap in which a counterparty agrees to pay a certain return to the escrow account in exchange for cash up front, thereby assuming the investment risk. Even in this instance, risk is not removed because, although the investment risk is removed, there remains counterparty credit risk. In one instance, an SPV had a total return swap agreement with Lehman Brothers in which Lehman received the proceeds and promised to pay a certain total return on the monies. When Lehman collapsed, not only did the SPV not receive its promised return, it did not fully recover its principal.

The advantage of this technique is that it allows protection buyers access to

alternative markets populated by investors like hedge funds who are comfortable in taking unusual risks in exchange for a high expected return. Let's mention two examples:

1. Credit-Linked Notes (CLN): Notes (i.e., securities) are issued by an SPV, proceeds of which fund an escrow account established to make payments to a protection buyer should a predetermined credit event occur. Typically, the credit event risk is higher than with most assets in asset securitizations. If the credit event occurs, the note investors are not fully repaid their principal. Investors in these notes typically have a higher risk tolerance and are seeking higher expected returns than in traditional ABS securitizations.

2. Insurance-Linked Securities (ILS), also known as catastrophe (“Cat”) bonds, are used by insurance companies to protect against catastrophic events like earthquakes or hurricanes. The insurance company sponsors the SPV that then sells securities to investors, the proceeds of which fund an escrow account. which, again, is invested. The investors have an appetite for these bonds because they tap a source of risk generally uncorrelated with the rest of their investment portfolios. The insurance company pays a premium to the SPV, which is usually structured as a reinsurance company, and these premiums, together with the investment proceeds of the escrow account, are used to pay the coupons on the bonds. If the catastrophe occurs and generates losses above a prespecified threshold amount, the proceeds are used to pay claims to the sponsoring insurance company, and, consequently, investors suffer a loss of principal.

In addition to the challenge of assessing the probability of occurrence of the underlying risk, the credit analysis must pay attention to the way the money in the escrow account is invested, as we learned from the Lehman collapse.

CREDIT RISK ASSESSMENT OF ABSs

Unless an institution is involved in the collateral warehousing business, which we describe in the following section, most credit risk managers' involvement in the securitization world is to review the strength of an ABS. We have already described essential reviews to perform on the collateral, the issuer, and the securities.

These tasks are mainly qualitative in nature, which is essential to form an informed opinion about the overall quality of the investment, and to detect weaknesses or flaws. In most cases, securitizations are a seller's market, in which originators and investment banks structure transactions to meet their own objectives, subject to what they perceive the market will bear. From time to time, the buyer can influence the transaction and demand a change to the terms, conditions, or pricing, which can have a profound impact on the soundness or profitability of a deal. Good transactions usually are differentiated from weak ones in the details, and the credit risk manager's job is to understand the details. In summary, no detail can be overlooked, and experience and specialization are paramount.

Virtually all ABS transactions are rated by at least two major global rating agencies. The methodologies they use to allocate ratings are described in technical material available on their websites. After the large amount of defaults experienced in the late 2000s, the agencies have strengthened their processes and issued new sets of criteria. A particular scope of interest has been the verification of the quality of the collateral and of the originators' processes.

Ratings are based on the qualitative assessments described previously but also on analytical models. Most sophisticated investors do not rely exclusively on the ratings but have their own models. They can be developed from scratch or purchased from vendors. The most popular one is INTEX (www.intex.com), which is the *de facto* industry standard. INTEX has a very large library of current and past deals. The models permit users to make changes to key assumptions to see how the transactions perform under different scenarios.

The rating agencies' models work with a two-step process, which, although simplified, is essentially as follows:

Step 1: Estimate the probability of default of the collateral. Using historical data and a set of assumptions, models are built to generate a loss

distribution, that is to say, a series of all possible outcomes, with corresponding expected relative frequencies of the collateral performance over time.

Step 2: Input the loss distribution into a model of the ABS's cash flows to identify the scenarios and their likelihoods in which a cash flow shortfall occurs, on a tranche-by-tranche basis. The probability of a tranche facing an interest or principal shortfall determines the rating assigned to the tranche.

In this chapter, we have identified many reasons that financial institutions participate in the securitizations. A final reason is that, since most ABSs are used to fund high-quality assets, the ABS often secure a high rating, often higher than the sponsoring institution. It is sometimes said that securitization is reserved for the “crown jewels” of a firm. By giving up future revenues generated by quality assets, sponsors are able to structure strong transactions that secure strong ratings. Strong ratings translate into low funding rates, so securitization proves to be an efficient tool to raise cheap money for these institutions.

WAREHOUSING RISK

We mentioned earlier that the sale of securities to investors is the first step of a securitization program and that the proceeds are used to fund asset purchases. Although technically the case, the mechanics are such that prior to being funded by the money coming from the sale of securities, the collateral assets are purchased by an intermediary and then sold to the SPV the day the securitization deal closes.

An intermediary, typically related to the originator or the investment bank structuring the securitization, purchases the assets (i.e., funds the loans or mortgages) at the point of sale. When enough loans have been accumulated, and the aggregate volume matches the expected size of a prestructured and pre-agreed on securitization transaction, the SPV purchases the loans from the intermediary.

The intermediary is warehousing the assets, and the period during which the intermediary accumulates assets is called the ramp-up period. From a credit perspective, the intermediary takes a significant amount of risk because the planned securitization could fall through and the intermediary could be left holding long-dated assets, which have credit risk since defaults could occur or the intermediary may realize losses when selling the loans.

This risk is known as a warehousing risk, and it is a risk faced, not by the ABS investor but by investment banks and originators. In order to receive the mandate to structure securitizations, investment banks often have to offer warehousing financing facilities, that is, liquidity lines to fund the assets. The sharing of the ultimate warehousing risk between the originator and the structurer (investment bank) depends on prevailing market forces. When investment banks are competing for mandates, they may agree to bear 100 percent of the risk. When the market is harder, banks request that originators share some risk. If a transaction fails and the collateral is sold at a loss, the originators and the structuring bank share in losses based on the risk-sharing terms agreed on up front.

At the peak of the mortgage securitization market in 2006–2007, some global banks were exposed to more than \$10 billion of warehousing risk and some are thought to have lost significant amounts of this money due to their inability to complete and permanently fund the transactions as originally envisaged.

Warehousing risk presents such a significant exposure that much of the conventional mortgage market has innovated a way around this by operating through a to-be-announced (TBA) mechanism. Prior to actually funding mortgages, investment banks presell a pool of mortgages for a securitization based on defined characteristics such as LTVs, average FICO, geographic concentration, and coupon rates. The deal closes months later, and final pricing is determined just prior to the close. In this way, mortgage originators can make commitments and arrange for funding at closing, without having to hold funds indefinitely or originate loans that then cannot be placed in a securitization.

FINAL WORDS

It is impossible to present securitizations today without mentioning their central position in the 2007 crisis. The biggest sources of investor losses stemmed from investments in structured mortgage products and related securities, such as collateralized-debt obligations (CDOs, discussed in Chapter 17), which were primarily invested in mortgages. Most losses were, therefore, due to credit exposures that had been analyzed with the methodologies we just described.

Many observers believe that, without innovations in the securitization markets, the origination of mortgages would not have been possible. Many borrowers, who subsequently defaulted, would not have been able to find lenders to finance their houses without these structured products. Some people view these mortgage products as being “weapons of mass destruction” that created the real estate bubble that collapsed and led to one of the worst financial crises ever.

As a result of the defaults of so many mortgage and asset-backed transactions, investors have become wary of the asset class, which nearly brought the issuance of new transactions to a standstill for the years immediately following the crisis.

¹ See Chapter 12.

PART
Three

Portfolio Management

CHAPTER 9

Credit Portfolio Management

We have focused so far on the origination and analysis of individual transactions and provided methodologies to assess the credit risk generated by a new deal. Should we be satisfied and consider that this is enough to protect a firm's balance sheet?

The answer is a clear no. What we are missing is the portfolio dimension as each new transaction contributes to the complexion of all existing transactions combined, the total of which is not equal to the sum of its parts. Even if each single deal satisfies all the firm's risk criteria, concluding too many of them can lead to the creation of an unbalanced portfolio loaded with exposures of the same nature, which is dangerous.

The role of the credit portfolio management (CPM) unit is to take a big-picture view and manage the risk of the portfolio in its entirety. Credit risk assessment and CPM are two complementary disciplines, staffed with people having different background and skills. The former focuses on individual deals, and the latter concentrates on the entire portfolio. Credit portfolio management is more strategic in nature, and, based on the firm's risk appetite, it sets the vision for the portfolio it wants to create and the direction that the originators should follow. If originators cannot execute this, if external events lead to unwanted changes, or if the firm changes priorities, then CPM implements corrective action.

Credit portfolio management has evolved significantly over the last 20 years. Once reserved to large banks with large portfolios, it is now implemented by most institutions that actively generate credit exposures. Two main factors contributed to this phenomenon: analytical tools and liquidity.

In the late 1980s, analytical tools took a leap forward when computers became more efficient and widespread. Mathematical models were developed and provided the foundation of modern CPM activities. Nowadays, all large financial institutions and some corporates have models to perform data-intensive and complex analysis. In addition, data have become more plentiful, and now market data such as default correlations across obligors, industries, and so forth are inputs into models. Once hard to obtain, the necessary data are now widely available because many vendors collect, process, and sell the data in a user-friendly format.

By liquidity, we mean the ability to buy and sell exposures when needed. In the not so distant past, few methods existed to get rid of unwanted positions. A few pioneers were trying to develop the CPM concepts and knew what actions should be taken in an ideal world, but implementation was nearly impossible. Without the ability to execute rebalancing transactions, CPM remained an academic exercise. Things changed in earnest in the late 1980s when a few banks engineered the development of new products, notably credit default swaps and credit securitization, which provided financial institutions with a toolbox to work on optimizing their portfolios.

Credit portfolio management is a discipline that requires significant resources, human and financial. As a result, developing a fully fledged CPM function is not realistic for all firms. Although it is inconceivable for a large financial institution not to invest in CPM, smaller companies with stable, modest, or unsellable portfolios may not be able to justify the resource allocation. The risk management function must be pragmatic and must size its CPM capabilities to be appropriate to the credit exposures assumed. Building a state-of-the-art credit risk management framework is not done in a day. It typically starts with establishing discipline around the origination process. Credit portfolio management, being one of four components (as a reminder: origination – assessment – CPM – transfer) of the credit risk management process, competes for resources with the other components and should not come at the expense of other parts of the chain, such as fundamental credit analysis.

That being said, hedge funds need to have all tools in place when they start trading, because modern financial techniques enable them to grow a portfolio rapidly. Credit portfolio management will be identified as a fundamental function during the development of the business plan, and execution should start immediately. Another example is financial institutions that are heavily regulated. As we will see in Chapters 10 and 11, methods developed by CPM teams are indispensable to calculate the amount of capital at risk. Some regulators may not grant the permission to start a business if the entity has not developed the infrastructure necessary to perform the analysis and report compulsory numbers.

Our suggestion is, therefore, to thoroughly consider one's own situation, to review what the objectives are, and to adopt a realistic strategy. If needs and resources are limited, a simple approach to portfolio management is sufficient.

In the sections that follow, we describe three different levels of CPM activities practiced by companies that have significant credit risk exposures. Companies will generally scale their CPM activities to their needs and resources. For

example, a highly sophisticated process would be inappropriate for a small or midsized firm for which credit exposure is a by-product of its core business. Implementation can also be gradual and scalable. As progress is made or major changes occur in the portfolio, the next level can be considered, which might include a comprehensive cost/benefit analysis that measures the benefit against incremental staffing, software, and other IT expenses.

LEVEL 1

Basic CPM consists of the minimum activities that need to be performed by any company exposed to credit risk. It does not require sophisticated analytical capabilities but common sense, a well-managed organization, and skilled people. The focus is on prudent risk taking via strict limits, on the knowledge of the composition of the portfolio and on the monitoring of its performance. Elementary defensive actions can be taken to protect unwanted or deteriorating exposures. This is an adequate level of CPM for companies taking credit risk as a by-product of their core activities (e.g., trade receivables) or involved in simple transactions.

The techniques described below are relatively simple to execute and appropriate under what we have labeled Level 1 CPM. They meet the objective of limiting concentration risk and thereby reducing credit risk in the aggregate. They do not require a large infrastructure and can be implemented by most companies.

Aggregation

Managing a portfolio of credit exposures starts with measuring the accumulation of risk for each counterparty, which is called aggregation. In Chapter 4, we described the three ways to measure the exposure: GE, NE, and AE. At the time, we focused on individual transactions and proposed a methodology to measure the credit risk for each and every deal. There is nothing to add about this approach as this is the way to work with transactions viewed in isolation. As the first CPM step, we measure the accumulation of risk across multiple transactions on a counterparty-by-counterparty basis. One division of a firm may sell a product to Company ABC, generating a trade receivable, and another division may enter into a derivative transaction with the same Company ABC, generating a dynamic credit exposure. The two exposures must be aggregated, because if

Company ABC were to default, losses would be experienced on both exposures.

This first CPM step requires identifying all companies that are related and how they are related. The ultimate parent needs to be identified along with each subsidiary and affiliate on a global basis. The default of one company belonging to a group may trigger the default of some or all associated entities. Even if they do not all default, the default of a subsidiary may indicate the inability of a group to support an affiliate, which may signal financial weakness. The ultimate parent may also default and that may trigger the default of some or all affiliated companies. It is, therefore, prudent to consolidate exposures based on the ultimate parent company and on all its subsidiaries. By quantifying and monitoring the exposure this way, the worst-case scenario is more likely to be captured.

In implementing this measurement system, a central database that groups all exposures must be developed. This task is so essential that some large institutions have a unit fully dedicated to it. The unit is staffed by professionals who know the organization well enough to surface all types of transactions generating credit risk. This function benefits from diplomacy since business managers are prone to deny that their products bear any credit risk to avoid having to abide by yet another set of guidelines or be subject to another level of approval, or have their turf stepped on by a risk manager.

Reporting

Risk management must provide frequent and regular updates on the content of the credit portfolio. The report must also be user friendly and allow its readers, primarily senior management, to quickly assess key exposure metrics. It is common for banks to prepare a daily summary report since exposures can change quickly, with new transactions coming on, old transactions running off, and changes in market prices that affect the exposure.

The credit reports must contain essential information to explain the quality of the portfolio and problematic exposures. At a minimum, it should present:

- Largest absolute exposures (compared to approved credit limit).
- Largest weak exposures.
- Biggest deterioration/improvement of creditworthiness with corresponding exposures.
- Large new transactions.
- Breakdown by products and business units.

Credit Limits

In Chapter 2, we presented the concept of credit limits. As a reminder, a credit limit is the absolute amount of exposure a firm wants to take. In creating and setting limits, there are a few basic principles to consider, and minimally they should be:

- Applicable to counterparties, industries, countries, product categories, and/or asset classes.
- Set in advance and changed infrequently. Although limits can be updated from time to time, ad hoc or frequent limit upsizing to accommodate transactions should be avoided.
- Enforced. In major banks, a transaction that breaches an approved credit limit is a cause for termination of employment. At a minimum, the operational risk management unit should investigate why it happened because it may be the result of a flawed process, such as data captures.
- Subject to judgment and review. Establishing a credit limit is as much an art as a science. Analytical models can help but, in most institutions, they are ultimately based on the experience of senior risk management and consensus with other senior management and even directors, taking into consideration how a loss would affect earnings and the reputational costs that may ensue—how large a loss from one counterparty would shareholders, rating agencies, and clients tolerate?
- Set for multiple exposure metrics. In Chapter 5 we discussed measurement of potential exposure for dynamic exposures: VaR (value at risk), which does not represent the worst-case scenario, or when relevant, the total notional amount, which does. So when setting limits, in addition to VaR-based PE, the notional amount of the transactions, when relevant, can be also taken into account.

Surveillance

Surveillance refers to the monitoring of the performance of the transaction and counterparty after the deal has been closed. In some companies, surveillance is considered as the ultimate back-office function because it is internally focused and most of the work performed is considered to be of secondary importance. Experience shows that this is wrong. Surveillance departments must be properly staffed and given appropriate resources because they are first to detect that a transaction is not performing as expected or that a counterparty shows signs of

stress. By informing the relevant teams in the organization that will review the issues and take necessary actions, they can avoid large losses.

Here are a few recommendations for an efficient surveillance process:

- Surveillance sign-offs on new major transactions. We do not say that they perform a key function in the structuring of a deal but involving them in new major transactions or initiatives can make structurers aware of potential issues that were problematic with other transactions. Surveillance specialists can also extract conditions from the counterparty up front, such as regular reporting under a certain format, which should be anticipated before the deal has closed.
- No one should assume that the surveillance department can quickly adapt itself to new types of transactions. Allow time for the department to get up to speed and allocate a budget for its resource needs. The learning curve can be steep and an efficient monitoring process can take months to put in place and require significant resources. For example, when a firm enters a new country, it will have trade receivables from that country. Although the firm may have the experience to monitor the creditworthiness of its domestic customers, it will have no experience with the receivables from its new international customers, and its regular processes of reviewing financial data and monitoring the evolution of the legal environment may be insufficient. One-off structured transactions are another place where the surveillance professional may miss important signals. Thus, when requested to approve a new transaction, a credit committee should know that the surveillance department may not be in a position to perform its usual task. Alternatives would be needed, because knowingly performing surveillance that is handicapped is not an option.
- Agree on a surveillance schedule for each transaction rather than using a one-size-fits-all approach. Not all transactions are uniformly difficult to monitor. Some are stable enough to require only infrequent reviews, whereas others deserve to be monitored more frequently. Each transaction and counterparty should have its own review period such as monthly, quarterly, or yearly.
- Distribute portfolio-level surveillance reports on a monthly basis. They can include a status of the performance of the main lines of business, transactions, and a progress report on transactions that have deteriorated and for which corrective actions have been recommended and implemented.
- Set up regular meetings to review the most problematic cases and take

corrective action, which may include purchasing protection or handing over a transaction to a workout department. To be useful, the meetings must be more than recommendation forums. They must be staffed by people with the authority to make decisions and, importantly, a budget for executing mitigation transactions. Allocating a yearly budget to the surveillance team avoids lengthy discussions about cost allocation, and, most important, the team can react more quickly as a credit deteriorates.

- Regular meetings must ideally also take a forward-looking view and invite people who can anticipate future problems. Economists can add value in that respect and provide useful input that can trigger preventive actions.

Mitigation

From time to time, firms originating credit exposures may want to transfer the credit risk they took on a counterparty to another firm. There are two main reasons for wanting to do so:

1. The counterparty's creditworthiness declines after conclusion of the transaction(s).
2. For commercial reasons, the firm accepts a transaction that bears credit exposure beyond its appetite for the counterparty. In this case, the difference between the assumed exposure and the available credit limit is hedged.

In Part Four, we cover the major techniques available for mitigating credit risk by transferring it to another party. There are ways to transfer the risk that are relatively simple to execute for the company that falls into this Level 1 category.

LEVEL 2

Intermediate CPM requires analytical skills and tools, because the focus here is on the amount of capital at risk and on profitability. Most commodities-trading companies, insurance companies, and other financial institutions practice CPM at this level.

Quantification of the Capital at Risk

Because large unexpected losses occur in any portfolio and current period profits are insufficient to absorb them, a cushion has to be built in in order to protect the firm against the risk of insolvency. Until the late 1980s, it was difficult to

quantify the amount of losses that could occur because of constraints on computational power and access to data. Thus, it was difficult to size the amount of capital to set aside to cover such losses.

Thanks to the development of quantitative methods and the advent of modern computing power, it is now more feasible to perform this sizing. This concept is known as value at risk (VaR) or more specifically as it relates to credit exposures, credit value at risk (CVaR), which we will cover in Chapter 10, and we will, therefore, not expand further here. Its quantification is a cornerstone of CPM activities for all major financial institutions.

Allocation of Capital and Profitability at Individual Transaction Level

After having developed a methodology to calculate the amount of capital at risk at the portfolio level, it is possible to allocate the aggregate amount to individual transactions. There are various techniques for coming up with an allocation scheme. One of the simpler methods is to calculate the overall capital needed for the total portfolio and then recalculate the need with all exposures included, except for one. The extra, or incremental, capital needed for the total portfolio relative to the but-for-one portfolio is the capital required for this one transaction. A similar process can be conducted for all transactions in the portfolio.⁴ Also, the motivated reader will note that by virtue of portfolio effects, the incremental capital needed for a transaction is smaller than the average capital need for each transaction, since each transaction's capital need is calculated based on an existing portfolio that already benefits from diversification that all other transactions have brought to the table.

The capital allocation process is useful for pricing transactions. Since capital is expensive, its cost must be covered by transaction revenue thus must be built into the pricing. The next logical step is to calculate all costs associated with each transaction, including internal costs, which may not be easy to allocate or even visible, such as overhead and other surveillance costs.

The pricing equation must be fully loaded with all these costs: operating, overhead, and, most important, the cost of capital.

The benefits of being able to compute profitability of each transaction are multiple, including the fact that it helps to negotiate if one understands the transaction's total cost on a fully loaded basis. It also helps to prioritize transactions, which helps to allocate resources, allowing transactions with low

profitability to be deemphasized in favor of transaction with high profitability.

Stress Testing

Stress testing refers to evaluating the economic consequences of unexpected but plausible events that may impact the performance of the counterparties, and, thus, of the entire portfolio. Value-at-risk calculations may be based on parameters that reflect historical economic circumstances that capture data across economic cycles, the results of which are fundamentally weighted by their historical occurrence. In contrast, stress tests allow for looking at extreme and hypothetical events. There are no one-size-fits-all scenarios; they are company specific. Each firm must identify the main factors that influence the financial performance of its portfolio. The portfolio performance is then simulated in which the main factors are allowed to take on extreme values.

To illustrate, consider a bank heavily exposed to steel companies, which are highly dependent on energy to produce their material. An increase in oil prices typically decreases the profit margin of steel companies, because they cannot pass on much of the cost increase to their customers. Rising energy prices, therefore, translate into higher credit risk. A stress or what-if scenario could test what would happen in case of a persistent period of high energy prices. The risk assessment team may assume that if oil price stays above \$150 a barrel for more than six months, 50 percent of steel companies could be downgraded by three notches (e.g., from A/A2 to BBB/Baa2) and that 15 percent of the B/B rated companies may default. The CPM then runs its capital model with the modified default probabilities for the steel subportfolio and is able to conclude that, in such a case, \$500 million additional capital would be necessary for the bank to maintain the same level of solvency. This method contrasts with a traditional VaR approach that would be unlikely to account for this outcome, since a sustained oil price over \$150 a barrel has never occurred.

Prior to the 2007 crisis, stress scenarios were performed but were not taken very seriously and were often based on optimistic outlooks. Postcrisis, a new world emerged as people realized that inconceivable scenarios like a prolonged and deep drop of house prices and double-digit defaults were plausible. Today, most financial institutions dedicate more resources to stress testing and are more open-minded about the plausibility of these events.

As a result of the crisis, regulators are also putting more weight on stress testing. The Federal Reserve Bank in the United States conducted stress testing

on U.S. member banks, and it is using the March 2012 results as the basis for restricting share repurchases and payment of dividends of banks that did not pass.

Hedging Strategy

Rather than dedicating resources to monitor risks that are not welcomed, some positions can be hedged. A hedging strategy, although defensive in nature, is proactively performed. An efficient way to orchestrate the implementation of a hedging strategy is to hold regular hedging meetings involving representatives of various units:

- CPM, as part of the risk-management function, leads the exercise and makes recommendations on overall portfolio characteristics and return targets.
- Risk assessment, as part of the risk-management function, provides analysis about the performance of counterparties and industry sectors.
- Surveillance as part of the risk-management function has ongoing involvement with each transaction and can opine on the performance of transactions and trends and will suggest hedging actions.
- Origination will provide an overview of the pipeline such that capacity can be freed up to make room for new transactions. Originators also offer their opinions about client sensitivities concerning hedging. For obvious reasons, some clients do not like to hear that their partners have sold or hedged their positions. It is, therefore, legitimate to forego the use of a hedge to avoid creating friction with a client. However, as we will discuss at the end of this chapter, the members of the origination team may not be allowed to discuss the possible hedging techniques, since they have had access to clients' material nonpublic information and securities laws could be violated.
- Structurers are in charge of deal execution but, by the surveillance stage, they have handed off responsibility to the CPM team, and may provide input to and assist CPM with implementation of the hedge, sale, or unwind of the transaction, should it be needed.

Rebalancing Transactions

Portfolio management activities aim to minimize the amount of capital deployed and generate the highest return on it. Firms that have appetite for credit risk and demonstrate so by setting limits on risks they are prepared to retain and by allocating a certain amount of their capital to credit-related activities.

The CPM team, then, must make the best use of the resources (capital) it is given by senior management, that is, it must optimize the use of the capital available. This means shaping the portfolio in a way to meet certain business objectives but also to provide the highest risk-adjusted return to shareholders. The goal is to generate the maximum amount of income with a given amount of capital and to do so in such a way that the capital amount reflects the portfolio's risk. Fine-tuning the portfolio by replacing transactions that provide little income relative to capital with those that produce more income relative to capital is a good way to achieve this goal. Optimization can be performed at the counterparty, industry, or country level. Another simple way to reduce the amount of capital consumed is to diversify the portfolio and avoid concentration. We will discuss this topic again in Chapter 10.

At the single counterparty level, optimization of the portfolio is another reason it is crucial to be able to assess the profitability and the marginal impact on the overall capital of each transaction. A review of all sources of exposures can be performed and priority given to the most favorable deals. For instance, a bank may sell or hedge a mildly profitable loan to a counterparty to make room for a more profitable derivative transaction with the same counterparty. The two transactions may generate a similar exposure or use an equivalent amount of capital, but if the loan generates less income than the derivative deal, the firm is better off selling the loan and executing the derivative transaction. This concept is known as the velocity of capital, which means the speed at which capital is redeployed to new transactions. Velocity is desirable, since it means that the firm has the ability to free up and redeploy capital when needed, maximizing its usage and redeploying it to higher-yielding transactions.

This type of rebalancing activity requires an intelligent employee compensation scheme and effective governance to avoid political conflicts. In the example mentioned earlier, the business unit that owns the loan is likely unwilling to sell it because it contributes to a client relationship and to revenues. Its managers would have to be compensated in some shape or form by the business unit that will replace their exposure.

LEVEL 3

An active CPM strategy integrates portfolio management concepts in the day-to-day operations of a company. As the concept is enticing but the implementation delicate, few banks are actually practicing it. Those that are have large portfolios

and are assuming credit risk as a primary line of business.

In these instances, the CPM team may, in fact, have a profit and loss (P&L) responsibility. Thus far, we have characterized the risk-management function as decidedly not a profit center. However, after deal execution, transactions become the assets of CPM, and in some instances CPM's profitability is measured as any other business group.

Transfer Pricing

Transfer pricing traditionally refers to intracompany transactions like the allocation of expenses for shared services or charges associated with the purchase of a product or a service from an affiliate.

The concept is extended to financial institutions that may employ a “funds transfer pricing” scheme to create the proper incentives for divisions so that they may focus on their area of expertise. In the risk-management context, the key idea of transfer pricing is to dispossess business units of their exposure immediately after closing a transaction. The ownership is transferred to the CPM group by selling the exposure via a funds-transfer price such that the originator can recognize income, which then shifts the performance burden to the CPM group that has the responsibility to manage the portfolio it owns.

The acquisition of the exposure by CPM is executed at market price, irrespective of the amount that the business units obtained from the client. Suppose that an investment bank participates in a loan facility in order to create a relationship with a large prospective client, even if it knows it is underpaid on the credit facility (as is often the case). The client is charged 3 percent on a \$100 million loan. Credit portfolio management buys the exposure from the origination unit and demands to be paid market price, which is 3.5 percent. The shortfall of revenue is, therefore, 0.5 percent or \$500,000 per year, which will be absorbed by the P&L of the origination unit. The CPM receives its needed 3.5 percent. In this way, if the institution needs to shed the exposure and sells the loan to the market, or hedges it, it has priced-in this cost. To the extent that market pricing does not move against the firm, CPM is made whole.

Note that pricing a deal based on the prevailing market conditions is not at odds with the costing that we discussed earlier in which all costs are considered, including the cost of capital. In fact, the internally calculated cost needs to be compared to the market price. If it's less, then the deal makes sense. If it's more, the deal should not be done since, from the firm's point of view, the market is

underpricing the transaction. Using market price as a benchmark for actual deal pricing is becoming more widely utilized. However, there are still many transactions that either don't use market prices as a gauge or don't have access to market prices because the transactions are illiquid and there is not much price discovery.

Some banks have thoroughly implemented funds-transfer pricing as they believe that it provides discipline, transparency, and accountability. It is, however, quite complex to put in place and can create acrimony across business units.

Acquisitions or Swaps of Exposures

As we will see in the next chapter, the amount of capital dedicated to credit risk can be reduced by adding diversification to the portfolio. Active CPM can involve the acquisition of exposures that the business is not able to generate.

For instance, a bank may not have any presence in the food sector, whereas analytical studies reveal that it would provide diversification to the portfolio. The CPM group can be proactive and purposefully acquire exposures in the sector. A straight acquisition via credit default swap or purchase of participations in commercial loans can be executed.

Another technique is for two institutions with unbalanced portfolios to engage in an arrangement that's profitable to both parties by swapping exposures. The concept is that one institution's peak exposure may be a low exposure for the other institution, and vice versa. Thus, the two exchange peak/low for low/peak, each institution benefiting from a newly rebalanced portfolio that is less capital intensive.

ORGANIZATIONAL SET-UP AND STAFFING

Credit portfolio management is either a corporate function attached to the chief risk officer or part of a business unit like investment banking or capital markets, and, thus, it either has a P&L responsibility or contributes to one. The latter case is found in institutions that, in addition to the transfer pricing and incentive alignment requirements, are so diversified (e.g., active in commercial banking, investment banking, and asset management) that it makes more sense to have CPM specialists reporting to people who understand what they do. In all cases, they are independent from the origination units, the same way the credit risk

assessment team is. Contrary to the risk-assessment team though, CPM interacts only infrequently with the business units because they are not involved in individual transactions.

A large part of what CPM does is analytical in nature, so a large number of staff will have strong quantitative backgrounds. Hedging transactions are executed via the internal trading desk, if there is one. Otherwise, CPM deals with external dealers.

Chinese Walls and Nonpublic Information

In case an institution has access to nonpublic information, it has to be careful when it executes hedging transactions. It is illegal to execute certain financial transactions based on information that not all market participants have, because this may constitute insider trading. Prosecutors all over the world are harsher and harsher with traders gaining from privileged access to material nonpublic information.

A firm in regular contact with its clients and counterparties has routine access to information that is not shared with the public. It is legitimate for a borrower or client to disclose nonpublic financial statements and other relevant information in the deal origination process. It is also fine for a firm to make a credit decision based on what it knows. Problems occur when the CPM team has access to material nonpublic information and uses this private information to hedge an exposure.

Firms wanting the flexibility to hedge some of their positions need, therefore, to isolate the staff deciding on new transactions from the staff that may be buying protection or selling the risk back to the market—that is, “Chinese walls” have to be built. Banks refer to the “private side” and the “public side” of the business. This can lead to the duplication of certain functions like credit assessment. Two separate teams are in charge of assessing the credit quality of counterparties. The one on the private side receives private information and recommends accepting or declining a credit exposure based on what they know. The CPM is on the public side and relies exclusively on public information as the basis for recommending hedging some exposures.

THE IACPM

Finally, let's mention that the development of CPM in major financial institutions

around the world led to the creation of a dynamic professional organization, the International Association of Credit Portfolio Managers (IACPM), based in New York. Close to 100 financial institutions are members. Its website (www.iacpm.org) and newsletters offer valuable information, including a freely available white paper called “Sound Practices in Credit Portfolio Management” that presents a fundamental framework to develop a CPM function.

FINAL WORDS

Credit portfolio management's role is to aid the firm in establishing a well-diversified portfolio. Its input occurs at all stages of a transaction's life cycle—at the point of origination, in the deal pricing, as transactions accumulate within the portfolio, and in executing exit and mitigation strategies to keep the portfolio in balance. Well-managed CPM reduces overall capital requirements for the firm, regardless of whether the firm is a Level 1, 2, or 3 participant. For firms further along in their CPM functionality, CPM can also increase the velocity of the firm's capital, which is a value-enhancing strategy. Credit portfolio management, although typically a support unit, is increasingly becoming integrated with business units. When the firm's originators have access to nonpublic information, CPM must be separated by a Chinese wall from other parts of the firm, if they want to be in a position to hedge or sell exposures.

¹ In Chapter 10, we elaborate how to calculate the capital for the whole portfolio.

CHAPTER 10

Economic Capital and Credit Value at Risk (CVaR)

The question we will address in this chapter is how to quantify the amount of capital necessary to support a credit portfolio. We begin by defining capital since capital itself has various meanings. We then describe credit value at risk, or CVaR, a technique widely used for quantification. We describe what it is, how to interpret it, how it's calculated, and how the risk manager can influence it. Lastly, we cover CVaR's role in the risk manager's tool box and its limitations.

By supporting a credit portfolio, we mean to not only avoid bankrupting one's institution but keeping it in good standing with all constituents—customers, regulators, ratings agencies, and creditors. The way in which capital supports a credit portfolio is by absorbing unforeseen or unexpected losses.

A company can easily manage expected losses, because it expects them, their occurrence can be reasonably quantified, and interest income or revenue can be collected to offset them. For these losses, capital is not required. The problem arises from unexpected losses. Losses can be bigger than expected because, for example, the number of defaults is larger than expected, high exposures are hit, recovery is less than anticipated, or a combination of all these factors. The capital absorbs these losses. Its presence is like a cushion in the unlikely event that credit losses are far greater than expected and current earnings are insufficient to cover them.

The expected performance of a credit portfolio is characterized by a high probability of experiencing small losses and a low probability of very large losses that can wipe out the organization. Small losses are generated by defaults of entities to which a company has either low exposure or high recovery. Frequent but small losses are not an area of concern. Even in a favorable economic environment, there are always a good number of companies that default as a result of issues that are specific to them and not to their environment. These frequent losses are expected from a statistical point of view, meaning we expect them to occur in the aggregate. However, among all entities composing a large portfolio, nobody knows which ones will default. The strategy is, therefore,

when deciding at what price to sell a product, to include a charge to cover the expected losses.

Large losses are problematic because they can jeopardize the very existence of an entity. If the portfolio has been properly managed, with little concentration of exposures, it takes more than one default to generate a large loss. Most often, large losses result from an above-average frequency of defaults that are large in size due to a large exposure, and/or low recovery value.

CAPITAL: ECONOMIC, REGULATORY, SHAREHOLDER

From a credit risk management point of view, capital is equity because only equity, not debt, can absorb losses. To illustrate, if a firm has \$100 million in debt and \$200 million in equity and losses amount to \$250 million, then the losses burn through all of the firm's equity and cause losses to the debt holders. The borrower will default on its debt obligations, and the firm will not continue on a business-as-usual basis. A series of actions will ensue, starting with a bankruptcy filing. If the firm had more equity, say \$300 million, it would survive this event (though having lost \$250 million of the \$300 million) and continue business as usual, to a greater or lesser degree.

More capital is, therefore, better, except for the fact that more capital makes attaining shareholders' expected-return targets more difficult. Thus, getting the capital number right is critical for an organization's survival. Too little capital means an insufficient cushion, and the company faces a quick death. Too much capital results in inadequate shareholder returns, which may cause shareholders to sell their shares, replace management or seek strategic alternatives.

There are several meanings of capital within a risk-bearing organization: economic capital, regulatory capital, and shareholder's capital, which we outline next.

Economic or Risk Capital

Economic capital for the risk-bearing organization exists to serve as a buffer against unexpected losses, and it is not intended to be spent. It is different from working capital or investment capital. It is sometimes called risk capital. The amount of economic capital needs to be significant, and the greater the risk, the more capital is required; this is why credit transactions, which are inherently risky, are known as being capital intensive.

Firms dedicate considerable resources to figuring out the right amount of capital. Major financial institutions employ large teams of specialists to focus on this task. Smaller firms will find numerous vendors and consultants who supply models and perform the required analysis. Either way, economic capital is an internal amount set by management so that the firm can withstand even dire circumstances.

Once the size of the economic capital is determined for a whole portfolio, it is allocated to individual transactions for pricing purposes to ensure that returns compensate for the risks taken, to allocate risk-bearing capacity across the organization, and to measure and reward performance across business units. One common measure of performance is risk-adjusted return on capital known as RAROC. It is calculated as the return or margin divided by economic capital.

After describing regulatory and shareholder capital, the balance of this chapter is devoted to the measurement of economic capital using the CVaR technique.

Regulatory Capital

Regulators impose minimum capital requirements on financial institutions, which we will explore further in Chapter 11. The regulators' mission is to protect the public's deposits, other funds, and the financial system in general, and they set capital requirements based on their views of the risks inherent in the company's undertakings. They have a low tolerance for risk, so they generally set high capital requirements so that their regulated entities stay solvent, even in extreme circumstances. Although the regulator's view of risk may be loosely aligned with a firm's view, the regulator will not give full credit for the quality of a firm's risk underwriting or for the finesse in which it constructs a well-diversified portfolio. By necessity, regulators will rely more heavily on a formulaic approach that will miss many details on exposure, the chance for loss, mitigating factors, and portfolio effects, all of which affect the firm's risk profile.

Notably, banks have historically considered regulatory capital requirements to be onerous; their own economic capital calculations were usually significantly less than regulatory capital. Clearly, both banks and regulators were optimistic in their capital calculations! With the 2007 crisis, the largest financial institutions were forced to accept emergency capital injections, and other banks failed in record numbers.

Banks are still reluctant to measure the profitability of their business based on regulatory capital; they prefer economic capital, even if they obviously cannot ignore what the regulator imposes on them. What is important to remember is that, even in an environment in which regulators strive to impose higher capital requirement, banks are not prepared to abandon the efforts to measure, at least internally, their performance based on economic capital. In the foreseeable future, economic capital will remain the yardstick that will drive business decisions and reward performing units.

Shareholder Capital

Shareholder capital is the book value of equity. It is the value that is visible to the outside world, whereas economic capital is a management number. Regulatory capital may be knowable, but it may not be widely disseminated.

Shareholder capital is also used for signaling. Even if a firm measures performance and makes strategic resource decisions based on economic capital, it may wish to hold actual shareholder capital in excess of this amount. One important signaling constituent in the outside world is the rating agency, and a major driver of a firm's credit rating is actual equity held relative to its risk exposure. Even if a firm perfectly estimated its economic capital to equal \$5 billion, it may choose to hold \$7 billion in shareholder equity just to remove all doubt to the outside world, especially the rating agencies, about its own creditworthiness.

Shareholder capital can be larger than regulatory capital but not smaller, at least not for a long period of time. If it were lower, the company would be out of compliance, and regulators could force the company to take action, including handing over control. Thus, financial firms will hold capital in excess of the regulatory minimum. Shareholder capital can be larger or smaller than economic capital. If it is well in excess, managers will return some equity to shareholders. If it is smaller, managers are doing a poor job of running their business.

To recap, credit is a capital-intensive activity because large losses can hit any portfolio. To prevent insolvency and to keep the business in good standing, firms engaged in credit activities must hold a large amount of capital. Apart from making sure that the firm can survive high losses, the economic capital number is used to:

- Provide an ordinal ranking of the riskiness of products and business units.
- Measure risk-adjusted return on capital, since the capital reflects risk.
- Allocate capital to the most profitable areas.
- Reward units that generate large returns relative to their capital utilization.

DEFINING LOSSES: DEFAULT VERSUS MARK TO MARKET

Before we proceed, let us take one step back and explain something that we have

voluntarily ignored so far in this book. We have defined credit risk as default risk. We focused on the possibility of losing money as a result of bankruptcy of a counterparty in order to introduce major concepts of credit risk management in an intuitive way.

There are actually two distinct views of credit losses: The default view, which we have adopted so far, and the mark-to-market (MTM) view. Both views of losses share the same objectives of assessing the performance of a credit exposure and of calculating the amount of capital at risk, they but take different paths to get there, based on how losses are defined.

Certainly, some firms consider losses only as those arising from default. Even when a counterparty gets downgraded, if the firm believes that the counterparty will repay, its view of the exposure doesn't change much—no losses are expected, and, thus, it is “money good.” Such firms take what is known as a default view to compute economic capital. The vast majority of industrial companies with a portfolio composed of trade receivables, or loans or leases to clients (vendor financing), use this approach. In part, this view arises from the lack of a liquid market for these exposures. If there's no real market for the exposures, if the firm intends to hold onto the exposures it creates, and if the obligors make good on their payments, then there are no losses unless there's a default.

The alternative view is what is known as an MTM approach, which we introduced in Chapter 5. Large financial institutions measure their performance not based exclusively on the number of defaults in their portfolio but, rather, by the economic value of the exposures they hold. They experience losses (gains) if the market price of their credit exposures falls (rises). The market price could fall based on a default, but it also could fall based on a myriad of other events including subtle changes in the market's perception of the creditworthiness of a particular counterparty or of borrowers in the aggregate. The market price could also change, based on what's known as technical factors, meaning changes in the supply and demand for the credit exposure thought to be independent of changes in the credit fundamentals. The most obvious event that causes a change in market price is a downgrade by a rating agency, which would impact the MTM value of all exposures associated with this counterparty. Note that changes in ratings—both downgrades and upgrades—happen far more frequently than default.

To illustrate, assume a firm charged 50 basis points per annum to take a credit risk on Company ABC when it was rated AA/Aa2 AA (*by Standard & Poor's*,

Moody's, and Fitch, respectively). If ABC is downgraded to A+A1/A+, the risk premium demanded by investors would increase from, for example, 50 bps to 80 bps p.a. The higher yield on the credit risk translates to a lower price of the asset, and thus the firm would lose money on an MTM basis. Note that the paper (MTM) loss would become a real loss if the firm decides to exit the position, and yet no default has occurred.

The advantage of a market risk approach is that, in concept, it is based on the market's view, which compiles all available information about an asset, including the creditworthiness of the obligor, and summarizes the information into a price. The disadvantages with using market prices (that is, spreads) to measure credit risk are twofold. First, we cannot readily observe market prices of credit obligations for most obligors, since those credit exposures are not publicly traded. Second, changes in spreads encompass technical factors; market vagaries; and the macroeconomy, including what is happening on the other side of the world. Arguably, if a sovereign nation were to default, this could cause a credit crunch worldwide, which might impact all borrowers and cause spreads of industrial corporates in the United States to rise. However, often when spreads increase, we may be uncertain whether this reflects an increased likelihood of default or a factor unrelated to creditworthiness.

For purposes of explaining the calculation of economic capital (with the CVaR method) in the simplest and most intuitive way, we will stick to the default view of credit risk while giving readers only a flavor for the MTM approach.

Accounting and the CVaR Calculation

We will now say a few words about accounting. Readers unfamiliar with the various accounting treatments of credit assets may wish to read Chapter 12 first, in which we review some relevant accounting aspects of credit risk, or they may skip ahead to the next section.

The language used in both U.S. Generally Accepted Accounting Principles (GAAP) and International Financial Reporting Standards (IFRS) as it relates to recognizing and valuing credit exposures is not dissimilar from the language used in determining economic capital, so it bears clarification up front.

Companies account for their credit assets in various ways, based on a variety of factors, including the type of credit exposure (loan, bond, credit card receivable), the companies' intentions about whether they will hold the exposure until maturity or sell it beforehand, and the extent to which a decline in the exposure's value is attributable to creditworthiness, and if this decline is expected to result in default.

The default risk approach to credit risk appears on the surface to be consistent with a buy-and-hold accounting treatment, and the MTM approach seems consistent with the available-for-sale accounting treatment for a bond. Thus, the two views of credit risk could easily be confused with the accounting treatments. What we'd like to underscore is that the choice of methods (default or MTM) to calculate CVaR is not necessarily dependent on the accounting treatment of the asset.

CREDIT VALUE AT RISK OR CVaR

Credit value at risk is the methodology firms use to size the amount of economic capital needed to support credit activities. It allows the firm to define the amount of losses it is prepared to withstand. Credit value at risk, a dollar loss number, is a special case of VaR whose concept was introduced in Chapter 5. Implementation of VaR can be fairly complex. In this chapter we will restrict our discussion to a high-level presentation of CVaR.

If the question is asked, "How much can my organization lose from credit exposures?" the logical reply must be, "Everything!" However, this is neither helpful nor realistic. First, not every entity will default even in extreme loss situations. Second, if an organization had to set aside an amount of capital

representing a large proportion of its potential exposure (GE) it could not survive since this business would be completely unprofitable. Instead, CVaR looks at the question in a three-step actuarial framework:

- 1.** Over what time horizon are we concerned about losses?
- 2.** What is the probability of losses of a certain size occurring?
- 3.** How confident do we want to be in our ability to withstand losses of some predetermined level?

The Time Horizon

To evaluate how bad losses can be, we need more time specificity for two reasons.

First, in most circumstances, the longer the time period, the larger the loss. For example, it is unlikely that losses in a given day will exceed losses in a year because volatility in credit quality increases over time. In [Table 10.1](#) we present a one-year credit transition matrix from Fitch for corporate credits on a global basis from 1990 to 2011. What can be seen is that there is an overwhelming chance that the rating, within one year, remains the same, especially for highly rated entities. The table reads that an AA rated entity has a 90.24 percent chance to remain rated AA and only a 0.04 percent chance of defaulting one year later.

Table 10.1 Fitch Global Corporate Finance Average One-Year Transition Rates: 1990–2011

	AAA	AA	A	BBB	BB	B	CCC to C	D
AAA	94.50	5.50	0.00	0.00	0.00	0.00	0.00	0.00
AA	0.09	90.24	9.28	0.31	0.02	0.02	0.00	0.04
A	0.02	1.99	91.79	5.45	0.52	0.08	0.07	0.09
BBB	0.00	0.20	3.62	91.49	3.62	0.60	0.24	0.25
BB	0.02	0.05	0.10	8.49	81.35	7.04	1.66	1.30
B	0.00	0.00	0.24	0.45	9.50	83.19	4.28	2.35
CCC to C	0.00	0.00	0.00	0.20	2.40	18.76	50.90	27.74

Source: Fitch (Fitch Ratings Global Corporate Finance 2011 Transition and Default Study 6, March 16, 2012).

In [Table 10.2](#), we show the same matrix capturing rating transitions over three years, that is, a cumulative three-year credit transition matrix. The three-year matrix shows much more movement across ratings classes. For example, the same AA has only a 74.99 percent chance of remaining an AA, and, now, a larger chance of defaulting after three years. Thus, since time is a driver of credit variability—that is, credit risk—CVaRs for longer time horizons will be larger, all else being equal.

Table 10.2 Fitch Global Corporate Finance Average Three-Year Transition Rates: 1990–2011, Three-Year Average

	AAA	AA	A	BBB	BB	B	CCC to C	D
AAA	84.01	15.02	0.97	0.00	0.00	0.00	0.00	0.00
AA	0.20	74.99	22.68	1.84	0.15	0.04	0.00	0.09
A	0.02	5.20	79.08	12.93	1.71	0.43	0.09	0.53
BBB	0.03	0.59	9.11	78.58	7.27	2.10	0.66	1.65
BB	0.00	0.20	0.99	21.95	54.73	13.08	2.63	6.42
B	0.00	0.00	0.58	2.33	21.01	62.06	3.86	10.16
CCC to C	0.00	0.00	0.00	0.79	6.60	32.19	14.78	45.65

Source: Fitch (Fitch Ratings Global Corporate Finance 2011 Transition and Default Study 6, March 16, 2012).

Firms will measure CVaR over multiple time horizons depending on the type of credit portfolio being monitored. For a loan portfolio, firms may calculate and monitor a one-year CVaR because default likelihoods may not be assessable over a shorter period; for a credit card portfolio, firms may calculate and monitor a one-month CVaR, since delinquencies and default likelihoods may be easier to assess in this time period.

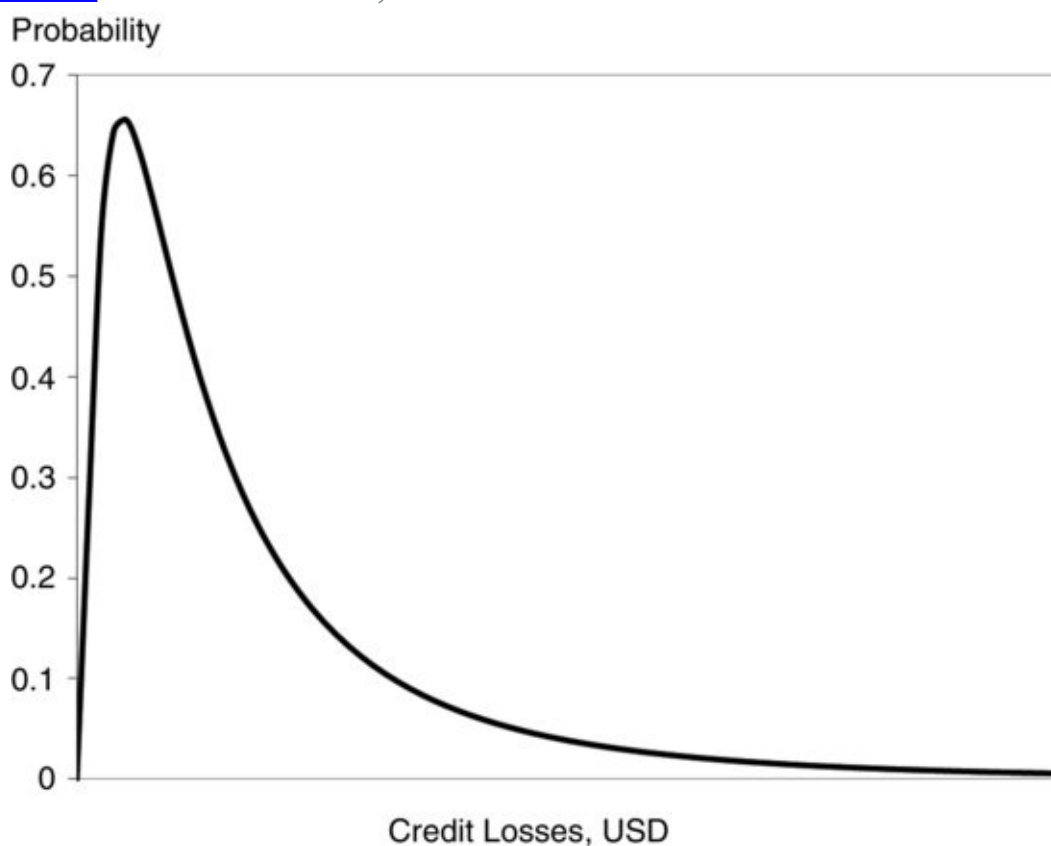
Second, the time horizon chosen to measure losses matters because it will be a function of how quickly the firm is able to react to losses. Thus, it is a choice variable. If exposures can be unwound or mitigated quickly, then the loss horizon chosen is likely to be short to reflect this. If exposures are illiquid or difficult to hedge, then the horizon period is likely to be longer. Understanding the time frame helps in contingency planning. If capital needs to be raised or positions unwound, management needs to know how quickly it must act to stem losses.

The Loss Distribution

The second step is to calculate the probability of losses matters because it of a certain size occurring. In the section that follows, we will describe how to construct the loss distribution for the portfolio, but before doing so, we explore the properties of these distributions once constructed.

The loss distribution of a credit portfolio describes the relative frequency, or probability, associated with all possible loss levels that a portfolio could experience within a given time horizon. [Figure 10.1](#) depicts a typical shape of a loss distribution for credit portfolios. The x -axis measures losses and the y -axis the relative frequencies of the losses.

Figure 10.1 Loss Distribution, Default View



In [Figure 10.1](#), we see that its shape is not symmetric. Rather, there is a high probability of experiencing small losses and a low probability of having large losses. This gives rise to the asymmetric, or skewed, shape and the “fat tail,” with the curve extending out to the left where these improbable but large losses are represented.

As explained, this picture corresponds to the default view of credit losses, meaning the portfolio of exposures is considered to have the extremes of either no defaults, at the leftmost point with zero losses, or some very large losses on the far right side, or other losses within the portfolio of varying amounts between the two points. It can be expected that the amount of losses will be small because the default probability of a company is, in normal economic circumstances, fairly low, especially for investment-grade entities. Any single firm is unlikely to default or even be downgraded in a limited period. Returning to [Table 10.1](#), one can read that the default probability of a BBB rated entity is only 0.25 percent for one year. This explains that the risk of losing money is small to start with if a portfolio is composed of a diversified collection of investment-grade credits. However, defaults do happen and losses are experienced, which explains the shape of the curve in [Figure 10.1](#): a high probability of credit losses of small amounts.

In contrast, large losses are rarely experienced but will have a very big impact. One scenario is the default of a large exposure, which may also trigger the default of correlated exposures. This scenario is uncommon because large exposures are closely monitored and are typically reduced when clear signs of deterioration emerge. The other likely scenario is an unforeseen event occurring that triggers a cascade of defaults. Recent examples include the burst of the Internet bubble in the early 2000s, the terrorist attacks in the United States in 2001, or the mortgage crisis starting in 2007. Before these events, many firms had accumulated exposures they thought were reasonable and in line with their normal risk appetite. All of a sudden, one or a series of events occurred and many companies defaulted, some directly correlated, some not.

It is impossible to imagine all types of events that may happen, but major unforeseen events have happened with some regularity. On the loss distribution, this corresponds to the extreme right tail of the curve. It is called the low-frequency–high-severity losses. The curve is very close to the x -axis but not on it. The probability of a large loss is close to zero but not exactly zero. The corresponding losses are, however, extremely high.

Under the default view, there are only two scenarios for each exposure: either it defaults or it doesn't. In contrast, under the MTM view, credit quality can go up as well as down. The movement in credit quality is visible in [Tables 10.1](#) and [10.2](#) and is known as credit migration. As a consequence, a credit portfolio has an entire value distribution showing not just the losses but also the gains. Credit migration forms the basis for most MTM approaches. Thus, instead of

estimating a loss distribution based on the frequency and severity of default, in the MTM case we consider a loss distribution based on the probability of an obligor's rating migration and the corresponding expected market value. It stands to reason that if a BB exposure is riskier and worth less than the A exposure, if an A exposure slips in rating to a BB, its obligation has not defaulted but is now worth less. As a consequence, the credit portfolio's value will change.

The Confidence Level

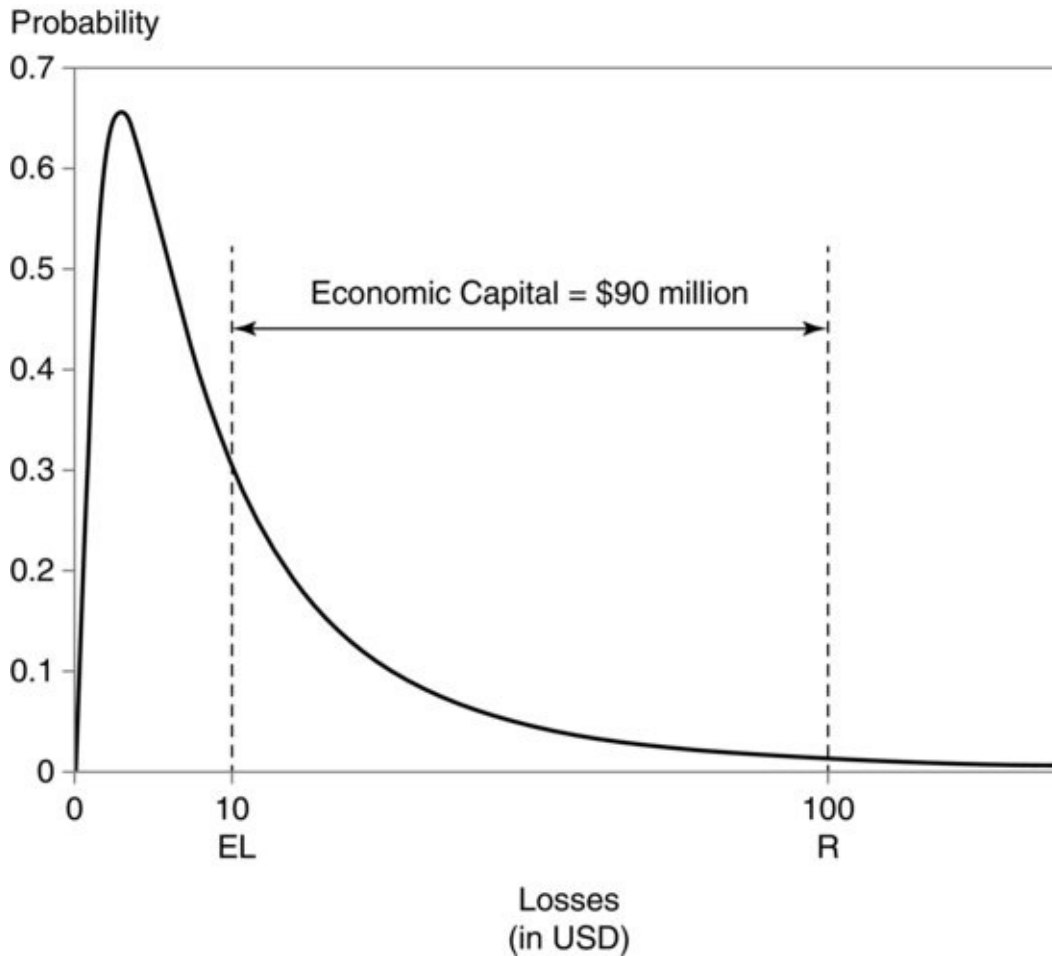
How certain do we want to be that the firm has enough capital to withstand a very large loss? We answer this question with a confidence level. Deciding what level of confidence the firm wishes to have in withstanding losses is the remaining piece of the CVaR three-step framework and ties directly to the firm's risk appetite.

A higher confidence level goes hand-in-hand with a lower risk appetite, and vice versa. It is a choice variable, meaning, the organization must decide if it wishes to withstand losses that are as infrequent as to occur only 5 percent of the time (a 95 percent confidence level), 1 percent of the time (a 99 percent confidence level), 0.1 percent of the time, (a 99.9 percent confidence level), or less than that.

There are various considerations in setting the confidence interval. Often, it is set to align with an actual or target rating. Suppose an institution wishes to maintain its BBB/Baa/BBB rating. If rating agencies' historical data show that a BBB/Baa/BBB rated entity has a one-year 0.25 percent default probability, the company may set its confidence interval at 99.75 percent. Note that the rating agencies will both review firms' internal risk quantification processes including VaR calculations, and will employ their own similar capital models.

In [Figure 10.2](#), we duplicate [Figure 10.1](#), with some points added. The area under the curve sums to one (100 percent). The expected loss (EL) of the portfolio is defined as the probability-weighted average loss and is denoted EL in the figure. The confidence interval, a choice variable, corresponds to a loss amount beyond which the company is not prepared to withstand. Suppose the firm chooses a confidence interval consistent with point R. At point R, the area under the curve is 99.9 percent, with only 0.1 percent to the right. If this point corresponds to losses of \$100 million, then the firm will hold capital to withstand losses up to this point.

[Figure 10.2](#) Loss Distribution, Default View, with Selected Points



In this example, the CVaR is \$90 million, which is equal to the loss amount of the \$100 million corresponding to the 99.9 percent confidence level, less the expected loss, EL, which is \$10 million, that the firm has already collected in its pricing. The CVaR is the economic capital.

In the example that we have been using, we looked at the one-year default probabilities as the basis for the loss distributions. Sometimes the confidence interval is expressed as a return period, which means that the loss value corresponding to a 99 percent confidence interval, for example, can be interpreted as the 1-in-100-year loss event, and a 99.9 percent confidence interval can be interpreted as a 1-in-1,000-year loss event.

In practice, firms with a large credit portfolios set their confidence intervals to be quite high and will calculate CVaR with a 99.5 percent or 99.9 percent confidence interval, suggesting that, for reasons easy to understand, they almost never want to face losses that can completely deplete their capital dedicated to credit.

Tail CVaR

Given that our estimate of a loss distribution is unlikely to perfectly reflect the true underlying loss distribution of a portfolio, the difference in losses between say 99.5 percent and 99.9 percent is somewhat of an arbitrary distinction. Thus, another supplemental metric used to capture extreme occurrences in the tail of the loss distribution is what's known as tail-VaR, or TVaR, and it is calculated as the average of the amount of losses that may occur in excess of some already extreme level, such as beyond the 0.5 percent (99.5 percent) level. This just enables us to summarize what the average loss is likely to be if, indeed, the losses experienced are in excess of the 0.5 percent level. The value will be higher than economic capital and is sometimes referred to as shortfall.

Caveats

What we just described is a basic CVaR framework. Implementation difficulties arise from various sources, including uncertainty and information gaps in: (1) any one exposure's probability of loss, (2) the correlation across exposures, and (3) recovery rates. However, even if [Figure 10.2](#) perfectly described the probabilities associated with all loss values, we still face uncertainty because actual losses could happen anywhere along the distribution. They are most likely to fall around point EL, but there's always the chance that they will fall at other points and we don't know beforehand where the losses will end up. A key point of any VaR approach is that it serves as a statistical guidepost only. Even if a firm is conservative and sets a high confidence level, the risk that it experiences losses in excess of this amount is not zero. In addition, credit risk is not a risk that can be perfectly quantified nor can it be completely eliminated. As we viewed in Chapter 5, like other VaR measures, CVaR does not represent the worst-case scenario, and no model can fully anticipate all outcomes.

In this section, we explained how to interpret the loss distribution. We now turn to reviewing what is needed to generate the distribution. This exercise helps to understand how portfolio management can influence the shape of the distribution, thereby reducing capital requirements.

CREATING THE LOSS DISTRIBUTION

If a firm had access to a long and robust time series of loss data from portfolios that look similar to the portfolio under consideration, there would be no need to create a loss distribution. We could simply observe the loss experience to see how bad losses can actually get. However, few entities have complete data, and even if they did, a portfolio today will look different from any portfolio in the past. How losses develop is a function of the credit quality of the obligor, their industries, the state of the economy, the correlation of the exposures, the seniority of the exposure, as well as many other elements we have discussed throughout the book, none of which is static.

Therefore, we instead use information on the drivers of loss, such as the credit quality of the obligor, recovery rates, and correlation across obligors, and we build or create a loss distribution by considering all these drivers taken together.

There are three main building blocks that we will consider here in creating a loss distribution.

1. The probability of default for a single exposure.
2. Value of the loss upon default, including recovery.
3. Portfolio effects: the joint loss distribution, including correlation, across exposures.

The first two components are used to derive the loss distribution for a single exposure. The third component considers how all exposures interact in the aggregate. We will discuss each of these in turn and will make some simplifying assumptions. First, we ignore time value of money. Second, we treat each exposure as a single payment due at maturity. Third, we treat recovery as a certain amount.

Step 1: Assessing the Probability of Default for a Single Exposure

To arrive at the probability of default for a single exposure, under the default view, we use only the rightmost column of information in [Table 10.1](#), (unlike an MTM approach, which uses information on migration for all intermediate credit quality points). In [Table 10.3](#) we reconstruct [Table 10.1](#) showing only the probability of default. For example, an A rated credit will have a 0.09 percent

chance of default within a year. This step is relatively straightforward and requires having access to data. If the exposures are large corporate credits, then these data are available from rating agencies and from other sources such as Moody's Analytics. If the entity has exposures of counterparties that are not rated by the agencies, then the firm must either develop and use its own internal ratings or, if these are insufficient, it would need to buy the information from a vendor.

Table 10.3 Fitch Global Corporate Finance Average Annual One-Year Default Rates: 1990–2011

Source: Fitch (Fitch Ratings Global Corporate Finance 2011 Transition and Default Study 6, March 16, 2012).

	D
AAA	0.00
AA	0.04
A	0.09
BBB	0.25
BB	1.30
B	2.35
CCC/C	27.74

Step 2: Assessing the Value of the Loss Upon Default, Including Recovery

Here, we need to know the value of the GE and the expected recovery should the counterparty default. If a \$30 million loan has an expected recovery upon default of 30 percent, then the value of the loss given default is \$21 million ($\$30 \times (1 - .3)$). Furthermore, if the probability of default is 0.09 percent the expected loss is \$0.0189 million (which is the loss given default multiplied by the probability of default).

Step 3: Portfolio Effects: The Joint Default Probability

We begin here with an illustration of a portfolio made up of three loans, as shown below in [Table 10.4](#). For each of these loans, we measure exposure as the amount outstanding, or GE.

Table 10.4 Illustrative Portfolio of Three Loans: Loss Given Default

	Exposure	Probability of Default	Recovery Rate	Loss Given Default	Expected Loss
Loan 1, A rated	\$30 mil	0.09%	0.30	\$21 mil	\$0.0189 mil
Loan 2, AA rated	\$20 mil	0.04%	0.40	\$12 mil	\$0.0048 mil
Loan 3, BBB rated	\$10 mil	0.25%	0.20	\$2 mil	\$0.0020 mil
Total Portfolio	\$60 mil	?	0.32	\$35 mil	?

Calculating the expected loss and the loss given default for each individual loan is straightforward enough. We also know the potential range of losses associated with the loss distribution—from zero (no defaults) to \$35 million. However, knowing the probabilities associated with the points between \$0 and \$35 million for the loans combined together in a portfolio requires knowing the joint probability distribution of default. Without this, we cannot calculate the probability of default of the three loans simultaneously or the expected loss of the portfolio as a whole, as indicated by the question marks in [Table 10.4](#). Nor can we calculate the intermediate loss outcomes for the portfolio as a whole.

The joint probability distribution tells us the probability of all possible combinations of default/no default across all the loans in the portfolio. That is, the probabilities associated with loans 1, 2, and 3 all defaulting together, all loans not defaulting, only loans 1 and 2 defaulting, only loans 1 and 3 defaulting, only loans 2 and 3 defaulting, and only one loan defaulting at a time. For each of these eight possible outcomes, there is an associated probability and the sum of all the joint probabilities adds to one. What we really want to know is the relative frequency of the various loss amounts associated with all possible outcomes. That is, we want to know the relationship between portfolio loss amounts and the probability of experiencing those loss amounts—namely, the loss distribution.

There are two real-life challenges with building the loss distribution. First, with more loans in the portfolio, the number of possible combinations rises exponentially. A portfolio of 10 loans has 1,024 joint probabilities (for the two states of default and nondefault and 10 loans, or 2^{10}); a portfolio of 100 loans has 2^{100} joint probabilities. As one can see, the computational requirements become challenging. Thus, just keeping track of all outcomes and the associated losses quickly becomes unwieldy (and in addition, an analytical solution for calculating descriptive statistics such as the variance of the portfolio, becomes intractable). This is true even if all of the loans are uncorrelated with one another.

Second, we know that loans are correlated, and the actual joint default probabilities of the loans are a function of their correlations. If for example,

loans 1 and 2 are independent, the joint probability of default is straightforward, or (0.01×0.02) or 0.0002. However, this is not realistic because default probabilities across loans are not independent. When one loan defaults, the chance of other loans defaulting also rises to some degree. This interdependence, or correlation, must be factored in.

Two companies are correlated if they exhibit the same behavior when faced with similar external events. At the simplest level, think of companies in the same industry that tend to react to the same economic factors. For instance, when the global economy is in recession, industrial investments are reduced. As a result, the construction, building materials, commodities, and heavy machinery sectors are struggling together. Companies deriving a large proportion of their revenues from these industries are all under stress at the same time. Just think of the construction industry in a broad sense in the United States in the aftermath of the 2007 crisis. There were so many homes for sale and so few lenders willing to finance new projects that the number of new constructions declined strongly. As a result, all companies involved in the construction business, from raw materials to builders, lost revenues and their creditworthiness declined.

The profitability of an entire industry or geographic sector can be impacted by a single event, which causes systematic risk, and this risk is reflected in high correlation across exposures, in contrast to risk introduced by the individual credit characteristics of companies, known as idiosyncratic risk.

As a consequence of these two real-life challenges, the actual calculation of the loss distribution for a portfolio is handled by way of a simulation, such as a Monte Carlo technique. In the simulation, the computer, with the probability of default for each exposure and correlations across exposures specified in advance, generates possible outcomes of loans defaulting in various combinations and the losses corresponding to these outcomes. If the computer is given instructions to generate 10,000 possible loss outcomes (trials), the loss outcomes are then ranked from low to high and grouped into bins to form a histogram. Plotting a histogram in the traditional fashion, with the relative frequency of the outcomes on the vertical axis and the loss outcomes on the horizontal axis, gives us the loss distribution. Note that a relative frequency, with enough trials, is in fact a probability.

In Tables 10.5 and 10.6, and [Figure 10.3](#), we show these three components. [Table 10.5](#) shows the simulated outcomes of losses for 10,000 trials generated by a Monte Carlo simulation. [Table 10.6](#) shows the grouping of the loss outcomes into bins, chosen by the user, with a tabulated relative frequency (actual

frequency divided by the 10,000 trials). Note that we could narrow the size of the bins (say from \$300 to \$100 amounts) and increase the number of trials and we'd get a finer and more continuous looking distribution. [Figure 10.3](#) shows the plotting of these two elements—the loss amounts and their associated relative frequency, in a histogram.

Figure 10.3 Histogram of Simulated Loss Outcomes

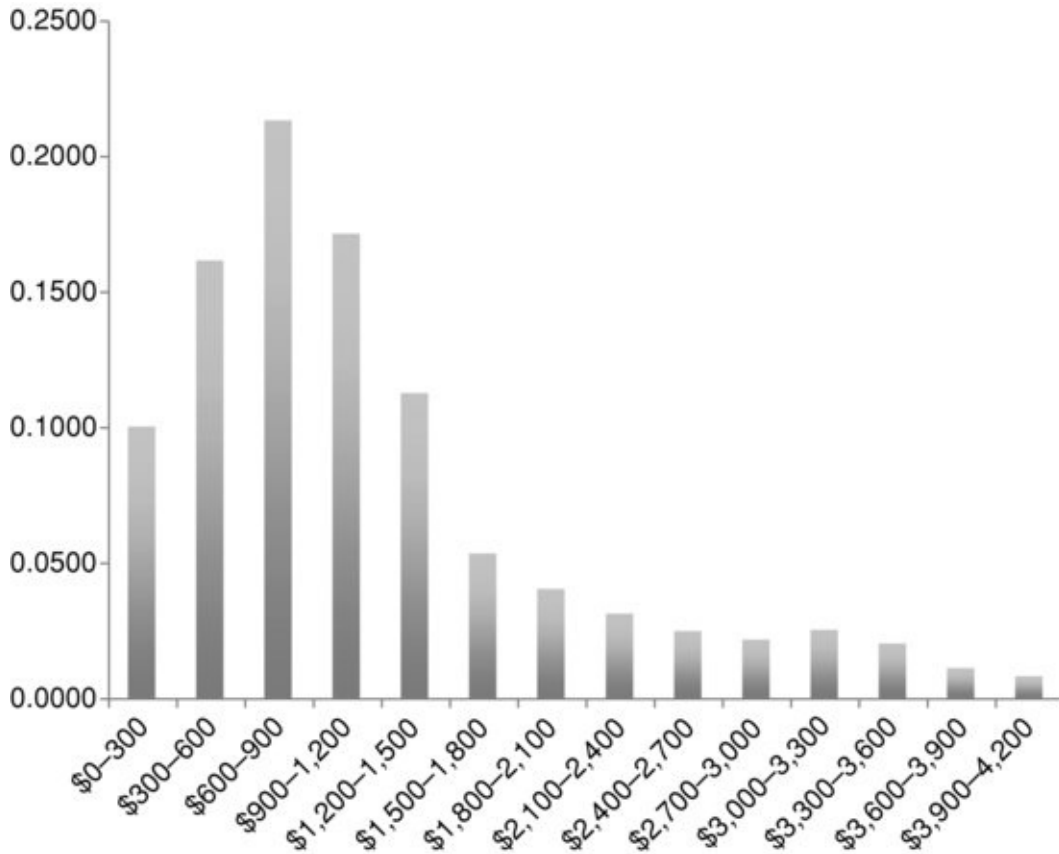


Table 10.5 Simulated Loss Outcomes for 10,000 Trials

Trial #	Losses
1	\$2,145
2	\$2,040
3	\$4,038
4	\$1,105
5	\$789
6	\$2,464
7	\$2,063
8	\$1,666
9,995	\$1,171
9,996	\$1,987

9,997	\$929
9,998	\$991
9,999	\$1,004
10,000	\$2,138

Now we can simply read either from [Table 10.6](#) or the chart in [Figure 10.3](#) to see the CVaR at a chosen level of confidence. We have other useful information at our fingertips as well. For example, no loss exceeds \$4,800, and 99.7 percent of the losses are less than or equal to \$4,500. Losses associated with a 99 percent confidence interval are between \$3,900 and \$4,200. The expected loss is \$1,204, and the median loss is slightly more than \$900. For precise loss amounts associated with a confidence level, we would simply read from the table of trial outcomes. We would sort the trial outcomes from lowest to highest and for the loss amount at, for example, the 99.9 percent confidence level, we'd observe the 9,990th largest loss outcome.

Table 10.6 Simulated Loss Outcomes for 10,000 Trials Sorted into Histogram Bins

Groupings Trial #	Losses	Losses Between	Frequency	Relative Frequency	Cumulative Frequency
1	\$2,145	\$0–300	1,001	0.1001	0.1001
2	\$2,040	\$300–600	1,612	0.1612	0.2613
3	\$4,038	\$600–900	2,129	0.2129	0.4742
4	\$1,105	\$900–1,200	1,711	0.1711	0.6453
5	\$789	\$1,200–1,500	1,123	0.1123	0.7576
6	\$2,464	\$1,500–1,800	533	0.0533	0.8109
7	\$2,063	\$1,800–2,100	402	0.0402	0.8511
8	\$1,666	\$2,100–2,400	311	0.0311	0.8822
		\$2,400–2,700	247	0.0247	0.9069
		\$2,700–3,000	215	0.0215	0.9284
9,995	\$1,171	\$3,000–3,300	251	0.0251	0.9535
9,996	\$1,987	\$3,300–3,600	201	0.0201	0.9736
9,997	\$929	\$3,600–3,900	110	0.0110	0.9846
9,998	\$991	\$3,900–4,200	80	0.0080	0.9926
9,999	\$1,004	\$4,200–4,500	40	0.0040	0.9966
10,000	\$2,138	\$4,500–4,800	34	0.0034	1.0000
		Total	10,000	1.0000	

There are significant benefits to constructing a loss distribution using a simulation technique. Correlations across exposures and default probabilities can be modified. In this way, the calculation can be forward looking, meaning that, for example, if a correlation between two credit types were historically low but is expected to rise in the future, a higher correlation can be inputted into the

simulation model. Similarly, historical default probabilities can be overwritten with estimates of what these probabilities might be in the future, or default probabilities based on current market data (e.g., Moody's Analytics approach) can be utilized. In addition, in a simulation, recoveries can be allowed to vary (that is, themselves treated as random variables), since we know that treating them as static is an oversimplification because recoveries tend to fall as the frequency of defaults rises.

While numerous software packages provide Monte Carlo simulation engines that generate distributions, credit analysis often integrates forecasted paths of financial market and economic variables into the simulation. Because credit analysis is best performed within a current and forecasted economic context, some simulation engines are now paired with an economic scenario generator (ESG). The ESG will generate simulated paths of the joint behavior of market variables. One such ESG is Barrie & Hibbert (part of Moody's Analytics), which takes an MTM approach to credit risk. On an exposure-by-exposure basis within a portfolio, the ESG considers credit transition probabilities, credit spreads, the risk free yield curve, correlations across credit markets globally, correlations with equity market paths, and other variables. With simulated paths for each variable, the ESG will generate a return (or loss) distribution.

Data Requirements

The well-known garbage in, garbage out adage is relevant for credit portfolio management. Having sophisticated models and high-quality people to run them is useless if the data that feeds them are incomplete.

For either the default or MTM approach to measuring credit risk, the management information system should capture all relevant data, such as counterparty, country, industry, rating, exposure, tenor, prepayment options, interest or coupon rate, collateral, and other credit enhancements. If a firm is exposed to the same counterparty across several transactions, each transaction's characteristics must be captured.

As explained earlier, with a default view, for each exposure composing the portfolio, four types of data are necessary: exposure, default probability, expected recovery, and joint default probabilities. These four data requirements are as follows:

- **Exposure:** The exposure is the GE, NE, or AE, as defined in Chapter 4 and according to each firm's choice.
- **Default Probability:** Few firms have enough internal data to extract default probabilities from their own portfolio. It would necessitate a large portfolio and reliable data over a long period of time. As a result, the industry standard is to rely on external vendors who analyze the performance of a large universe of companies over a long period of time. In addition to Standard & Poor's, Moody's and Fitch regularly publish the evolution of their ratings similar to those in Tables 10.1 and 10.2.
- **Expected Recovery:** For each transaction, an assumption of recovery upon default must be made, and each firm may have specialized terms that will affect its own loss, net of recovery. To simplify, firms may adopt a uniform recovery rate for exposures of the same nature—for instance, 40 percent for all senior unsecured transactions.
- **Joint Default Probability:** Next, we turn to correlation and to estimating joint default probabilities, which is not a simple task. There are actually few default observations in the real world (for example, in 2011, there were just eight defaults of companies rated by Fitch.¹ Firms that have enough historical data may use their own values, but in many cases, firms will not have enough internal data and will use estimates provided by vendors.

Because the number of actual cases of joint default occurrences is not very

high, a common methodology is to use other indicators of a company's financial strength as a proxy for likely default or migration. The two main proxies used in the marketplace are the market value of assets and equity prices. The main benefit is that their values change often, reflecting the sentiment of the investors vis-a-vis their future performance. It is, therefore, possible to develop a statistical model capturing the way they evolve, and to use the outcome as a proxy for joint default or joint migration.

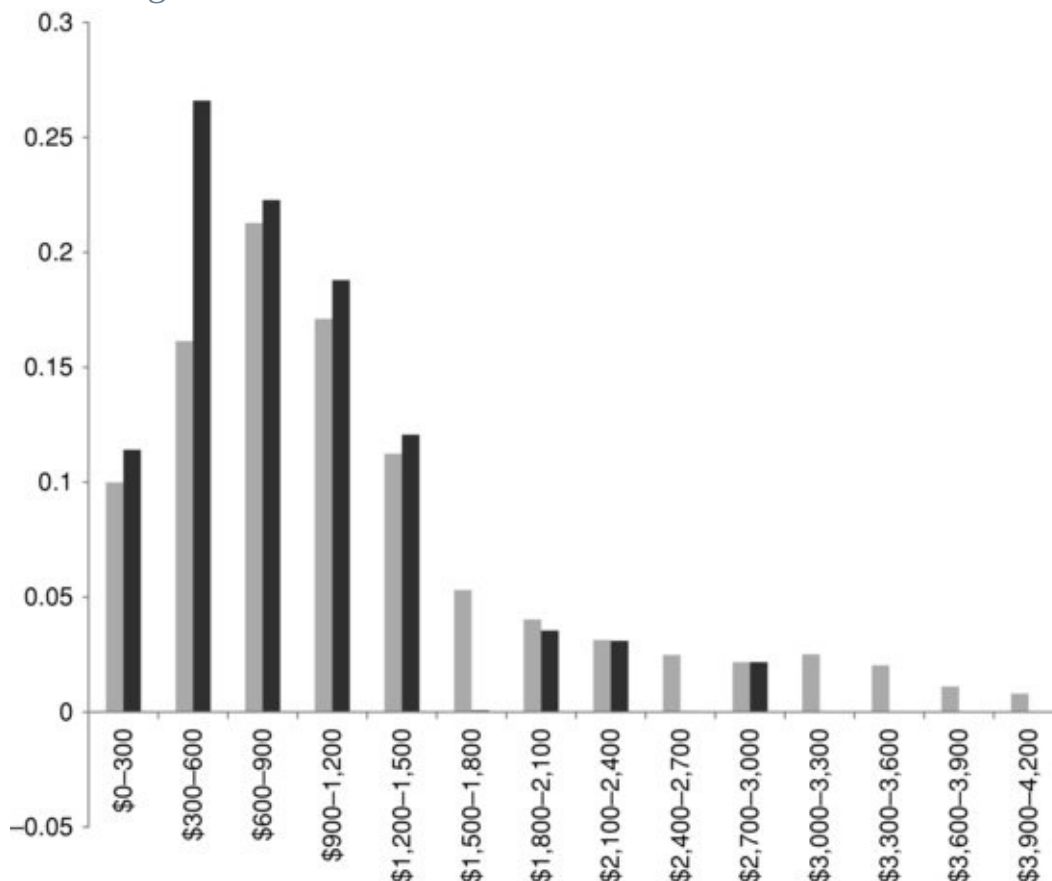
For joint default probabilities, Moody's Analytics Global Correlation Model (GCorr™) provides numbers derived from the market value of assets, calculated with their version of the Merton Model, which we described in Chapter 7.

For the MTM approach, it is necessary to obtain rating migration probabilities as well as correlations. Here again, Standard & Poor's, Moody's, and Fitch are the main sources of data for firms that do not have their own model or data.

ACTIVE PORTFOLIO MANAGEMENT AND CVaR

In the loss distribution of [Figure 10.4](#), the curve approximated by the dark bars has a high and narrow hump indicating that there is a relatively high probability of experiencing a low level of losses. Also, the curve converges toward zero relatively quickly, so the likelihood of a high level of losses is remote. All in all, this loss distribution reflects a healthy portfolio. The curve approximated by the light colored bars is much flatter. The probability of experiencing only small losses is much less than with the portfolio represented by the dark bars. Also, there is a higher chance to experience medium-sized losses. Furthermore, this loss distribution stays well above the x-axis for a while, showing that the probability to be hit by large losses is not insignificant. It has a “fat tail” that reveals undesirable portfolio characteristics.

Figure 10.4 Histogram of Simulated Loss Outcomes Before and After Active Portfolio Management



The portfolio responsible for the light colored bars may have been originated without care or it may have experienced deterioration of counterparties over time. It requires much more capital than the one attached to the distribution represented by the dark bars: The 99.5 percent confidence level associated with the dark bars is closer to \$2,700 vs. \$3,900 under the light bars. Thus, it is a good candidate for an active portfolio rebalancing exercise that aims at moving the light colored bars closer to the dark ones. The result will be that the capital needed to support the portfolio will be much less after than before rebalancing, or alternatively, for a given amount of capital, more business can be generated, thus improving the return on risk-adjusted capital.

Portfolio-management steps that can be taken to tighten the loss distribution include:

- 1. Elimination of weak names.**

This is easier said than done, and it can be hard and costly to execute, but in the end, eliminating weak names may help cut future losses. For example, assuming no recovery and no correlation across obligors, a \$15 million portfolio of 100 BBB obligors and 50 single B obligors with \$100,000 each in notional exposure has, at the 95 percent confidence level, a one-year CVaR of over \$400,000 under the default view using the data from [Table 10.3](#). If the 50 single-B obligors were replaced with BBB credits, the CVaR would be reduced by half to about \$200,000.

- 2. Reduction of peak exposures.**

Peak exposures are counterparties or assets in a portfolio that stand out due their large size relative to the rest of the portfolio. They are sometimes called tall trees. Reducing them will have a material impact on the shape of the loss distribution. For example, assuming no recovery and no correlation across obligors, a portfolio of 10 BBB obligors with \$1,000,000 each in notional exposure at the 95 percent confidence level has over 3 times the CVaR as the same-sized portfolio of 100 BBB obligors with \$100,000 each.

- 3. Diversification.**

Having many correlated counterparties in a portfolio is not favorable. If something that has the power to influence the performance of many companies at the same time occurs, large losses could affect the portfolio. One of the goals of portfolio managers is, therefore, to avoid concentration of correlated exposures. Everything else being equal, a well-diversified portfolio necessitates less capital than one containing a lot of correlated

obligors.

Bringing diversification to a credit portfolio is one of the most powerful tools to reduce capital needs. For example, assuming no recovery, a portfolio of 100 BBB credits each with a 0.5 correlation has a one-year 95 percent CVaR twice that of a portfolio of same-sized credits having a 0.25 correlation.

PRICING

Pricing is a complex topic beyond the scope of credit risk management. We simply reiterate some basic concepts:

- Expected losses have to be priced-in for each and every transaction. As the name indicates, it is known that, on a portfolio basis, companies will default and cause some losses. What is not known is which company will default. Some have a higher chance than others, but even companies with a higher rating can default. The portfolio should, therefore, at least generate enough revenue to compensate for the expected losses.
- Covering expected losses with revenues is not enough, however. A company cannot make money if it merely covers expected losses with margins collected from performing transactions. A profit margin has to be added to the aggregated amount of expected losses to pay for other expenses like general administration and also to provide a profit to the shareholders.
- In targeting profit, return expected by shareholders is taken into account. Capital is provided by shareholders and put at risk by the credit activities of the company. If shareholders expect a 12 percent return, then a company with \$500 million of economic capital must integrate an additional \$60 million of revenue in its pricing strategy to compensate the shareholders.

FINAL WORDS

In his well-known book, *The Black Swan*, Nassim Nicholas Taleb describes the general unpreparedness of most institutions to face highly unexpected events. As he put it, having never seen a black swan does not enable us to conclude they do not exist. In other words, it is not always possible to envisage extreme scenarios but it is not a reason to ignore that they exist. It is a strong message for risk managers, who have to always be on the lookout.

VaR approaches have been criticized for failing, and the crisis of 2007 is a testament to the failure of risk-bearing firms to properly assess their risks. We reiterate that VaR is a tool, only one of many in the risk manager's toolbox, and it serves as a guidepost alongside stress tests and other considerations to help size capital requirements. It will be only as effective as the quality of the data and the robustness of the analysis permit, and importantly, knowing its limitations in capturing extreme, unforeseen events.

VaR also has been criticized for assuming normal probability distributions. Losses and credit returns as presented throughout this chapter are far from being normally distributed. VaR is also criticized for having a backward-looking approach. Although credit ratings, which are historical, are widely used, this is only one contributor to the loss-probability distribution. Portfolio composition can reflect a forward-looking business plan, and defaults and correlations can be derived from forward-looking market prices and linked to economic forecasts, to name a few.

To summarize, CVaR—and VaR, more generally—is a statistical guidepost for evaluating how much capital a firm needs to hold to be viable. Many factors influence the ultimate size of credit losses, and these factors are largely under the control of the firm in its portfolio construction—the quality of the obligor, the seniority of the obligation, the correlation across obligors and the size of the exposures. Because these elements are under the control of the firm, the probability distribution for either losses or returns that results is a product of a portfolio construction process versus something that a firm is passively subjected to. Thus, in addition to providing a guidepost, CVaR is an important tool in the portfolio-management process.

One final comment is that some institutions, such as pension funds and bond mutual funds, which are exposed to an enormous amount of credit risk, may not

interpret the CVaR as indicative of a capital need since they do not manage their funds using a return on capital framework. In this case, CVaR is simply a way for these institutions to size the amount of potential losses and to manage their portfolios accordingly.²

¹ Source: Fitch 2011 Default and Transition Study.

² We encourage readers to read J.P. Morgan & Co. Inc.'s paper from 1997, “Credit Metrics™—Technical Document.” The CreditMetrics paper is a comprehensive treatment of CVaR from an MTM perspective. Although there are alternative ways to calculate CVaR using an MTM market-based approach, and although Credit Metrics was not the first of its kind, it is the seminal paper on the topic and is widely used in the financial industry.

CHAPTER 11

Regulation

We have explained how financial institutions calculate the economic capital they need to support their credit operations and described their primary goals as meeting self-imposed solvency requirements and also measuring and optimizing the profitability of their business. In this chapter, we survey how regulation affects credit risk management practices and in particular what regulators require of financial institutions as minimal amounts of capital. This is known as regulatory capital, and its size is influenced by a number of parameters, including the content of the credit portfolio.

Governments and their agencies around the world regulate financial institutions to ensure the safety and soundness of the financial system, which protects consumers, businesses, and economies overall. In particular, regulators provide considerable oversight to those firms that take funds from individuals with the promise to repay or make these funds available on demand or at a later time. This includes depository financial institutions (such as commercial banks, credit unions, and thrifts), insurance companies, and securities brokers, among others. The mission of financial regulation ranges from keeping financial systems safe and sound by instilling confidence in the financial system and ensuring solvency of financial institutions, to leveling the playing field for investors, to preventing fraud, and to promoting ethical market practices. Regulations for banks, insurers, and other financial institutions around the world are currently undergoing a transformational overhaul. Although much of the activity took root before the 2007 crisis, the crisis gave regulators resolution authority to step up their oversight, tighten rules, close loopholes, and expand their scope to work cooperatively towards bringing more entities under regulatory supervision. Much of their focus, particularly the regulatory arms of central banks, is on large, complex and systemically important financial institutions since the unraveling of just one of these could make global financial markets collapse.

Globally, the Bank for International Settlements is implementing Basel III rulemakings for central banks, which, in turn, must implement these rules across banks in their home countries. The Financial Stability Board, a multinational body, is tasked with standard setting, monitoring, advising, and coordinating

across regulators globally. The G-20, a consortium of 19 large global economies plus the EU, although not a regulator itself, is attempting to globally harmonize regulation of derivatives since this industry has perhaps the least amount of supervision. Each of these international organizations is coordinating with one another, other international organizations, and with regulators in member countries.

In Europe, insurers and pension plans are engulfed with Solvency II, which is the EU's rulemaking directive for these institutions. In the United States, the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 affects not only the rules, oversight, and supervision of all financial institutions, but also reforms the regulation of credit rating agencies and goes so far as to implement changes to corporate governance and executive compensation practices.

In this chapter, we will explore various facets of regulation. First, we cover why regulation matters for the credit risk manager of a company doing business with a regulated entity. Next, we explore why regulation matters for the credit risk manager of a company doing business as a regulated entity. Finally, we discuss how regulation matters, with a survey of the key regulators and the major directives affecting the financial industries in the United States, Europe, Canada, and Asia Pacific, where much of the industry's activity occurs.

DOING BUSINESS WITH A REGULATED ENTITY

Doing business with a regulated entity, whether it's a utility company, pharmaceutical, food-processing company, or bank means that the credit profile of that entity will be materially affected by the regulation. The credit profile can benefit from regulation, or alternatively, create pitfalls for the creditor, as we explore next.

Benefits from Regulation

Alignment of Interests

In addition to their other, closely related missions, regulators act on behalf of the customers of financial institutions who, as depositors, policyholders, and customers, having prepaid for services, are often, in fact, creditors to these

institutions. The regulator, working on behalf of the customer, provides an ancillary benefit to all creditors, such as bondholders, by keeping the regulated entity on sound footing, and to monitor, and potentially limit, its risk taking. Thus, there is an alignment of the creditors' interests with the objective of the regulator, with the creditor getting a benefit from the regulator's oversight and enforcement activity.

Solvency

In some instances, regulation makes companies stronger financially, and this is true for financial institutions. In particular, the regulators have strict requirements on the level of capital that these institutions need to hold. This is true not just in the aggregate, but also on a business line or even a transaction-level basis. For example, each time that a life insurer wishes to shift invested assets out of government bonds and into riskier assets such as equities, the regulatory rules are there to require an increase in regulatory capital to reflect the heightened risk from the reallocation. Because capital is expensive, the capital rules provide an effective constraint on the level of risk taking.

Oversight and Governance

Regulation provides an additional layer of governance, and this is good for the creditor because the governance is being conducted by an entity whose mission aligns with the creditor's objectives, under normal circumstances. The regulatory oversight thus raises the burden of proof for management to engage in M&A activity, make expensive and/or unnecessary capital expenditures, or take on too much debt, which ultimately protects the creditor.

A large part of the oversight is disclosure. Regulators require companies to disclose information about their operations, including detailed financial information. Although not all information disclosed becomes available to the public, the disclosure helps to correct a natural information asymmetry between a creditor and obligor. The obligor would rather disclose less information, and the credit analyst would like access to more information. Thus the regulator provides a public good through its information gathering and dissemination. Often accompanying the information disclosure and the increased transparency is a system of early warning signs that trigger various enforcement actions, again, to keep the entity on sound footing.

Systemic Risk and Contagion

Finally, to the extent that the regulated entity is a financial institution, the curtailment of risk appetite by the regulator coupled with the information disclosure requirements, creates a public good and should benefit all creditors insofar as the potential for systemic risk (contagion) is lower in a regulated environment. Although this benefit may not be tangible to any one particular creditor, it does help to make credit markets operate more effectively. The ability to lower systemic risk is a primary objective of the G-20 and Dodd-Frank.

Pitfalls from Regulation

Not All Creditors Are Treated Equally by the Regulator

We noted earlier that the regulator's and creditor's interests are aligned, with the solvency of the entity important to both, and that creditors get to free ride on the regulated entity's oversight. Although this is often true, it is not in all instances because, from the regulator's point of view, not all creditors are equal. The regulator's constituency is usually the retail customer, not an investor or business counterparty. Thus, when a regulator gets involved with an entity's operations, it is likely to give preferential treatment to customers. We caution that this is a general statement, and there are instances in which the regulator subordinates the claims of the customers to other business counterparties or to other creditors. However, these cases are usually the exception, not the rule.

Seizure and Lack of Orderly Disposition

Regulators can intervene with a regulated entity's business operations to varying degrees. There is usually a schedule of events that trigger an intervention, such as a breach of minimum capital. The most extreme form of intervention is conservatorship (receivership), in which a regulator takes over the entity and either manages its rehabilitation or, if not viable, its liquidation. In these instances, the regulator will interfere with the transfer of proceeds, and an orderly disposition of the assets by a bankruptcy judge may not occur. When regulators step in and seize the entity's assets, all contractual rights of the creditors may be subordinated to other stakeholders, and creditors' claims will fall in value and even become worthless. This can happen with or without *force majeure* clauses in the contracts (*force majeure* clauses are used by obligors to

expunge their liability in the event of governmental or regulatory intervention, or for acts-of-God events).

For this reason, creditors must evaluate the pros and cons of lending to a regulated subsidiary instead of a parent company. The subsidiary produces the cash flows and likely has a higher rating, but it is regulated. The parent has the benefit of not being regulated, but also has no operations, is dependent on upstream dividends, and may have a lower credit rating,

Note that doing business with an unregulated entity can still have exposure to this risk of governmental seizure. Take the case of General Motors' (GM) creditors in 2008. GM, a largely unregulated entity, was insolvent and could have entered bankruptcy to move forward with an orderly and dispassionate disposition of assets. Instead, the U.S. federal government by fiat, took control of GM, put over \$30 billion of financing into the company, and gave the bondholders shares of a newly organized company worth only a small fraction of their investment, subordinating their interests to the United Auto Workers (UAW) union. The concurrent seizure of Chrysler had an outcome for its creditors that was not dissimilar. For instances in which the government deems a company too big or too important to fail, as that company approaches insolvency, there is political risk that jeopardizes the creditor's rights.

In the case of regulated entities, this political risk is just a form of regulatory risk that can cause credit losses, and it is a fact of life of doing business with them. The regulator can and does step in and take control over the company's assets, which could render the creditor's claims meaningless.

Moral Hazard

Moral hazard manifests itself in various ways. First, regulated entities, knowing that there is a guarantee fund or insurance in place (such as FDIC, SIPC, or PBGC in the United States) to protect their customers should the risks that they take result in losses, have an incentive to take on more risk. Most managers would never knowingly assume more risk on account of insurance or a guarantee fund being in place, yet many behavioral finance studies find that risk taking is seldom a product of a deliberate decision-making process. A notable exception occurred in 2003, when, as both housing prices and subprime lending were escalating, U.S. Representative Barney Frank now infamously commented on Freddie Mac and Fannie Mae, "I do think I do not want the same kind of focus on safety and soundness that we have in OCC and OTS. I want to roll the dice a

little bit more in this situation towards subsidized housing.”¹ It is not difficult to infer that allowing the agencies to roll the dice was a decision made more palatable knowing Congress was standing by with a bailout should it be needed.

Second, the creditor can rely too heavily on the regulator's work and not perform enough of its own due diligence. Again, we go back to the 2007 crisis, when, as data suggested, the housing bubble was ready to burst, some analysts, investors, and observers naively figured that all was well since these entities were overseen by regulators with access to their operations, management, and data, and were in a position to stop irresponsible lending and investment activities, should they occur. The regulator's oversight may not be granular enough, nor adaptable to the innovations that the regulated companies experience, positioning the regulator one or two steps behind the supervised company.

Finally, owing to a safety net, customers may be more willing to do business with a regulated entity, which allows the entity to grow faster. In most financial institutions, fast growth is synonymous with unwitting and excessive risk taking, with unfavorable outcomes. Although regulators recognize the danger that fast growth poses, their presence may be somewhat of an enabler.

Gamesmanship

Regulation imposes many operational constraints that impede an entity's operations, financing, and strategic and organizational decisions. Thus, many of the decisions made by management will be affected by the regulatory presence. As a consequence, management will seek to organize itself to give it the most discretion as possible. For lack of a better term, we call this gamesmanship, and it can take various forms.

Organizational Arbitrage

First is organizational arbitrage, in which management (and shareholder) place key personnel, financing, strategy, and even some operations outside of regulatory supervision. For example, nonregulated parent companies will issue shares, which keeps the equity financing out of the regulatory domain. A nonregulated management company may sit alongside the regulated entity and, via service contracts, extract excess cash from the regulated company, which can then be sent upstream to the parent company. In other cases, SPVs will be formed to assume risks, issue securities, and manage cash outside of regulatory

supervision. These activities allow the organizations more flexibility in running their businesses.

Although the regulator may be overseeing how its constituents are treated, the company's business will be increasingly managed outside of this oversight.

Regulatory Arbitrage

Second, there is regulatory arbitrage in which an entity bases its decisions for operations, financing, or strategy based on where it will get the most favorable regulatory treatment. It will have set up various legal entities and will pick and choose which to engage based on the most beneficial regulatory treatment. A popular misconception is that insurers and SPVs used offshore havens such as Bermuda and the Cayman Islands for the tax-purposes benefits. As important, and perhaps even more so, is a regulatory climate that is more favorable than that in the United States or Europe.

Ratings Arbitrage

Another common form of gamesmanship is ratings arbitrage. For many financial institutions, regulators use ratings to assess the credit risk of assets held and to set regulatory capital requirements. A company may decide to take a credit risk exposure to gain a favorable regulatory treatment. One excellent example of this was the investment in collateralized debt obligations (CDOs), which were structured in order to secure AAA ratings for the buyers. Financial institutions liked these instruments because they minimized regulatory capital requirements. As we now know, the fundamentals of these securities did not perform as intended. During the financial meltdown, institutions that purchased these instruments suffered and their creditors were affected as a consequence.

Uneconomic Decision Making

More generally, the gamesmanship can take the form of simple uneconomic decision making in which regulated companies may enter into transactions that are favorable from a regulatory capital standpoint—that is, they use less regulatory capital, yet may have lower risk-adjusted returns or use more economic capital. For example, an insurance company may choose to transfer risk to a U.S. licensed reinsurer whose credit profile is not that strong in lieu of transferring the risk to a financially stronger offshore company because of the incremental cost associated with using an offshore reinsurer that the regulator

imposes, such as requiring a letter of credit. Or, in the case of regulatory arbitrage as described earlier, the decision to engage a particular legal entity may be uneconomical, but is preferable for the regulatory advantages.

DOING BUSINESS AS A REGULATED ENTITY

In this section, we summarize why regulation matters for the regulated financial entity. We will not cover the regulatory aspects of nonfinancial firms, such as utility companies, since there is little overlap with this form of regulation and the credit risk management function.

The day-to-day business activities of a regulated entity will be influenced by regulatory rules. This includes its customer-facing activities such as marketing, communications, and new-product development. It also includes internal management activities, such as investment decisions and particular duties of the company's officers. The regulator's presence will be felt throughout the organization, and the credit risk manager will work closely with the chief compliance or chief legal officer to keep from running afoul of regulatory directives.

For the credit risk management function in particular, the regulator will supervise the entity's many exposures to credit risk, such as aging receivables, large balances due from particular counterparties, the valuation of collateral securing an asset, derivatives usage, specific terms and conditions in agreements with counterparties, ratings of tradable securities on the balance sheet, and many more. The supervision will range from monitoring some of these areas, to absolute restrictions, to valuation adjustments based on a quantitative assessment of the risk, to requiring more capital to be allocated to particular risk-bearing activities.

The credit risk manager must know at all times how the firm's internal assessment of risk and capital lines up with the regulator's assessment. Why? First, the company never wishes to breach regulatory limits on exposure or violate any other restrictions. Not only do rule violations put the entity on the wrong side of the regulator, including fines, sanctions, or greater reporting burdens, but some violations can be made public, which can damage the entity's reputation in the marketplace. Second, all else equal, firms will want to have as much capital in excess of the regulatory minimum as possible, since a large

margin puts distance between the regulator's reach and the entity. Regulated entities like to point out that the regulatory assessment of credit risk lacks precision, overlooks transaction details that mitigate loss exposure, and suffers from other shortfalls that end up overstating the risks faced by the entity. Despite these protests, most highly rated entities hold capital well in excess of the regulatory minimum, largely in anticipation of the stresses placed on the excess capital margin during economic downturns.

The regulator's assessment of the amount of credit risk exposure taken and the amount of capital required is often based on a formula, which we will discuss in some detail later. At a high level, there are two basic approaches. In one, the regulator evaluates how much capital is needed based on the riskiness of positions. This amount (regulatory capital) must then be exceeded by the capital the entity actually holds. In the second, the regulator revalues the entity's assets (in a downward direction; i.e., it applies haircuts) and then recalculates actual capital held (revalued assets minus liabilities) and then compares this amount to a regulatory minimum. Both techniques are subject to various modifications, including what forms of hybrid capital are admissible, ad hoc charges for counterparty credit risk, and other asset and liability valuation adjustments.

In the next section on “how” regulation matters, we summarize how the various regulators assess and charge for credit risk.

HOW REGULATION MATTERS: KEY REGULATION DIRECTIVES

In the sections that follow, we describe how regulation affects financial entities with an overview of the key regulators and regulatory directives that they must contend with.

Many international efforts are underway whose purpose is to set standards and harmonize regulation to close loopholes. The Financial Stability Board (“FSB”) and the G-20 are two such international bodies. The Bank for International Settlements, is a banker for central banks, organized as a consortium of the member central banks. Although not a regulator itself, it has formed the Basel Committee on Banking Supervision that seeks to harmonize the regulation of banks globally, with a particular emphasis on risk recognition and capital adequacy. In addition, supranational organizations such as the World Bank Group, and the International Monetary Fund, both members of the FSB,

although not regulators, provide oversight to both financial institutions and to sovereign nationals where the financial institutions are domiciled. They exert their oversight through their lending programs via the terms and conditions of the lending agreements, which are not dissimilar to a regulator's rules. They further exert influence by being situated with stand-by with lending facilities. The International Swaps and Derivatives Association (ISDA) is a global trade association for the swap market and is actively participating in the G-20 and other undertakings around the globe as they relate to swaps regulation.

In the United States, numerous agencies are responsible for regulating financial institutions. The Dodd-Frank Act recognizes this and, in response, has created the Financial Stability Oversight Council (FSOC) to oversee financial institutions. The regulation attempts to coordinate efforts across products types, such as banking, insurance, and securities, and also to harmonize the patchwork approach to the regulation of these entities that currently involve both state-by-state and federal oversight.

In Europe, the three most important agencies are the European Banking Authority (EBA), the European Insurance and Occupational Pension Authority (EIOPA), and the European Securities Markets Authority (ESMA), which also recognize that they must work in concert with each other to close regulatory loopholes.

In Canada, the Office of the Superintendent of Financial Institutions, (OSFI) regulates commercial banks, insurance, pensions, lending institutions, and credit unions (cooperatives). These institutions, with the exception of the banks, also have provincial regulation. Securities are regulated at the provincial level only. Next, we discuss key regulatory directives in more detail as they affect financial entities.

Dodd-Frank Act of 2010

The Dodd-Frank Act's mandates are to create a new agency responsible for implementing and enforcing compliance with consumer financial laws, introduce more stringent regulatory capital requirements, effect significant changes in the regulation of over-the-counter derivatives, reform the regulation of credit rating agencies, require changes to corporate governance and executive compensation practices, incorporate the Volcker Rule, require registration for advisers to certain private equity funds, and make significant changes in the securitization market. Although some initiatives have been completed, such as stress testing

for banks conducted by the Federal Reserve, most others are still to be implemented.

The Financial Stability Oversight Council is charged with identifying threats to the financial stability of the United States, promoting market discipline, and responding to emerging risks to the stability of the United States financial system. It directs various existing agencies, such as the Federal Reserve, to implement and enforce various requirements for financial institutions, including lower leverage, stronger risk-based capital, and greater liquidity. It is chaired by the U.S. Treasury, and is comprised of the following additional voting member agencies: The Federal Reserve, Office of the Comptroller of the Currency (OCC), Securities and Exchange Commission (SEC), Commodities and Futures Trading Commission (CFTC), Federal Deposit Insurance Corp (FDIC), Federal Housing Finance Agency (FHFA), National Credit Union Administration (NCUA), The Bureau of Consumer Financial Protection, and an independent member with insurance expertise appointed by the president and confirmed by the Senate. Notably, Dodd-Frank dissolved the Office of Thrift Supervision and allocated its oversight responsibilities to other agencies.

Although Dodd-Frank's major emphasis is on closing regulatory gaps and reducing the country's exposure to systemic risk, there are many initiatives that address a financial institution's credit risk management activity. Among F-SOC's 10 voting members, there are eight agencies that impose regulatory rules, and each of these has a myriad of rules affecting the recognition, measurement, and curtailment of credit risk, and capital allocation as it relates to its assumption, with some of the rules preceding Dodd-Frank and some rules being enacted as a result of Dodd-Frank. The interested reader can find all of the regulatory rules on www.regulations.gov, which has a search function by regulator and date. Rules as they relate to Dodd-Frank on the U.S. Treasury's website, can be found on www.treasury.gov.

Basel III

The Basel Committee on Banking Supervision,² under the aegis of the Bank for International Settlements, has enacted a comprehensive set of reform measures, developed to strengthen the regulation, supervision, and risk management of the banking sector commonly known as Basel III. Note that Basel III is the current directive, having superseded Basel II. These measures are highly similar to Dodd-Frank's in that they aim to (1) improve the banking sector's ability to

absorb shocks arising from financial and economic stress; (2) improve risk management and governance; and (3) strengthen banks' transparency and disclosures, which are designed to help raise the resilience of banks to periods of stress, called microprudential regulation. Also like Dodd-Frank, the reform measures target systemic risk, which they call macroprudential regulation.

Rule making from Basel III, as they are implemented by the U.S. Federal Reserve, must coordinate with the Dodd-Frank regulatory reform legislation. This is easier said than done, because there are many inconsistencies across the two rulemaking bodies. For one, Dodd-Frank disallows external credit ratings to be used to assess risk, whereas Basel III permits this. Second, prior to the 2007 financial crisis, the Fed had been slow to adopt Basel guidelines, so U.S. banks are behind their international counterparts in its implementation.

In Europe, banks must comply with Basel III as supervised by the EBA, and the EBA, as the regulator, may make additional capital assessments on banks in the EU, as it is considering doing now with the European debt sovereign crisis and its fallout on European banks.

Basel III sets minimum capital requirements, minimum liquidity, and maximum leverage for banks. Capital is assessed using the approach of evaluating the risk in the assets (a risk-weighted-assets formula), assigning a capital charge, and then comparing this to actual capital held. Entities may elect to use an internally developed (own) model that would allow a more granular approach to measuring credit and other risks. The internal model results require comparison against the formulaic approach, and basic guidelines in recognizing and measuring risk are required, including an approval of the model and the economic scenario generator that underlies it.

The new rules are being phased in and will not be fully in effect until 2015 at the earliest for certain rules and 2019 for others, giving banks time to build up capital while continuing to lend and support economic activity.

Solvency II

Solvency II is the directive for supervision of insurance and pensions in the EU by the European Insurers and Occupational Pension Agency (EIOPA). Solvency II supersedes the earlier Solvency I directive. As with Basel III, implementation is underway with a timetable for full implementation (meaning effectiveness of the new quantitative rules) being out a few years (and likely subject to a moving deadline). Also, similar to Basel III, Solvency II lays out specific requirements

for supervised institutions to recognize, measure, curtail, and allocate capital for credit risk exposure. These range from allocating capital based on credit rating and concentration thresholds, to allocating capital for structured credit products based on the quantifiable amount of credit enhancement with which the securities are supported.

As with Basel III, regulated entities may use EIOPA's formulaic model for determining required capital or they may use an internally developed (own) model. There is of course some opportunity for gamesmanship in the usage of an internal model. However, the methodological approaches that companies are ultimately able to adopt will have been reviewed by EIOPA in the commentary periods prior to the full implementation, and, thus, model arbitrage should be minimized.

U.S. Insurance Regulation

Currently, there are 50 regulators across the United States, each supervising insurance companies licensed (or otherwise permitted) to do business in their respective state. Regulators across states coordinate some efforts in terms of rule setting, capital adequacy, disclosure, and marketing practices under the National Association of Insurance Commissioners (the NAIC). The NAIC seeks to harmonize rules and reporting. It is generally effective, but many rules are not adopted universally. States are not required to adopt NAIC model legislation.

However, since regulators know their state's insurance companies very well, they are able to pay significant attention to what goes on in their backyards and are effective watchdogs. Although seemingly disparate and decentralized, these regulators did their job in keeping most licensed insurers out of trouble during the 2007 financial crisis (AIG's troubles emanated from its noninsurance operations). In 2010, the NAIC took a bold step and rejected the use of Acceptable Ratings Organizations (e.g., Moody's and S&P) ratings for residential mortgage-backed securities (RMBS) assets, and hired PIMCO, the world's largest independent bond manager, to review and re-rate these securities for credit risk.

That said, as the complexity of transactions increases, particularly with respect to embedded options in life-insurance policies (such as minimum investment return guarantees), and as the use of offshore vehicles continues to grow, the need for trained and highly specialized supervisors is on the increase, which may suggest that there are economies of scale that centralization could foster. Prior to

Dodd-Frank, there was momentum building for the federalization of insurance regulation.

With Dodd-Frank, and the goals of closing loopholes in regulatory arbitrage, the Federal Insurance Office (FIO) was created. The FIO is still in a working-group mode, coordinating with the NAIC and various state insurance departments to come up with a blueprint for moving forward. Note that the FIO has a mission to coordinate and gather information and to consult with the FSOC on insurance matters. The FIO is not a regulator, not a voting member of FSOC, and the 50 states in the United States still have their full supervisory powers.

States take a formulaic approach to risk measurement and capital assessment, using the second type of methodology, as described earlier, in which assets are revalued and the resulting recalculated capital (called surplus) is compared against various thresholds.

U.S. Pension Regulation

Defined benefit pensions are regulated by the Pension Benefit Guaranty Corporation (PBGC), an agency of the U.S. government and founded to provide insurance for underfunded, terminated plans; assist with the bankruptcy process; and to ensure timely and uninterrupted payments to retirees. Concerned about the credit risk posed by pension plans to workers and retirees, the Pension Protection Act of 2006 strengthened contribution and funding rules and required increased transparency to liability recognition and asset valuation.

The PBGC walks a fine line, because forming and keeping the plans open to new hires is optional on the part of corporate sponsors and something that the government wishes to promote. Thus, refraining from placing regulatory burdens on corporate sponsors is part of the PBGC's mission. Notably, there is no risk-weighted asset concept for a pension plan, and no capital requirement as there is with a bank or insurer. Plan sponsors must simply abide by “prudent–investor” rules as defined by ERISA (Employee Retirement Income Security Act), which give the plan sponsor significant leeway in managing the plan's assets.

From an institutional creditor's perspective, a corporation's pension plan represents a large and typically underfunded liability with the potential to grow, not just because actual liabilities could surpass current projections but also because asset performance that is expected may not materialize. Not only does the pension plan stress the finances of the corporate obligor, if and when the corporation (plan sponsor) enters bankruptcy, the PBGC will be exercising its

control to represent the interests of workers and retirees, which puts the creditor's claims at risk.

Derivatives Regulation

Derivative regulation around the globe is in the midst of being created. Since much derivative activity has been conducted on an over-the-counter (OTC), basis—meaning bilateral agreements between two parties—regulation of millions of individual transactions would have been impossible. Transactions have, to date, been conducted on an ad hoc basis, often using a standardized contractual form known as an ISDA, with counterparties negotiating how much collateral needs to be initially posted and subsequently topped up, based on price movements of the underlying asset or on downgrades to the counterparty's credit rating. Regulators globally witnessed the weakness in these agreements due to the systemic risks posed; since the institutions engaged in the transactions are leveraged, if one's counterparty cannot make good on an agreement, that threatens one's own ability to make good on other agreements.

The movement has been toward moving derivatives transactions into exchanges and clearinghouses, where the rules are consistent, collateral requirements are systematic, and in which participants' exposures to various assets can be monitored.

The regulatory impetus is coming from international bodies, such as the Financial Stability Board, since much derivative trading is outside of the United States and Europe.

Regulators and industry participants are in preliminary consultative stages of the rules formulation. These undertakings are being spearheaded by the G20 overall, ESMA in the EU, and the SEC and the CFTC (Commodities Future Trading Commission) in the United States. In Asia, Japan and Australia have taken steps to implement G20 commitments, as have Hong Kong and Singapore who are not even G20 members.

Regulation of Broker Dealers

In the United States, security broker-dealers are regulated by the Financial Industry Regulatory Association (FINRA), which is a nongovernmental regulator that serves as a watchdog for all stock exchanges in the United States and has a mission to protect the investing public. Broker dealers must be licensed with FINRA in order to operate in the securities business. FINRA does

not regulate firms from the standpoint of credit risk recognition and management.

In contrast, the SEC does impose capital rules on broker dealers to reflect the credit and other risks in their operations. The SEC's Net Capital Rule (Rule 15c3-1) works similarly to U.S. regulated insurance capital rules, by which the entity's statutory net worth is adjusted downward to reflect credit and other risks embedded in its assets. Similar to the Basel III and Solvency II capital calculations based on an internal model versus a regulator's formula, in 2004 the SEC began allowing the largest broker dealers to use an internal model consistent with Basel guidelines.

Also noteworthy is that, under the Securities Reform Act of 1934, the SEC regulates Nationally Recognized Statistical Ratings Organizations (NRSROs) such as S&P and Moody's since their ratings are the primary and most heavily relied on credit risk indicator to most investors, both institutional and individual; integral to the functioning of the capital markets; and what Congress describes as “of National Interest.” The regulation has been amended and strengthened at various points in time, notably 2002 (Sarbanes-Oxley), 2006 (Credit Reform Act of 2006), and, most recently, Dodd-Frank. Ironically, the use of ratings are inadmissible for quantifying regulatory capital requirements under Dodd-Frank.

In the EU, the ESMA regulates the ratings agencies. This regulation is more recent, since 2010, and on the table, as this book goes to print, are proposals for increased regulatory oversight including the mandatory rotation of rating agencies by corporate debt issuers, requiring agencies to get regulatory approval of proposed changes in their ratings methodologies, and standardizing liability for registered ratings firms across the EU, among others.

In [Table 11.1](#), we summarize the key financial regulators, their territories and industries.

[Table 11.1](#) Selected Financial Regulators

Regulator	Industry Domain	Territory	Selected Credit Risk Management Directives
EBA	Banks	EU	Basel III, including risk recognition and measurement; capital setting; liquidity management.
EIOPA	Insurers and pension funds	EU	Solvency II, including risk recognition and measurement; capital setting; liquidity management.
ESMA	Securities ratings agencies	EU	Risk recognition and measurement; capital setting.
Federal Reserve	Banks, bank holding companies, and large complex financial institutions such as securities holding companies	U.S.	Basel III, including risk recognition and measurement; capital setting; liquidity management.
FDIC	Commercial banks	U.S.	Risk recognition and measurement; capital setting.

Regulator	Industry Domain	Territory	Selected Credit Risk Management Directives
NCUA	Credit unions	U.S.	Risk recognition and measurement; capital setting, liquidity management.
FHFA	Freddie Mac; Fannie Mae; Federal Home Loan Banks	U.S.	Capital and risk reporting currently suspended.
SEC	Securities firms; broker dealers; investment advisors; ratings agencies (NRSROs)	U.S.	Net capital rules and associated variations to this. Market conduct. Governance, transparency, methodology.
U.S. Treasury	Coordination of other regulators	U.S.	Implementation of Dodd-Frank directives.
FINRA	Broker dealers	U.S.	None.
PBGC	Private defined benefit pensions	U.S.	Prudent Investor and required plan contributions triggered by an underfunded status threshold.
CFTC	Options, futures, swaps	U.S.	Capital requirements based on admitted assets.
U.S. States (NAIC)	Insurance	U.S.	Risk recognition and measurement; capital requirements based on admitted assets; liquidity management.
FCSO	Insurance, pensions, lenders, credit unions	Ontario, Canada	Risk recognition and measurement; capital setting based on admitted assets; liquidity management.

FINAL WORDS

For financial institutions around the globe, three statements are likely to be true. One is that capital requirements will rise from what is currently required. This is well understood in the case of Basel III and Dodd-Frank, with other directives falling in line with these. A second is that internal assessments of risk and the

regulator's assessments will converge, largely because of the ongoing consultative dialogue between industry and regulators on how to identify and measure risk, and, in particular, credit risk. In the rounds of quantitative impact studies and other consultative processes, regulators and industry participants have a forum to discuss the impact of the regulatory undertakings in draft form, with industry often educating regulators. Finally, although the methodological approaches between industry and regulators may converge, regulators will always add in a safety margin that industry participants will object to, and the fundamental conflicts between the regulator's desired level of capital and the regulated entity are unlikely to dissipate.

¹ U.S. House of Representatives Financial Services Committee hearing, September 25, 2003.

² BIS, "Basel III: International Framework for Liquidity Risk Measurement, Standards and Monitoring," December 2010.

CHAPTER 12

Accounting Implications of Credit Risk

The objective of this chapter is to highlight some current accounting issues as they relate to credit risk management. In Chapter 6, “Fundamental Credit Analysis,” we approached accounting from the point of view of evaluating the creditworthiness of a prospective or existing counterparty. Understanding basics of how assets, liabilities, contingencies, revenue, and costs are accounted for by a counterparty is integral to understanding that company's credit profile. In this chapter, we instead approach accounting from the point of view of the originator in understanding the accounting implications of originating, holding, or transferring credit risk exposures.

We review accounting guidance from both the Financial Accounting Standards Board (FASB) for U.S. Generally Accepted Accounting Principles (GAAP) and from the International Accounting Standards Board (IASB) for International Accounting Standards (IAS). Since accounting guidelines in general are continually being updated as they adapt to current business practices and needs, any guidelines that exist at a given time may be amended or superseded by others.

As of June 2012, this state of flux is particularly acute and includes ongoing efforts by FASB and the IASB to converge U.S. GAAP and IAS; regulatory input and consultation from Dodd-Frank, Basel III, Solvency II, the Financial Stability Board (FSB) globally and the U.S. Financial Services Oversight Committee (FSOC); and the planned adoption of International Financial Reporting Standards (IFRS) in the United States. On top of all of this, in 2009, FASB instituted a new codification system to streamline its guidelines into one authoritative set of standards that can be logically followed by any user, not just a certified public accountant (CPA) and years of auditing experience. Thus, what were known in the past as Financial Accounting Statement (FAS), Financial Interpretation Number (FIN), Accounting Principles Board (APB) opinion, or emerging issues task force (EITF), and the like have been mapped to a new and consistent naming convention, the Accounting Standards Codification (ASC) system. Industry is slowly coming around to the new codification, but references to the old system remain, so henceforth in this chapter, we will refer to a particular guideline under both the new and old classifications. International

Accounting Standards also has two classification naming systems. Before 2001, standards were classified under IAS; from 2001 onward, standards were issued under IFRS. The IAS standards are still in effect; IFRS does not replace the older standards but adds to them under the new naming convention.

To summarize, the accounting treatment and reporting requirements of an entity's credit exposures are in a state of overhaul. Thus, we underscore that these topics are neither comprehensive nor reflective of the current accounting guidance at any time in the future. Our discussion is aimed at giving readers a high-level overview of issues that they need to be aware of. In all cases, what we cover below should not be construed as accounting advice.

We cover a nonexhaustive list of topics that we feel are most central in the context of credit-exposed businesses under U.S. GAAP and IAS. We begin with an overview of accounting for impaired loans and leases, and then follow with the basics of loan-loss accounting, and then the joint regulator's (U.S.) policy statement on the Allowance for Loan and Lease Losses, developed to comply with FASB's guidelines. We briefly cover the accounting treatment for other credit instruments, such as corporate bonds, as they relate to impairment.

Next, we cover de-recognition and consolidation because these accounting issues relate directly to the accounting treatment of special purposes entities that are a key mechanism in asset securitization. Here again, regulators amended their directives in response to FASB and the IASB.

Then we cover netting, which is in the midst of being modified by FASB in the United States to align with the IASB standards. We then cover hedge accounting, and, finally, we touch on Credit Valuation Adjustments (CVA) and Debit Valuation Adjustments (DVA) including the accounting for what's known as "own credit risk."

LOAN IMPAIRMENT

General principles a creditor should apply to account for impairment in a loan portfolio under U.S. GAAP are FAS 5 (ASC 450), "Accounting for Contingencies" and FAS 114 (ASC 310), "Accounting by Creditors for Impairment of a Loan." Under IASB, the treatment of loan impairment is roughly similar so we will not go into detail here. FAS 5 gives guidance on accounting for loss contingencies. An estimated loss from a loss contingency, including uncollectable receivables or loans, is needed because a fundamental

accounting goal is to match revenues and expenses. If a loan portfolio generates revenues, there will doubtlessly be credit losses, and setting up a provision for losses as revenues are recognized permits this matching. The estimated loss is thus accrued by a charge to income if it is probable that an asset had been impaired and that the amount of loss can be reasonably estimated. FAS 114 provides further clarity that the uncollectability of both interest and principal should be considered when evaluating impairment (that is, credit losses include late payment) in addition to nonpayment, and that measuring the amount of impairment can be done either from an observed market price or from estimating the discounted value of the impaired loans' future cash flows, including collateral.

A loan is impaired when, based on current information and events, it is probable that a creditor will be unable to collect all amounts due according to the contractual terms of the loan agreement. FASB allows for impairment to be recognized both for specific loans known to have problems and more generally for a portfolio of loans known to have problems in the aggregate but without knowing which particular loans in the portfolio are troublesome. Loans that are specifically identified must be accounted for under FAS 114 and loans in the second category must be accounted for under FAS 5. However, FAS 5 and FAS 114 do not apply to the impairment of leases, debt and equity securities, and large groups of small-balance homogeneous loans such as credit cards.

Neither FAS 5 nor FAS 114 specifies how a creditor should: (1) determine that it is probable that it will be unable to collect all amounts due; (2) identify loans that are to be evaluated for collectability; (3) record a direct write-down of an impaired loan; and (4) assess the overall adequacy of the allowance for credit losses. These important decisions are left for the creditor to undertake in its normal loan review procedures. As a consequence of the creditor's judgment, the creditor creates a loan-loss reserve, which we discuss next.

LOAN-LOSS ACCOUNTING

When a bank originates a loan portfolio, it creates a loan-loss reserve for impairments as a contra asset for losses it expects from the portfolio. As described earlier, reserves for impairments are established only for losses that are expected. Again, expected losses include those that are specifically identified and those that are expected in the aggregate. The bank will perform its own internal analysis for why losses are expected to occur, and many of the

techniques that we have described in the preceding chapters, such as using expected default frequencies (EDFsTM) or rating agency credit migrations, are used for this purpose.

We provide an illustration for loan-loss reserving in [Table 12.1](#).

Table 12.1 Loan-Loss Reserving on the Balance Sheet

In Millions USD	Jan 2012	Mar 2012	Sep 2012	Dec 2012
Loan Assets	10,000	9,980	9,950	9,950
Loan-Loss Reserve, Contra Asset	200	180	150	195
Net Loans	9,800	9,800	9,800	9,755

In January, the bank has \$10 billion in loans, and against these loans, has reserved \$200 million for expected losses, which creates an expense of \$200 million on the income statement (the P&L) and a net asset of \$9.8 billion on the balance sheet. At the next quarter, the bank acknowledges that \$20 million of its uncollectable loans are total losses after all recovery is factored in. The bank writes off the \$20 million from its gross loans and takes the reserve down by \$20 million. The reserve goes down because the bank has figured that the loss was within its expectations as represented by its reserves. Net loans are still \$9.8 billion and essentially, nothing has changed. All performance was within expectations and had already been factored into the bank's calculation of its net loans. There is no change to net assets and no change to income since the bank had previously recorded a \$200 million charge.

In September, the same situation happens but now with a write-off of \$30 million. The bank takes down both its gross loan holdings and its reserves as well, and net assets do not change. Again, the loss materialized but the bank had already expected it, so there is no change on its total net asset line and no change to income.

Between September and December, the economy takes a turn for the worse, and delinquencies rise unexpectedly across the loan portfolio. The bank's CRO and CFO fear that losses will exceed what was originally estimated to be \$200 million, and the new estimate for total losses associated with the original portfolio of \$10 billion is now \$245 million (the \$200 million in original reserves plus the \$45 million of additional reserve relating to changed conditions), or \$45 million higher than originally estimated. Loan-loss reserves are now increased by \$45 million. Gross losses don't change, since there are no new write-offs, so now net loans fall by \$45 million. The reduction in net assets, which is a bad debt expense, is reflected in income, so income—all else equal—

falls by \$45 million.

This is a highly simplified example. In reality, it is difficult to decompose observed delinquencies and losses into what was anticipated versus what was unanticipated. If losses are somewhat larger than expected, is it timing, seasonality, or a geographic aberration as opposed to absolute loss amounts, when all is said and done? Even with a long time series of data on credit migration and expert analysis, the reserves that will ultimately be needed is still an estimate that is subject to error. If it were determined that a portion of the additional \$45 million reserve was attributed to some of the \$50 million already written off in the first three quarters—for example, \$20 million—then net income would fall by the remainder, \$30 million in the example given. Stated another way, the CRO needs to assess what reserves are appropriate for the \$9,950 of gross loans outstanding and any change to existing reserves that this entails would affect income.

Note that how often and how significantly loss reserves are reset will affect income volatility. Thus, loan-loss reserves are a key balance sheet item for management. Because there is ambiguity as well as discretion in establishing loss reserves, a topic that we expand upon later, establishing a new reserve or changing a reserve once established is, within broadly defined parameters, at the bank's discretion. Thus, a bank has some leeway in establishing these provisions and in recognizing income.

REGULATORY REQUIREMENTS FOR LOAN-LOSS RESERVES

Income recognition worries the SEC and public accounting firms registered with the Public Company Accounting Oversight Board (PCAOB, the auditors of publicly traded firms), since the opportunity for managing earnings is present, and inadequate reserves worries regulators. For accounting issues as they relate to banks, such as this, there is a dialogue maintained between the FASB and the banking regulators (known as banking agencies by FASB), namely the SEC, FDIC, FRB, National Credit Union Administration (NCUA), and the Office of the Comptroller of the Currency (OCC).

This dialogue resulted in an Interagency Policy Statement on the Allowance for Loan and Lease Losses released in 2003.⁴ In the statement, there are numerous directives regarding application of FAS 5 and FAS 114. The directives

include not only measurement of estimated credit losses and the estimation process, but also the governance of the process itself. Outlined are responsibilities of the reporting entity's board of directors and of management, the process for independent review of the methodology employed, and the qualifications and independence of loan review personnel, among others.

The credit risk management function may be involved in the reserve setting either directly or in the capacity of an independent reviewer. If independent from the business unit, credit risk management can be assigned to review the methodology employed or to perform the credit review of loans. As per the banking agencies' directive, the review functions need to report directly to the Board of Directors.

IMPAIRMENT OF DEBT SECURITIES

The impairment and accounting treatment of impaired bonds differs from that for loans and leases. Bond impairment depends on how the debt instruments are classified upon purchase, namely under FAS 115 in U.S. GAAP, Accounting for Certain Investments in Debt and Equity Securities, and under a similar classification under IASB guidelines (IAS 39). Debt securities can be classified as held to maturity, available for sale, or as trading securities. The classification drives the accounting treatment and, thus, how impairment is treated.

For bonds designated as available for sale (AFS) under FAS 115-2, which amended FAS 115 in response to the Emergency Economic Stabilization Act of 2008, valuation changes are to be assessed as either credit related (non-temporary) or temporary, such as from yield curve movements. Valuation changes due to temporary, noncredit events are recognized on the income statement as other comprehensive income, an entry below the earnings line. The corresponding recognition on the balance sheet is through accumulated other comprehensive income, which is a component of shareholders' equity. Thus, when valuation changes for noncredit events—such as the yield curve increasing—and the reporting entity intends to hold the bond until the price recovers, the change in market value attributable to this factor is recorded in other comprehensive income on the income statement and correspondingly affects accumulated other comprehensive income on the balance sheet. Note that if the reporting entity is more likely than not to sell the bond before price recovery, the change in value is recognized directly in income.

For changes in value that are credit related, the amount of the value change attributable to the credit quality change is recognized in income, and this is known as other-than-temporary impairment (OTTI). This treatment is followed regardless of whether the reporting entity intends to hold onto or sell the asset. However, the described treatment of accounting for noncredit valuation changes prevails—for the element of the value change attributable to yield curve and other noncredit related factors, regardless of whether these changes are recognized in accumulated other comprehensive income or income directly is a function of how long the owner intends to hold the bond. While reversals to impairments are not permitted for any future recoveries, under FAS 115-2, the difference between the new amortized cost basis and the cash flows expected to be collected is accreted as interest income.

Under IASB, for bonds that are available for sale, an impairment is recognized directly in income only if there's evidence of credit default. Reversals to impairments are permitted for any future recoveries.

Under FASB, for bonds designated as held-to-maturity, total impairment is the amortized cost basis less the bond's fair value. The portion of the impairment attributable to credit loss is recognized in income. All other sources that the value change can be attributed to (such as interest rates) are recognized in accumulated other comprehensive income. Then the part of the impairment attributable to all noncredit sources is accreted to the carrying amount of the bond through accumulated other comprehensive income over the remaining life of the bond. Under IASB, the impairment is measured as the carrying amount of the bond less the present value of estimated future cash flows discounted at the instrument's original effective interest rate. This method may not be equivalent to a fair value estimate under FASB. Impairment is recognized in the income statement. Under IASB, the impairment calculation is unlikely to reflect credit deterioration unless it is to the point of default.

DE-RECOGNITION OF ASSETS

De-recognition of assets, which allows originated transactions and some or all of their associated assets and liabilities to become off-balance-sheet, and consolidation of the special purposes entities and vehicles (SPEs and SPVs, respectively) that house them are integrally related. Under IAS 39, Financial Instruments, Recognition and Measurement, which governs de-recognition under IAS, the SPE must first be consolidated. Then a flowchart test is followed to see

if de-recognition is allowed. If the originator has no rights or remaining rights to the cash flows of the SPE, or has no control over the SPE and no substantial risk or reward from its relationship with the SPE, then it can de-recognize. The originator's continued involvement with the transaction (for example, as a servicer) does not preclude it from de-recognition, provided that certain conditions are met, which are essentially that it acts only in a pass-through capacity, just collecting cash from one place and passing it through to another.

Under U.S. GAAP, the treatment for structured finance transactions involving an SPE was governed by de-recognition guidelines in FAS 140 (ASC 860), “Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities” until 2008, when they were updated with FAS 166 (ASC 810). Originators (or other participants involved in an SPE) may de-recognize an asset and achieve sale accounting if they have no control over the asset upon transfer or thereafter, if the transferor is legally isolated from the transferee (originator) and all of its affiliates, and if there are no constraints on the transferor's sale of the assets. The de-recognition step is taken first or in conjunction with the consolidation test, as described next.

CONSOLIDATION OF VARIABLE INTEREST ENTITIES (VIEs)

Consolidation of SPVs and SPEs (hereafter referred to as SPEs) and other entities set up for the purpose of facilitating securitization transactions has been at the forefront of accounting issues in the last decade because, up until 2003, SPEs did not need to be consolidated by any other entity. As we saw in Chapter 8 dedicated to securitization, a primary driver behind an originator's setting up an SPE was to keep the assets and liabilities off its balance sheet while still retaining some economic benefit from the transactions. Keeping the assets off-balance-sheet is desired because otherwise capital requirements would be far higher. Under current banking rules in many jurisdictions, capital is determined, in large part, as a factor of risk-weighted assets; the greater the assets, the greater the capital, all else equal. Thus, bigger balance sheets are more capital intensive.

However, the proliferation of securitizations created large amounts of assets and liabilities that were orphans—recognized on no one's balance sheet. Recall Enron and its exploitation of the off-balance-sheet treatment of its business dealings, in which billions of liabilities went unrecognized. As a consequence of

Enron, Sarbanes-Oxley was passed in 2003, and the FASB, in concert with the legislation, created guidance, known as Financial Interpretation Number (FIN) 46R. FIN 46R required that the entity with the largest variable interest, and more distinctly, with the most to lose in the SPE (for example the originator or the servicer), needed to consolidate the SPE. Guidelines were promulgated to determine which participant held the largest variable interest with the most downside. Note that FIN 46R and subsequent directives consider a whole class of entities, of which an SPE is a special case, called variable interest entities (VIEs). VIEs include not only SPEs and SPVs, but also joint ventures between two companies and other arrangements in which participants have variable stakes. Qualified SPEs (QSPEs), which were widely employed in asset-backed commercial-paper conduits, loan securitizations, and other types of securitizations, were exempt from FIN 46R.

Then, in 2009, Financial Accounting Statement (FAS) 166 and FAS 167 amended FIN46R (now, ASC 810 captures all consolidation issues). FAS 166 removed the exemption for Q-SPEs and under FAS 167 a qualitative approach to identify which party has the power to direct the entity's activities, rather than a downside risk approach, is used as the primary determinant of which entity must consolidate. Thus, for many banks, the implementation of FAS 166 and FAS 167 will increase the amount of assets and liabilities reported on the balance sheets and may result in significantly higher regulatory capital requirements.

Under IASB's IFRS 10, the test for consolidation relies more heavily on who controls the VIE. However, by and large, the two bodies have succeeded in adopting a reasonably similar approach. That said, the IASB and FASB have not concluded their efforts regarding consolidation. The boards' goal is to have one consolidation model whose principles are similar to those in statement 167 and that would apply to all entities.

This accounting change has such a material impact on banks that originate these securitizations and other structured finance transactions that the FDIC, one of several U.S. banking regulators, actually allowed banks to delay their compliance with regulatory capital requirements. In 2011, the FDIC allowed banks for a phased-in approach to both adopt FAS 166 and FAS 167 and to meet risk-weighted, asset-based regulatory capital requirements. During this time, banks rebuilt their capital bases as they brought assets back on the balance sheet with some relaxation of regulatory limits.

ACCOUNTING FOR NETTING

In Chapter 13, we will cover netting of derivative asset and liability positions across counterparties as a form of mitigation. As we recall, offsetting, or netting, is the act by which two counterparties owe each other money, and under a legally enforceable agreement, they are allowed to net the two sums, resulting in just one counterparty remitting a payment to the other. In the following discussion, we will cover netting of derivative positions. However, netting is not limited to derivatives; for example, it is practiced in the insurance industry with claims receivable against premiums payable, in the securities lending markets (borrowings against lending), and in other markets.

Under Financial Interpretation Number (FIN) 39 of U.S. GAAP (now ASC 210-20), provided there is an unconditional legally enforceable right to offset, netting on the balance sheet is permitted but not required. However, although presenting net positions is optional, almost all industry participants choose to make use of it. Under IASB, provided there is an *unconditional* legally enforceable right to offset, netting is *required*. A master netting agreement (MNA) is the legal contract used by most participants that gives them the legal enforceable right to offset.

The key word is unconditional. Under IASB's IAS 32, if the MNA's terms are that offset is allowed only if one of the companies defaults or goes into bankruptcy, then amounts due and owed must be presented on a gross basis (until such time that there is a default or bankruptcy, if ever). Under current U.S. GAAP, netting in this circumstance is both permitted and widely practiced.

As of December 2011, FASB amended FIN 39, which covers the accounting treatment for offsetting, with “Accounting Statement Update No. 2011-11—Balance Sheet (ASC 210-20): Disclosures about Offsetting Assets and Liabilities.” Although not the equivalent of IASB's treatment, the update brings the accounting for offset closer to IASB's. Effective January 2013, if the right of offset is conditional, then amounts must be shown on a gross basis.

[Figure 12.1](#) shows an illustration of positions on a net and gross basis. On the far right of the table, assets and liabilities are shown on a gross basis; Bank A has \$1 billion of assets owed to it by Bank B, and \$600 million of liabilities it owes to Bank A. If the MNA includes an unconditional right of offset, then the assets and liabilities are netted, which shrinks balances on the balance sheet (far left column). This is also the case under FIN 39 as it currently stands without the unconditional right (middle column).

Figure 12.1 Netting Illustration, U.S. GAAP and IFRS

	Bank A Unconditional right of offset FIN 39 current & as amended	Bank B	Bank A Conditional right of offset FIN 39 current	Bank B	Bank A Conditional right of offset FIN 39 as amended	Bank B Conditional right of offset FIN 39 as amended
Assets	\$US 400 million		\$US 400 million		\$US 1 billion	\$US 600 million
Liabilities		\$US 400 million		\$US 400 million	\$US 600 million	\$US 1,000 million

The result of the change is that balance sheets of U.S. financial institutions will grow, perhaps materially, putting pressure on regulatory capital requirements and leverage ratios. Note that balance sheets for European and other IAS reporting financial institutions already presented positions on a gross basis if the MNA had conditions for offset. After 2013, the balance sheets across these two cohorts will be more comparable. At this time, the gap between the two standards is addressed by requiring reporting entities to report in a footnote what the net or gross exposure would be.

HEDGE ACCOUNTING

Hedge accounting is important for the credit risk manager to understand, first, because a hedge may be employed to mitigate credit risk exposure, and second, the accounting treatment is partially dictated by the creditworthiness of the counterparty.

In many but not all cases, a hedge is a particular application of a derivative, and, thus, it is guided by FAS No. 133, “Accounting for Derivative Instruments and Hedging Activities” under U.S. GAAP. If the derivative is used as a hedge and if the hedge is deemed effective, it is recognized as either an asset or liability and valued at fair value, and it may be classified as either a fair-value hedge or a cash-flow hedge.

Accounting for a Fair-Value Hedge

If a company uses a derivative to offset an exposure to changes in the fair value of an asset or liability or of an unrecognized commitment, this use would be classified as a fair-value hedge. If so, the accounting treatment of the asset or liability would change. For example, if a company wants to hedge an exposure to a bond that has been classified as available for sale, once the hedging

transaction is entered, that bond's change in value will now be recognized in income, rather than in other comprehensive income (OCI), which would have been the case in the absence of the hedge. In this way, the change in the value of the bond, now reflected in income, offsets the change in the value of the fair-value hedge that also flows through income.

A reporting entity seeking to use fair-value hedge accounting for its derivatives must meet certain requirements including the effectiveness of hedge. Effectiveness is determined through a periodic assessment to confirm that the hedge is “highly” effective in offsetting changes in the fair value of the derivative with changes in the fair value of the hedged position.

Each derivative in an MNA is tested individually for effectiveness, after considering rights of offset because offsetting amounts will affect the valuation of the hedges on a portfolio level. In addition, a counterparty's credit risk is considered in estimating the hedge's effectiveness, even if it is not eventually factored into the effectiveness test. Also, we will cover the treatment of counterparty credit risk in derivative valuation next, on credit and debit valuation adjustments.

Accounting for a Cash-Flow Hedge

Cash-flow hedges are used to hedge exposure to cash-flow volatility. The accounting for cash-flow hedges differs from that for fair-value hedges. Like fair-value hedges, cash-flow hedges are recognized at fair value on the balance sheet; however, changes in value of the hedges do not flow through income but rather to OCI.

For a hedge to qualify for a cash-flow hedge, certain conditions must be met, including effectiveness tests that, like a fair-value hedge, are highly prescriptive.

Accounting for Macro Hedges

In addition to hedging particular exposures, companies also enter into hedging transactions to hedge an aggregation of exposures, known as a macro hedge. Thus, the hedge is viewed on a portfolio basis. In this case, hedge accounting does not apply, and the change in value of the macro hedge is recognized in both equity and income, and it is subject to CVAs and DVAs as discussed next.

Hedge Accounting Under IASB

The treatment of derivatives under IFRS 9 is similar on the surface to FAS 133 (ASC 813) but many details and nuances differ between the two. The IASB is currently undergoing a revision to hedge accounting under IAS 39. At this time, in 2012, an exposure draft for IFRS No. 9 is out that is intended to replace IAS 39 in 2015. IAS 39 has been criticized because it lacks principles, is strictly rules-based, and, as a consequence, there may be a mismatch between the application of hedge accounting and the entity's risk management objectives. For example, under IAS 39, an airline that hedges jet fuel with a forward contract for crude oil cannot use hedge accounting for the forward contract.

CREDIT VALUATION ADJUSTMENTS, DEBIT VALUATION ADJUSTMENTS, AND OWN CREDIT RISK ADJUSTMENT

In other parts of this book, such as Chapter 16, we touch upon the mark-to-market (MTM) value of derivative positions and outline why a position's value is different from a price paid (collected) to buy (sell) a derivative.

On top of this, the MTM value of the positions can be adjusted downward for the creditworthiness of one's counterparty. To illustrate, if an MTM position of a derivative is worth something with a highly creditworthy counterparty, the same position is worth less with a less creditworthy counterparty. Since no counterparty is truly free of credit risk, all positive MTM positions could be marked down by some amount. This is the essence of a credit valuation adjustment (CVA).

In symmetry with this concept, if one's MTM position becomes negative (goes in the favor of one's counterparty), and there is a net liability, this, too, can be marked down for one's own creditworthiness. This is a debit valuation adjustment (DVA). The DVA reflects one's own credit risk in valuing one's liabilities.

Credit and debit valuation adjustments (CVA and DVA, respectively) and own credit risk adjustments are being incorporated by financial and other institutions in response to fair-value measurement directives under both IAS and U.S. GAAP.

By way of background, both IAS and U.S. GAAP guide reporting entities on the measurement of fair value in FAS 157 (now ASC 820) and IAS 39 and also

gives reporting entities the option to report using fair value for other positions in FAS 159 (now ASC 825-10-25), such as one's own issued debt securities, and allows marking down the value of these for one's own risk.

Currently, most large financial institutions adjust the values of traded products using CVA and DVA to reflect the credit risk of one's counterparties and also for one's own credit risk. Neither FASB or IASB require that reporting entities calculate and report CVA and DVA, and neither give specific guidance on how the adjustment should be calculated, and the various ways to calculate credit risk discussed throughout this book are used in practice.

The calculation of CVAs and DVAs are tied to the MTM position valuations and, thus, are not straightforward. In fact, the calculations are involved enough that many firms will outsource the function to specialist valuation firms that will remove the quantitative burdens for companies needing to perform these calculations. Valuation specialists also provide an independent third-party validation role for the values of these relatively illiquid instruments.

IFRS 7

IFRS 7 touches on some of the other accounting issues in this chapter, so we will mention it briefly. IFRS 7 requires disclosures on a reporting entity's financial instruments and how they affect the entity's financial position, performance, and cash flows. It also requires disclosures on the risks associated with those financial instruments and the processes for how an entity manages those risks.

IFRS 7 both combines and goes beyond the disclosure requirements previously set out in IAS 32 and IAS 30. Some examples of items requiring disclosure are the ineffectiveness of both cash-flow and net-investment hedges recognized in income, provisions against impaired assets, and a ratings analysis (internal or external) to reflect the credit quality of financial assets that are neither past due nor impaired.

FINAL WORDS

The purpose of the chapter was to give the reader a flavor of some of the most common accounting implications that the credit risk manager would come across and likely need to understand in performing a credit risk management function. That said, most of the accounting guidelines are in a state of flux responding to

significant input from regulatory initiatives happening globally. We reiterate that the preceding discussion is by no means sufficient in either the depth or breath of the issues at hand.

¹ Federal Deposit Insurance Corp, “5000 – Statements of Policy: Interagency Policy Statement on the Allowance for Loan and Lease Losses,” www.fdic.gov.

PART
Four

Mitigation and Transfer

CHAPTER 13

Mitigating Derivative Counterparty Credit Risk

In Chapter 5, we explained why certain transactions, such as derivative transactions or supply/purchase agreements, of commodities generate a type of credit risk called counterparty credit risk. We also explained how to quantify it, which presents a challenge because the exposure amount changes constantly over the life of the contract. Recall that the exposure amount depends on the market value of the product underlying the transaction such as a commodity, an interest rate, or a foreign-currency exchange rate, which can vary considerably over time. This is why it is a dynamic exposure and not a fixed one. The more volatile the underlying product, the more uncertain the counterparty credit risk exposure.

It is not surprising, then, that this uncertainty has led to the development of mitigating techniques to make transactions less risky for the parties involved. A firm can have an appetite for, say, interest-rate risk, but may not want to take the associated credit risk on the counterparty. Similarly, a company may need to lock in the price of a commodity over a long period of time but does not want to be exposed to the risk of loss from its counterparty defaulting prior to the termination date of the contract.

The mitigating techniques work to isolate the risk of default of the counterparty from the underlying contract. What they achieve is to reduce, transfer, or eliminate the credit risk and leave the participants exposed either to primarily market risk for derivative transactions or to the commitment to sell or buy a product for the supply/purchase agreements related to physical delivery of commodities like oil or sugar.

MEASUREMENT OF COUNTERPARTY CREDIT RISK

As a reminder, a dynamic exposure is measured with the concepts of mark to market (MTM) and value at risk (VaR):

- The MTM value of a derivative contract is a snapshot of the economic value of a transaction at a certain point in time based on the value of the

underlying product. If it is a positive number, what traders call an in-the-money position, it indicates credit risk exposure, meaning that the contract itself has value, so if the counterparty fails to live up to the contract, there is a loss. It fluctuates with the changes in the market value of the product underlying the transaction. As such, it can be a highly volatile number. The MTM value is, therefore, closely tracked and is the driver that triggers mitigation actions. Most large financial institutions calculate MTM for all transactions generating counterparty credit risk exposure on a daily basis.

- The value-at-risk (VaR) measure of counterparty credit risk is a forward-looking measure of the exposure associated with a transaction. It aims at forecasting, with a chosen degree of confidence, a realistic value of the expected credit loss of a transaction over its lifetime should a counterparty default. It is sometimes called the future estimated exposure or potential future credit exposure. Its primary use is to set a credit limit and to calculate the amount of capital necessary to support a transaction. Thus, it has no impact on the relationship between the parties. It is an internal calculation, not shared with the other party. Note that the time horizon chosen can be much shorter than the final legal maturity of the contract, like a few days for certain highly traded products as the credit risk is present just between the time to receive the confirmation that the original counterparty defaulted and to take action, such as replacing the counterparty with another in the same trade.

Much of what we present in what follows applies to both exchange traded derivatives, which are standardized contracts that are traded on an exchange, and over-the-counter (OTC) derivatives, which are bilateral transactions between two counterparties, and in many cases they are not standard. In instances in which we describe the interaction between two counterparties, these are OTC transactions. We also introduce how the counterparty credit risk is affected by trading through a central clearinghouse and how the clearinghouses themselves mitigate their own exposure to this risk.

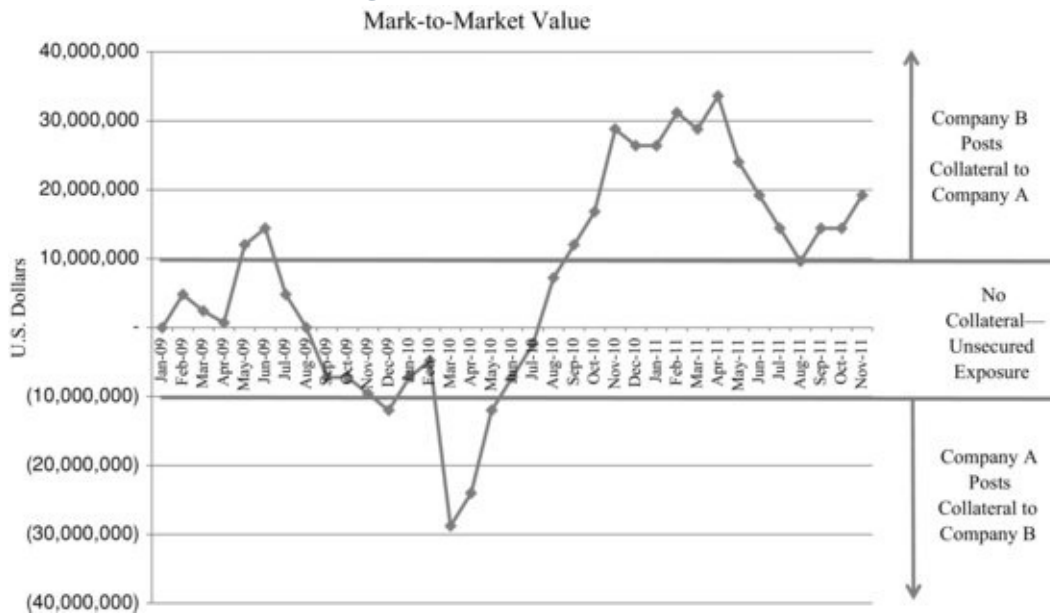
MITIGATION OF COUNTERPARTY CREDIT RISK THROUGH COLLATERALIZATION

The idea behind mitigation is to cap the counterparty credit risk exposure at some predetermined, acceptable level, known as a threshold. Mitigation is

achieved thanks to a mechanism that kicks in whenever the value of the credit exposure (i.e., the MTM value) reaches or exceeds the threshold agreed upon between the two parties involved in a transaction. As long as the MTM is below the threshold, nothing happens.

How is this accomplished? The usual process is called collateral posting, collateralization, or margining. Collateral posting has been a feature of the derivatives market for almost as long as the market has existed. This is the way it works: The counterparty that creates the exposure provides to the other party an amount of money or securities equivalent to the difference between the value of the transaction and an agreed threshold of unsecured exposure. We illustrate this process in [Figure 13.1](#).

Figure 13.1 Collateral Posting



Suppose that Company A enters into a derivative transaction with Company B and that each party has agreed to a \$10 million threshold. As long as the MTM value of the deal remains below \$10 million, nothing happens. If one day, the deal is valued at \$15 million in favor of Company A, Company B must post \$5 million of collateral. If the following day, the transaction is valued at \$17 million, Company B must post an additional \$2 million. If, on the next day, the value retreats to \$16 million, Company A must give back \$1 million to Company B. When the collateral exchange is settled, the exposure never exceeds the \$10 million that Companies A and B have agreed to take on each other.

In derivatives markets, firms are not involved in only one but in multiple trades with the same counterparty. As a result, the threshold does not apply to

each individual transaction but to the entire portfolio. The MTM value of each and every trade is calculated and then added up. Taking into account all portfolio transactions is known as netting all positions, and the mechanism is fully described in the ISDA (International Swaps and Derivatives Association) documentation presented later. Note that some deals create exposure to a counterparty and some deals give a counterparty one's own credit exposure. The result of all additions and subtractions is then compared to the threshold and to the amount of collateral already exchanged. Netting is conducted on a legal-entity basis. For example, if a firm has positive and negative exposures to two legal entities that have the same parent company, these exposures cannot be netted.

Another method of collateralizing derivative exposure that is commonly used with large corporates rated below investment grade is to cause derivatives to be secured together with loans under the counterparty's primary secured-bank-credit agreement. This is done because these corporates are generally prohibited by their credit agreements from posting separate collateral for derivatives. These highly specialized arrangements are heavily negotiated and require careful attention to the terms of the relevant credit documentation exposure.

Analyzing the Counterparty and Setting the Threshold

An essential task of the credit assessment unit is to analyze the financial strength of a potential counterparty. Like all mitigation techniques, collateral posting is not a substitute for risk analysis. It does not improve the credit quality of a counterparty but simply limits losses in case of default.

The first decision to be made is whether to transact with a counterparty at all. Before setting a threshold, a firm must be comfortable with the creditworthiness of its counterparty and with its ability to post collateral when needed. If a firm is weak and has limited access to liquidity, setting a low threshold alone is not sufficient. If the MTM value increases, a weak counterparty may not have sufficient collateral to post, or it may be precluded from posting by restrictions in its loan documents and could default on its obligation to do so. This may translate into a straight loss for all its trading partners.

For example, the inability to post collateral caused the demise of the U.S. broker dealer MF Global Holdings Ltd. in 2011. MF Global had entered into large transactions (primarily the purchase of sovereign bonds with the proceeds of repurchase agreements) whose value deteriorated quickly with the European

sovereign debt crisis. As a result, MF Global's counterparties requested collateral that MF Global did not have, which led to its default and liquidation in a very short period of time.

The second decision is to set a threshold for collateral posting. In other words, two firms deciding to do business together agree on the amount of uncollateralized or unsecured counterparty exposure they are comfortable with. In practice, there are little negotiations taking place between counterparties. The largest financial institutions agree to set very low or, most recently, even zero thresholds in order to make the transactions with each other as safe as possible. If the thresholds are not zero, they are normally based on rating agencies' ratings, or ratings-triggers. If a firm is downgraded, the threshold drops automatically and the firm must post additional collateral to its counterparties. Typical threshold amounts are shown in [Table 13.1](#).

Table 13.1 Illustrative Minimum Transfer Amounts

Debt Rating: Moody's	Debt Rating: S&P	Threshold Amount	Minimum Transfer Amount
Aaa	AAA	\$35,000,000	\$1,000,000
Aa2	AA	\$25,000,000	\$1,000,000
A2	A	\$10,000,000	\$1,000,000
Baa2	BBB	\$ 5,000,000	\$ 500,000
Ba1 or lower or unrated	BB+ or lower or unrated	0	0

The standards also contain a minimum transfer amount (MTA) in order to avoid an exchange of cash for small amounts. The idea is that if the change between two valuations is immaterial, no additional cash is required. The MTA is either a fixed amount or based on the credit rating of the counterparty, also seen in [Table 13.1](#).

Collateral relationships may be one-way or two-way relationships, meaning that, in some cases, only one of the parties may be required to post collateral.

Margin-call mechanisms are fairly standardized except for the frequency of margin calls and the manner in which collateral must be handled by the receiving party. Negotiations also take place when a counterparty, because of its status or for other reasons, either is not allowed to or not willing to post collateral. These instances are infrequent, and most happen when a counterparty is anxious to do a one-off deal that is not collateralized together with others or if a deal has end-users (which we will explain later). Credit analysts must then review the specifics of the transaction as it relates to counterparty credit risk exposure

before providing an opinion on the deal.

Weak credits, including hedge funds, are also required to post initial margin or independent amount. This may be a fixed amount but it is more commonly determined on a transaction-by-transaction basis and returned as each transaction is closed out. Under the ISDA documentation architecture discussed later, these amounts legally secure all transactions between the parties, not only the transactions under which they are posted.

Collateral Posting: The Valuation Agent

For each bilateral collateral relationship, one party is legally responsible for the computation of the MTM values of each transaction in the portfolio and for the valuation of the collateral already posted. This party is called the valuation agent.

The computations of MTM values and the valuation of existing collateral start after market closing to take into account the most recent information available. The results are available to back offices when they arrive in the office the following morning. They then share the numbers with all their counterparties and ask for additional funds (if the MTM values have deteriorated and/or if the collateral assets have lost value) or announce a refund (when they have too many collateral assets). Asking for collateral is known as making a margin call.

If the process works well, the counterparty credit exposure will exceed the threshold only for a few hours, between the market closing and when the collateral assets are received. Thus, the uncollateralized exposure is of short-term nature and, absent strong volatility, does not pose much additional risk. Notices of margin calls have to be sent early, typically before 1:00 p.m., and the funds must be transferred the following business day. In practice, most firms endeavor to settle all margin calls the day they receive the notice.

What happens if the counterparty fails to post collateral? It is considered to be a breach of the master agreement between the parties and the asking counterparty then has the right to terminate all transactions and liquidate the positions to reduce its losses. Assume, using the same prior example, that the aggregate MTM value of all trades goes one day from \$12 million to \$15 million and that the threshold is \$10 million. Let's also assume that the counterparty had met its previous margin call and had posted \$2 million. If it is unable to post the additional \$3 million, the trades are liquidated. Absent more changes of MTM value, this leads to a gross loss of \$15 million and the net loss is \$13 million.

In exceptional cases, credit assessment teams of the counterparties can agree to exclude a particular trade from collateral posting requirements, meaning that no collateral is required, regardless of the MTM value of the trade. These rare and increasingly uncommon cases involve the largest and most creditworthy firms that have great bargaining power, and they may have short-term trades that are difficult to value. Also, in some instances, an entire derivatives relationship with a very creditworthy firm, typically a large corporate, may be uncollateralized.

Acceptable Collateral

Collateral assets must meet the following basic criteria to truly mitigate credit risk:

- **Credit quality:** Collateral must have high credit quality. The collateral received to mitigate counterparty credit risk cannot pose credit risk in its own right. For example, low-rated bonds posted as collateral may themselves default. Thus, usually only high-quality collateral is normally accepted, such as those with ratings of at least AA/Aa or even the increasingly rare AAA/Aaa bond.
- **Liquidity:** Collateral must be liquid; that is to say, it can be sold easily. If a counterparty defaults, the trades are liquidated and the collateral assets are sold to maximize the amount of money recovered. Instruments with deep markets like government bonds are preferred because they can be sold easily. Even high-quality corporate bonds can take time to sell or be subject to wide bid-ask spreads. Furthermore, highly liquid collateral assets are easy to value, which greatly facilitate the process.
- **Price stability:** Collateral must have price stability. If the collateral's price is volatile, the price movement between two valuation dates can cause losses. A sharp decline of MTM values can trigger a margin call that is, at best, settled the following day, which thereby exposes a firm to additional credit risk. Similarly, money can be lost between the time that the decision to sell collateral assets is made and that the proceeds of the sale are actually collected. Price stability is not an issue when cash is delivered, but it has to be taken into account for other forms of collateral. In practice, when the price of collateral is volatile, haircuts, as described later, are applied.
- **Correlation:** Collateral must be uncorrelated with the transaction. To be effective, collateral must not be correlated either with the counterparty or with the underlying product. If the risk of the counterparty defaulting

coincides with the loss of value, or even the default, of the collateral, the mitigating efforts are close to worthless. This is called wrong way collateral, which means that, instead of providing security to a transaction, the value of the collateral assets declines when the exposure increases.

- Security interest: The party must have a perfected security interest in the collateral. The right to truly own and liquidate the collateral in a default scenario must be conveyed to the party that receives it. In case of default, a third party must not claim the rights to the collateral. Bulletproofing this security interest is the domain of lawyers who specialize in these transactions.

Occasionally one or more of these requirements may not be met when a counterparty, typically a fund or similar entity, insists on posting only certain classes of assets that it is likely to have available. Normally adjustment is made in this situation by requiring initial margin or overcollateralization in some form.

Haircuts

In a perfect world, collateral would always consist of cash, which is completely liquid, stable, and void of credit risk. However, in the real world, companies often have to compromise and settle for assets other than cash. All financial assets have a specific risk profile, and some may score well for credit quality but less for liquidity or price stability, and vice versa. To address this issue, the industry has developed the usage of haircuts, or valuation percentages, that represent a discount applied to the face value of collateral, which is less attractive than cash. The haircut serves to adjust for the difference between the amount of money expected to be recovered and the actual proceeds of the liquidation. Small haircuts are applied to high-quality and liquid collateral with limited price volatility. Conversely, collateral assets presenting more credit risk, being less liquid and prone to price changes, bear larger haircuts. Note that longer U.S. Treasury obligations are subject to haircuts due to price volatility.

If collateral belongs to a family with a haircut of 2 percent, it means that $100/98$ percent = 102.04 percent of the requested amount must be posted. In other words, \$1 million of collateral can only cover \$980,000 of margin requirements. The concept of haircuts is also central in the design of repurchase agreements, or repos, presented later in this chapter.

In [Table 13.2](#) we present examples of haircuts used in the industry.

[Table 13.2](#) Collateral Haircuts

Eligible Credit Support	Valuation Percentage
Cash in eligible currency	100%
U.S. Treasury obligations having a remaining maturity as of the relevant valuation date of not more than 1 year	100%
U.S. Treasury obligations having a remaining maturity as of the relevant valuation date of more than 1 year but not more than 5 years	99%
U.S. Treasury obligations having a remaining maturity as of the relevant valuation date of more than 5 years but not more than 10 years	97%
U.S. Treasury obligations having a remaining maturity as of the relevant valuation date of more than 10 years	95%

Readers interested in accessing more detailed information on eligible credit support are encouraged to visit ISDA's website (www.isda.org).¹

Segregation of Money

In most jurisdictions, including the United States, entities that receive collateral from clients to secure derivatives transactions are supposed to segregate the money coming from other sources. That means that the funds received must not be used for other purposes than the derivatives transactions. In particular, they must not be commingled with the entity's own money and must not be used as a source of liquidity for operating expenses or to collateralize the entity's own derivatives transactions.

Imagine that the MTM value of trades move against the entity that received the funds. The entity must then give back some of the collateral assets to the other party. If the funds have been used and are not available, this party would not be able to receive back its own money.

The segregation of accounts is a fundamental principle, but it is also a big risk for all derivatives players because there is no easy way to verify that the counterparties are keeping the funds they deliver separate from other sources. There is a major risk of fraud, which was demonstrated when MF Global Holding filed for bankruptcy in 2011. As this book goes to print, liquidators were still investigating the case, but the mass media regularly reported that hundreds of millions of dollars of assets belonging to MF Global's customers had been used by the company for its own purposes, that is, essentially collateralization of proprietary trading.

LEGAL DOCUMENTATION

Standardizing the legal documentation governing derivatives transactions is achieved thanks to the widespread use of documents published by ISDA. Legal documents between parties engaging in derivatives transactions are negotiated but have their foundations in the ISDA documents and, to the extent possible, deviate little from these, especially for the most liquid and simple trades. Customizing documentation creates risk since it invites opportunities for events not anticipated and, thus, creates additional exposure.

There are three fundamental documents related to derivatives transactions:

- 1. The ISDA master agreement:** This is the cornerstone of the legal relationship between two entities. There is ordinarily only one for all derivatives and similar transactions between two trading parties. However, if a firm operates through several subsidiaries, each legal entity is required to have its own master agreement in place. Once the master agreement is completed, it is rarely modified, except to reflect major changes in the organization of one party. It does not normally contain any deal-specific information.
- 2. The credit support annex to the master agreement (CSA):** This is the most important document for credit risk management purposes as it specifies key parameters such as the valuation process, thresholds, eligible collateral, and corresponding haircuts. In practice, it is the only document credit analysts review. Specialized legal-staff members negotiate the other documents. The CSA also contains a dispute resolution mechanism in case of disagreement over valuations of MTM or collateral assets. It is placed as an annex to the master agreement.
- 3. The confirmation:** This document spells out the economic terms of each individual trade.

DEALERS VERSUS END-USERS

In the derivatives market, a distinction is made between dealers and end-users. A dealer is a financial institution that enters into a derivatives transaction either for its own trading book of business or to intermediate transactions across clients. The largest U.S.-based derivatives dealers are Bank of America, Citigroup, Goldman Sachs, JPMorgan Chase, and Morgan Stanley. An end-user is a party

that enters into a derivative transaction in order to hedge risk associated with its business operations. The idea is to offer different treatment to dealers who act for their own account or as intermediaries, and to firms for which financial products are not their main business but a support to their core activities.

Differences in treatment arise mainly in the collateral posting requirements and also in the clearing process, which we cover next. Generosity is extended to end-users, who may have less access to collateral than a financial institution and, therefore, may be unable to post collateral when needed. Credit analysts have to carefully study the creditworthiness of these potential counterparties and the nature of the trades that are envisaged with them. As a result, the volume of business can be limited and the type of transactions restricted to deals presenting less risk.

BILATERAL TRANSACTIONS VERSUS CENTRAL COUNTERPARTY CLEARING

The margin requirement used in bilateral transactions is a long-standing risk mitigation technique. It has served its purpose and has been tested with success in a large number of bankruptcies where it proved to be an efficient tool in reducing losses after a counterparty's collapse. Over time, market participants became comfortable with taking a level of credit risk that spawned the fast development of the derivatives markets.

However, for all institutions involved in business that is generating dynamic credit exposures, collateral posting creates some issues. We summarize the three most significant ones:

1. Margin requirements are highly inefficient as each and every bilateral trade must be collateralized, which leads to many exchanges of collateral for related trades. Consider the case of an interest-rate swap between Company A and Company B.

In this instance, given the MTM value of the swap, Company A has posted collateral. At a point in time, Company B may wish to exit the position, but Company A may not wish to terminate. Thus, to accomplish the same objective, Company B enters into a similar swap with Company C, only this time it takes the other side of the trade. The MTM value of the two swaps are close in value, so Company B has to post collateral to Company C. As a result, in this simple example, twice the collateral is being posted for the

same positions taken. It is easy to imagine that in a world in which so many related transactions are closed every day, many firms across the globe have to post collateral to each other. This is inefficient, costly, and leads to operational errors. In very large relationships involving many thousands of trades, significant errors may occur frequently because the parties have not agreed on the universe of trades they have in place, a process called portfolio reconciliation, or simply “port rec.”

2. Margin requirements have systemic risk. The entire financial industry is exposed to the default of even a single counterparty. As firms have business relations with up to thousands of counterparties, if one company defaults, it exposes the whole industry to potential losses. If the collateral assets in place are properly valued and all the assets deposited with the defaulted party are accounted for, losses will be limited to the unsecured exposure (i.e., the threshold for margin requirement). In reality, it is not unusual that in case of a large-scale bankruptcy, the liquidation process is not very smooth. Volatile prices may prevail causing the positions to be closed out at levels causing losses far in excess of the collateral. Deposited assets may be lost or frozen as part of the bankruptcy procedures. In short, with even only bilateral relationships between trading counterparties, the default of a single entity can have a devastating effect on the entire industry and trigger consequences difficult to forecast. These were precisely the circumstances in 2008 when the U.S. government took over AIG. AIG was involved in hundreds of billions of dollars of derivative transactions and the government feared that its failure would trigger a domino effect, that is, other major bankruptcies. The ultimate consequence remains unknown had the U.S. government not stepped in.

3. Margin requirements are resource intensive. In addition to the IT platform necessary to compute MTM positions and collateral requirements, back offices must handle the collateral assets they receive from counterparties and transfer assets to counterparties when required to do so. For large institutions, the numbers are big and the process cumbersome and prone to operational errors. The largest financial institutions can hold more than \$100 billion of collateral assets and employ hundreds of people to manage the entire process, which is complex and costly.

An alternative to a bilateral transaction is to trade with a central counterparty—a CCP or a clearinghouse. Clearinghouses specialize in intermediating derivatives transactions. They are not involved in the negotiations of the trades,

but when two parties agree on terms, the parties inform the clearinghouse, which becomes the legal counterparty of the two parties or, in the United States, of intervening Futures Commission Merchants (FCM). Instead of facing the credit risk of the trading partners, each party ultimately faces the credit risk of the clearinghouse. Collateral assets are no longer posted to the party that is actually on the other side of the trade but to the clearinghouse, which is also responsible for the MTM of transactions and the calculation of the margin requirements. These functions are called clearing. The biggest advantage is that instead of bearing credit risk of multiple counterparties, all firms are ultimately facing only one party. If the clearinghouse is properly capitalized and managed, it should not default because it does not take any risk itself. It is just an intermediary and is exposed only to the risks associated with intermediation.

When one firm defaults, only the clearinghouse is involved in the bankruptcy proceedings. It should have sufficient collateral assets in hand and, if needed, be sufficiently capitalized and have access to guarantee funds supplied by its members to support losses in excess of the collateral.

Clearinghouses can be organized as an industry mutual, meaning owned by the financial institutions that are their members that use their services to clear trades. They can also be organized as public or privately owned companies. Examples are IntercontinentalExchange (listed in New York under the ticker ICE), the CME Group, or LCH.Clearnet in the United Kingdom.

Generally speaking, clearinghouses have no tolerance for credit risk and are very strict and consistent in asking for a high level of collateralization pursuant to their official rules. They carefully select which entities they accept as clearing members. They may require an initial margin to allow a counterparty the right to conduct trading, before any clearing actually occurs. The initial margin provides the clearinghouse with a cushion against the market volatility in case a counterparty defaults.

Historically, most OTC derivatives transactions were bilateral. With the meltdown, regulators around the globe have scrambled to move all standardized OTC derivatives trading into the highly capitalized central clearinghouses. The absence of central clearing for credit default swaps and other OTC derivatives has been frequently cited as a major contributor to the 2007 mortgage crisis in the United States that quickly transformed into a major banking crisis.

In the foreseeable future, fewer trades will remain bilateral, with the exception of end-user and one-off transactions. For those transactions that remain bilateral, other features to expect are additional and possibly more frequent margin

requirements, such as posting a multiple of regular margin calls, or the need to have the collateral assets held by third-party custodians. Furthermore, for derivatives that remain traded on an uncleared basis, regulators will require financial institutions to hold a large amount of capital for these, which may make them uneconomical.

The biggest question mark is what would happen if a central counterparty fails. It is supposed to provide stability to the financial system yet it concentrates the exposure of all market participants (and possibly the world economy) to one entity. The amount of collateral assets deposited at major CCPs is astronomical. It is not hard to imagine that a failure could cause a chain reaction of a larger magnitude than the default of single bankruptcy. As usual in the realm of credit risk management, risk can be reduced but neither completely anticipated nor completely eliminated.

PRIME BROKERS

When large international financial institutions dominated the derivatives market, it was relatively simple to assess the credit quality of the trading partners and to make informed decisions. As more and more firms entered the trading world, the task became much harder. For instance, risk analysts now have to review the financial situations of a myriad of privately held hedge funds with short histories, few employees, and limited funds. Despite uncertain credit quality and sometimes untested business models, because hedge funds are major players in certain financial markets, financial institutions would be at a competitive disadvantage not to do business with them. Conversely, hedge funds do not want to limit their business to a small number of counterparties, because their business model is to exploit opportunities wherever they arise. As such, they are interested in giving confidence to potential partners.

This situation led to the rapid development in the early 2000s of prime brokers. Major banks like Goldman Sachs, J.P. Morgan, or Morgan Stanley specialize in dealing with hedge funds and have prime brokerage operations. One of the major roles of a prime broker is to act as an intermediary between a hedge fund and its ultimate counterparties. When hedge funds place trades, they negotiate directly with their counterparties, which in prime brokerage terms are called executing dealers. However, upon execution, a transaction is given up to their prime broker so that the prime broker is the entity the counterparty faces. The prime broker executes back-to-back transactions with both the hedge fund

and the executing dealer. The executing dealer, therefore, does not take any credit risk on the hedge fund but, instead, only on the prime broker. Collateral requests are met by the prime broker and not by the hedge fund. It is up to the prime broker to analyze the creditworthiness of the hedge funds they want to do business with and to provide them with liquidity. They are specialized in such a function, so they can employ specialized staff.

Prime brokerage has been around the financial services industry for a long time, but it was not very active until recently. With the recent proliferation of hedge funds, it became a major business unit and massive source of revenue for the major players. The difference between prime brokerage and clearing is that prime brokerage includes other services such as securities lending and repo, so, unlike a clearinghouse, the prime brokerage seeks to make money by extending credit to its customers. In addition, prime brokerage provides customers a wide array of financial services including crediting customer accounts with proceeds from short sales. In a prime brokerage relationship, normally all the products furnished by the prime broker are cross-collateralized, so that the customer receives netting benefit. The prime brokers themselves use clearinghouses to conduct trading including trading on behalf of their customers.

REPURCHASE AGREEMENTS

Repurchase agreements, known as repos, are a type of transaction that generates counterparty risk. Repos are a commonly used financing technique involving two parties. One party, the borrower, sells a security and commits to buy it back at a predetermined price and at a certain date. The other party, the lender, temporarily purchases the security against cash and sells it back at the agreed date. The risk taken by the lenders is that the securities are not repurchased due to the inability of the borrower, thus repos can be characterized as presenting counterparty risk.

As a convention, the expression *repo* is used to describe the viewpoint of the borrower and *reverse repo* refers to the same transaction but described from the point of view of the lender.

Repos involve collateral management, in a way similar to what has just been described. Repos are legally purchases and sales but are in economic effect a form of secured lending. The main difference with other forms of secured loans is that the value of the collateral asset has to be maintained at an agreed level

during the lifetime of a transaction. In order to strengthen credit risk mitigation, repos are overcollateralized. This means that, in order to receive, say, \$10 million of cash, the borrower must provide more than \$10 million worth of collateral. If the collateral assets' value declines, the borrower receives a margin call and must provide additional collateral. If it fails to do so, the agreement is terminated and the collateral liquidated by the lender.

Institutions utilize repos to raise cash, and, during the period when the money is borrowed, the ownership of the security is in fact transferred. Money can be raised for general purposes. Another usage is to finance the purchase of securities. By pledging them immediately as part of a repo agreement, the buyer of the securities has just to fund the overcollateralization amount.

Conversely, repos are a way for institutions with cash available to lend money, taking limited credit risk on the borrower, and being well paid to do so. The repo agreement states the repurchasing price of the security, which is higher than the original purchase price, which provides a fixed-rate interest payment to the lender. Therefore, it is viewed as a cash investment.

From a risk management perspective, the credit analysis is very similar to the process described earlier. The first step is to become comfortable with the creditworthiness of the counterparty. The presence of collateral is a strong mitigant but not a sufficient condition to lend money to weak companies. Once a counterparty has been accepted, transactions are structured in a way to almost eliminate the credit risk via overcollateralization.

The overcollateralization is achieved via haircuts as described earlier. Haircuts are based on the type of security temporarily purchased including corporate bonds, government bonds, and a broad array of other types of securities. The more volatile, the less creditworthy, and less liquid the asset is, the larger the haircut.

Transactions are typically of short-term nature, normally less than one year. Some involving U.S. Treasuries have a lifetime of one day and are called overnight repos. Repos are documented with standard documents. In the United States, the master repurchase agreement published by The Bond Market Association (TBMA) is utilized, and outside the United States the global master repurchase agreement published by TBMA and the International Securities Markets Association is utilized.

Finally, let us mention that one of the largest repo markets involves central banks that provide funding to private banks against collateral. In the aftermath of the 2007 crisis, central banks were actively providing liquidity to banks in their

jurisdictions via repo transactions.

FINAL WORDS

Standardization in mitigating counterparty credit risk for derivatives transactions has promoted the usage of these markets and made them more efficient. However, the vast majority of transactions presently happens bilaterally, and the lack of transparency about which firms have exposures to which counterparties, coupled with the possibility of the exposures exceeding the posted margin poses a threat of systemic losses. The movement toward central clearing will usher in significant changes to how counterparty credit is managed. Although, in principle, central clearing has advantages by having operational efficiencies, standardized collateral management, and risk pooling, the reality is that each clearinghouse operates differently from others, and full transparency is not always present. By moving trades into a clearinghouse, companies are taking significant exposure to concentration risk. The clearinghouse will be more creditworthy than an individual counterparty, but moving from taking credit risk from an assortment of counterparties to one large counterparty introduces a new form of risk for derivatives trading.

¹ ISDA, the International Swaps and Derivatives Association, Inc., is a global trade association of swaps and derivatives dealers who participate in the privately negotiated (OTC) derivatives industry. The website has collateral guidelines, “2005 ISDA Collateral Guidelines,” posted in its white paper section, www.isda.org/publications/pdf/2005isdacollateralguidelines.pdf. These guidelines govern the vast majority of OTC derivatives transactions.

CHAPTER 14

Structural Mitigation

In this chapter, we will present structural techniques used to mitigate the default risk of a debt instrument and to reduce the impact of a default by increasing the recovery rate.

In Chapter 6, when we reviewed how to analyze the creditworthiness of a corporate, and in Chapter 8, when we reviewed how to analyze the securities issued by a special purpose vehicle, we focused on the cash-flow-generating ability of an entity. What is different in this chapter is that we will examine how the debt instruments can be structured up front to protect investors when the financial performance of the issuing entity is deteriorating. The two topics are closely related and complementary. Before considering investing, credit analysts must thoroughly analyze the issuing entity. Then, in a second step, they must focus on the debt itself and the way it is structured. All details regarding the structural elements are found in the various legal documents prepared at the time of the originating transaction.

The techniques we will review are structural insofar as they are either embedded in the way the financial instrument is engineered and documented or they utilize the support of third parties. There is a large variety of ways to strengthen a transaction to reduce its credit risk or to increase the recovery in case of default. There is no limit to creativity. Investors benefit from a steady evolution of structural features, which gradually become market standards.

For credit analysts, supporting the structuring of a transaction is an enriching experience. Rather than rejecting a transaction considered too weak, a good professional can add value by helping design mechanisms aimed at making deals stronger. The main objectives to good structuring are to protect creditors against a deterioration of the financial performance of the counterparty during the lifetime of the transaction and to enable transactions with weak counterparties.

We will also cover ways to offer investors a chance to trade risk versus return in securitization schemes. This is accomplished primarily by tranching, which creates senior and junior obligations of debt issued by special purpose vehicles.

TRANSACTIONS WITH CORPORATES

Corporate borrowers primarily use loans and bonds as their preferred funding instruments, and these, with letters of credit (LoCs), all generate default risk. Since the structural mitigation techniques used for loans are similar to those used for bonds and LoCs, we will focus our attention to loans in this section.

Commercial loans are old and simple products, whose technology has been well tested through numerous economic cycles. There has been little innovation over the years and all market participants know well how to make a loan stronger or weaker. Competition in the marketplace will dictate to some degree the strength of the structural mitigants. During credit crunches, banks lend reluctantly, and borrowers have strict conditions imposed on them, in addition to paying a high interest rate. The lower their credit quality the tougher the terms are. Conversely, when the economy is growing, banks want to increase their revenues and chase business. Competition leads to softer conditions in favor of the borrowers.

The loan documentation is the set of legal documents agreed on by lenders and borrowers. The most important one in the set is the “credit agreement,” which contains all the details of the loan. From a credit risk management perspective, the most relevant loan details in the credit agreement are related to four main topics: the priority of payments, the security package, the covenants, and the definition of the “events of default.” We will review these four aspects in the following sections, but before that, we present an overview of the loan market.

Segmentation of the Commercial Loan Market

The main parameter that dictates the lending conditions offered to a borrower is its credit rating. Loans to investment-grade companies are treated completely differently from loans to noninvestment-grade companies. Furthermore, markets for these loans are not the same. [Table 14.1](#) is a high-level presentation of the two markets. New terminology is introduced in [Table 14.1](#), which we explain in the following sections.

Table 14.1 Segmentation of Commercial Loan Borrowers

Investment-Grade Borrowers	Noninvestment-Grade Borrowers
<p>Borrowers are well-established companies. All loans are <i>pari passu</i>, i.e., all lenders are treated the same way and have the same level of seniority.</p> <p>Loans are typically unsecured.</p> <p>Loans are syndicated and purchased by large commercial banks, in order to anchor a</p>	<p>Borrowers are low performing and/or very leveraged companies. Some companies that have been acquired by private equity firms (as part of a leveraged buy-out scheme) are in this category.</p> <p>Loans with different priorities of payments are created, placing some creditors ahead of others in case of liquidation of the borrower.</p>

relationship. Covenants are simple and not very restrictive, except for borrowers with a rating close to noninvestment grade. Many facilities are unfunded because borrowers want to have the option to borrow but do not necessarily need the cash all the time. They are called revolvers.	Loans are structured by large investment banks but distributed to specialized investors like hedge funds or structured finance vehicles (primarily collateralized loan obligations or CLOs—see Chapter 16). All loans are secured by some of the borrower's assets. Covenants are very strict. Loans are fully funded at inception. They are called leveraged loans or high-yield loans, a reference to the high interest rate paid by the borrowers.
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Senior versus Junior Debt

In case of default or liquidation of a company, all creditors are not treated equally. In most cases, the liabilities of the defaulted company exceed its assets, so a decision has to be made about who is paid and when. The court in charge of the bankruptcy procedure or—if the company cannot be reorganized—the liquidation process ultimately decides which creditors receive the available funds in priority. The priority order is the result of a number of factors:

- The legal environment. For example, the company is legally required to pay outstanding taxes or workers compensation insurance for employees. The tax authorities and the workers compensation insurer typically do not participate in the negotiations among creditors. They can demand payment because, if they are unpaid, the rights of a company to operate during a bankruptcy procedure or reorganization are forfeited.
- The judgment of the court. For example, key suppliers are paid before lenders to keep the business afloat and avoid immediate liquidation. It is not uncommon to try to maintain a company's operations in order to try to recover as much as possible for all creditors. If suppliers are not paid, they stop delivering their goods or services, which accelerates the demise of the firm. Suppliers are, therefore, typically paid before lenders.
- The terms of the legal agreements with the creditors. We focus on this aspect later.

When issuing debt, companies can create instruments that have various priorities of payments. This technique is known as subordination, and the products that are created are senior and junior debt. The debt can be loans or bonds. Senior means that the lenders are paid back first. Junior means that they are paid back if money is left after all senior debt has been repaid. Junior debt, therefore, stands between the senior debt and the equity. Junior debt holders and equity investors have a residual claim on the assets on the firm, in that order. They have a chance to be repaid only after senior creditors have been fully paid

back. As a consequence, junior debt is, for the issuer, more expensive than senior debt. In case of financial stress, the expected recovery rate of junior debt is, by definition, lower than that of senior debt. It is a riskier investment, which warrants a higher interest rate for loans and a higher coupon for bonds.

There are various forms of junior debt such as hybrid capital, which has been issued primarily by financial institutions. As the name suggests, it contains some debt-like and also some equity-like features. In the past, it offered a way to raise cash to strengthen a capital base and meet ratios demanded by regulators. More recently, new regulatory initiatives presented in Chapter 11 have essentially disallowed financial companies from counting hybrid capital toward meeting regulatory capital requirements. Only limited credit is now given to hybrid capital. In the past, the most popular instruments were preferred stocks, trust-preferred securities, and mandatory convertible securities. All instruments are deeply subordinated.

Secured versus Unsecured Loans

A secured loan is a financing instrument that first relies on the cash flow generated by the borrower to pay interest and principal, and second on a lien on some assets (the collateral) to reduce the loss in case of default. As long as the borrower is able to make the scheduled interest and principal payments on the loan, the assets taken as collateral remain in the possession of the borrower. However, if the buyer misses a payment, the lender has the right to seize the assets and sell them to recover its losses.

The easiest example of a secured loan is a mortgage, be it a residential mortgage to an individual or a commercial mortgage to a developer. Lenders have a lien on the property, that is to say, the right to repossess it if certain conditions are met. When the borrower honors all payments legally due, the real estate assets stay with the borrower, but when the borrower defaults, the lender can foreclose the property.

All types of assets can be taken as collateral to a loan. The general rule is that short-term assets (e.g., receivables) secure short-term loans and long-term assets (e.g., building or equipment) secure long-term loans.

Obtaining assets to secure a loan does not increase the credit quality of a borrower. Its probability of default is not affected by the security package of the loan. The credit analyst's job remains unchanged: to thoroughly assess the financial strength of the borrower in order to make a lending recommendation.

The security package comes into play when forecasting the expected recovery in case of default. When a secured loan defaults, it is expected that the recovery will be higher than the recovery of an unsecured loan of similar seniority. The secured lenders have access to the pledged assets and the unsecured lenders have to share the residual assets with all other creditors.

Forecasting the recovery value of an unsecured instrument is difficult. Among other things, one has to estimate future values of balance sheet items, which is particularly challenging when dealing with intangible assets. In contrast, assets taken as security of a loan agreement are normally tangible and well delimited. As such, their valuation is a manageable and meaningful exercise.

For a credit analyst, there is a big difference between the assessment of an unsecured loan to a high quality borrower and a secured loan to a weak one. For the former, the analyst thoroughly analyzes the cash-flow generation ability of the borrower and must be convinced that the cash flow will be around until the maturity of the investment. Little consideration is given to the residual value of the assets. As we described earlier in Chapter 4, financial institutions make recovery assumptions for pricing and for modeling their portfolio. They typically use 40 percent for all senior unsecured facilities, a conservative proxy since the historical average is somewhat above this.

The analysis of a secured loan follows a similar process as far as the credit assessment of the borrower is concerned. However, lenders recognize that a borrower's ability to repay a loan could be impacted by the occurrence of even mild economic events or operational issues and that, on a stand-alone basis, it would be risky to extend the credit, that is, fund the loan. This is why a pledge on assets is required. Credit analysts must, therefore, also become comfortable with the value of the collateral being proposed. They must thoroughly assess what the recovered value could be in case of bankruptcy. To do this, the support of experts like property assessors is often necessary.

Covenants

Covenants are conditions imposed on the borrower as part of a loan or financing facility, such as an LoC. Their objective is to maintain the risk profile of the borrower by keeping the borrower from deviating too much operationally, financially, or strategically from its current path. Lenders impose a list of things that a borrower can or cannot do in order to maintain its credit quality as long as the loan is outstanding.

For credit analysts, negotiating tight covenants represents a guaranty that the borrower will endeavor to maintain its creditworthiness regardless of the evolution of its economic and operating environments. Failure to maintain the conditions of the covenants is a default event and the loan becomes immediately due. In the real world, breaching covenants does not necessarily translate into a forced default by the creditors. If the parties agree, covenants can be waived or reset against compromises from the borrowers, like a price increase, or, in the case of a secured loan, the provision of additional collateral.

Solid companies are able to benefit from generous covenants. Their market power combined with competition among banks enables them to obtain favorable covenants. Thus, the covenants would not constrain them unless their situation became dire in a short period of time. As long as they perform at a level close to where they were at the inception of the loan facility, covenants will not prevent them from operating normally.

In contrast, weak companies face tight covenants that limit their financial flexibility. Lenders want to control the activities of the borrowers, which are prevented from making any decision that could significantly change their financial profile.

The market standards revolve around three types of covenants:

- 1.** Affirmative covenants list what a company must do to maintain its business in good shape, for example, keep a legal existence, maintain its building, and preserve trademarks. Also, borrowers commit to provide financial information on a regular basis to lenders.
- 2.** Negative covenants limit what a company cannot do as long as the loan is outstanding. The main elements are (1) the limitation on taking on other secured debt, which prevents other creditors from accessing the borrower's assets; (2) the limitation on sale and leaseback transaction, for the same reason as above in point 1; and (3) an interdiction to merge with another firm, to sell itself (change of control) or to sell significant assets.
- 3.** Financial covenants are a subcategory of the negative covenants. They come in different forms: Maintenance covenants require an issuer to meet certain financial tests every reporting period. Incurrence covenants require that the borrower remains in compliance when it takes an action like paying a dividend, entering into a merger or an acquisition, or issuing more debt.

The most common examples of financial covenants are a minimum coverage ratio (cash flow or EBITDA over specified expenses like interest payments),

leverage (level of debt relative to assets or equity), current ratio, tangible net worth, and maximum capital expenditures.

To recap, the stronger the borrower, the less restrictive the covenants are. Additionally, as with other lending terms, the economy and competition between lenders influences the rigidity of the covenants. As such, loans originated during tough economic times will have restrictive covenants, and when the economy improves, loans even to the same borrower will have looser covenants. Loose covenants give way to what is called covenant-lite, or simply cov-lite, loans. When lenders accept incurrence instead of maintenance covenants, this is a favorable period for borrowers. Requiring a company to meet solvability and liquidity criteria only in a particular instance enables it to deviate from its path and perform worse than if it had to abide to maintenance covenants, which must be respected at all times.

Events of Default

The definitions of *events of defaults* are fairly standard, but credit analysts must, with the assistance of their lawyers, review them carefully to avoid surprises. The focus must be on what constitutes a default, what kind of grace period is granted, and the relationship with the other debt facilities of the borrower. Events of defaults also contain provisions about the consequences of false representations and inability to enforce a parental guaranty. A mis-representation or problem with a parental guaranty typically would trigger a default the same way as a missed payment.

The consequences of all events of default are similar: All sums, including principal, accrued interests, and fees owed to the lenders become due immediately.

Impact of Structural Mitigants on Default Probability

The default probability of a borrower is not modified by the creditor's position in the priority of payment chain or by the loan's security. Senior and subordinated debt have the same likelihood of default. If a borrower does not generate enough cash to finance its operations and service its debt, it defaults. All financing agreements include a cross-default clause, which means that the default on one facility automatically triggers the default on all facilities. Borrowers cannot pick and choose what they want to pay if they run out of cash. It is the responsibility of the bankruptcy judge to decide how the available money is disbursed.

As far as covenants are concerned, restrictive covenants can increase the default probability for a given time horizon because a borrower may default if it breaches a covenant, even if it has some cash left to service its debt for a few more weeks or months. Lenient covenants can extend the time before default is triggered; the company that will ultimately default operates above default thresholds only because the thresholds are low. Operations continue even though the financial situation of the company deteriorates.

Impact of Structural Mitigants on Recovery Rates

In theory, covenants have no impact on the recovery rate because they do not give access to more or less collateral. However, covenants that contribute to a delayed default, like incurrence covenants, have the potential to lower a recovery rate. When a borrower ultimately defaults, its assets may have lost considerable value and the creditors, especially the subordinated ones, recover much less money than if the default would have occurred earlier with the existence of more restrictive maintenance covenants.

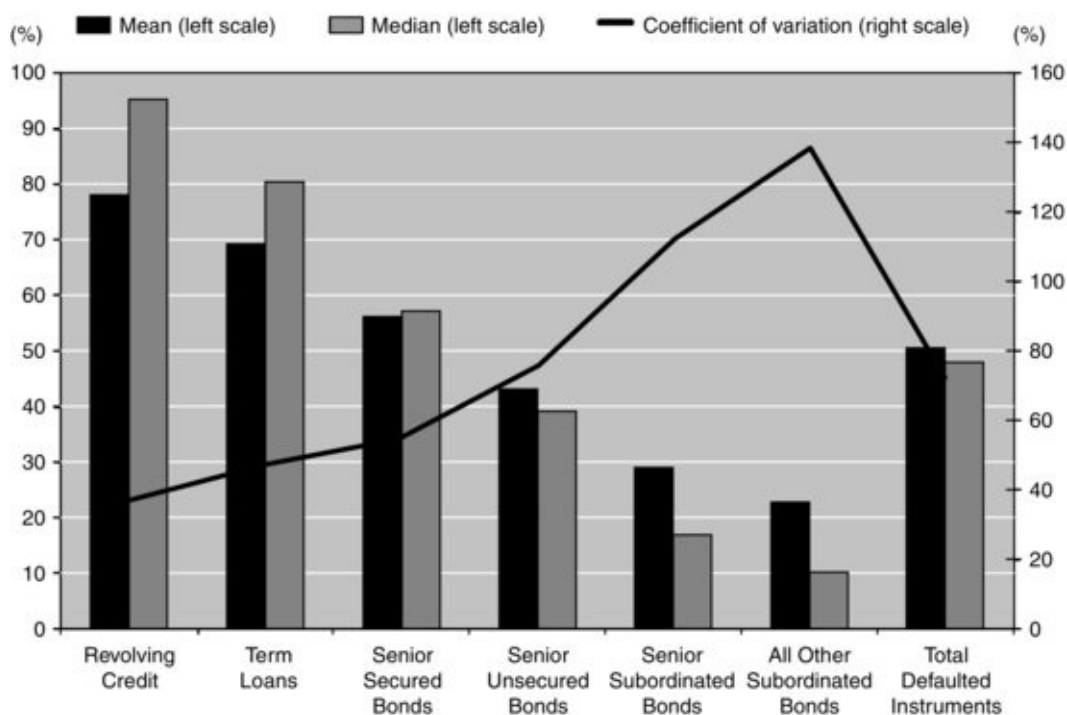
The seniority of the loans and the existence or not of a security package have a major impact on the ultimate amount lost by lenders in case of default. As explained earlier, this is actually the very reason that loans are secured. Without collateral, lenders would be reluctant to provide funds. With collateral, they know that their losses will be reduced or even eliminated.

There are multiple sources of historical data for recovery rates of defaulted financial obligations. One example is Standard & Poor's, which publishes statistics like the ones presented in [Figure 14.1](#).

[Figure 14.1](#) Discounted Recovery Rates by Instrument Type, 1987 to 2009

Sources: Diane Vazza and Nick Kraemer, *Default, Transition, and Recovery: 2011 Annual Corporate Default Study and Rating Transitions*, March 21, 2012, Standard & Poor's Financial Services LLC.

Security and Position in the Capital Structure Matter



In the mid-2000s, Standard & Poor's went one step further and began assigning recovery ratings to leveraged loans which enabled bank loans to be rated. In [Table 14.2](#), a bank loan rating (BLR) starts with the borrower's corporate credit rating (CCR), which is then modified by an expected recovery rate. In the event of a high recovery rate, there's an uptick to the rating. We remind readers that *notch* means a + or – ratings step.

Table 14.2 Recovery Ratings Scale

Recovery rating	Recovery description	Recovery expectations*	Issue rating notches relative to corporate credit rating
1+	Highest expectation, full recovery [¶]	100%	+ 3 notches
1	Very high recovery	90%–100%	+ 2 notches
2	Substantial recovery	70%–90%	+ 1 notch
3	Meaningful recovery	50%–70%	0 notches
4	Average recovery	30%–50%	0 notches
5	Modest recovery	10%–30%	– 1 notch
6	Negligible recovery	0%–10%	– 2 notches

*Recovery of principal plus accrued but unpaid interest at the time of default.

¶Very high confidence of full recovery resulting from significant overcollateralization or strong structural features.

Source: Standard & Poor's Bank Loan Ratings (BLRs) and Recovery Ratings (Monthly List), Table 1. January 11, 2011.

TRANSACTIONS WITH SPECIAL PURPOSE VEHICLES

In Chapter 8, we provided an introduction to asset securitizations. We explained that SPVs issue securities whose repayment depends on the cash flow generated by a pool of assets. The instruments are asset-backed securities, such as those described in Chapter 8.

Investors in ABSs benefit from many protection mechanisms. Whereas a company has many types of creditors (e.g., suppliers, professional services providers, governmental agencies), SPVs primarily owe money to their investors, and use structural techniques to strengthen their ability to pay off their investors. Unlike a loan or other funding facility, the mitigants are not always part of the documentation but may result from the way that the SPV is organized.

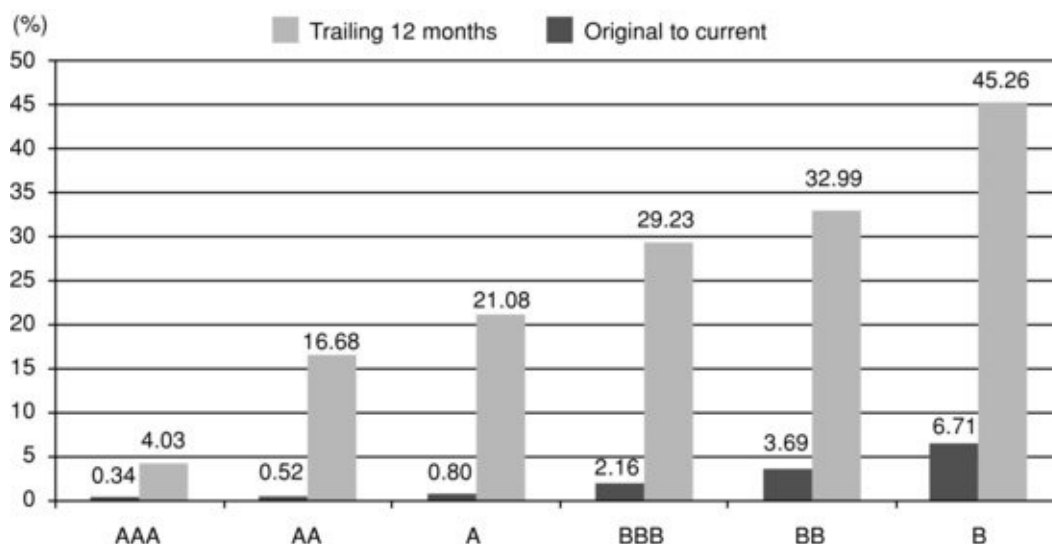
Senior/Subordinated Structures

In Chapter 8, we explained the structure of ABS transactions. In summary, several tranches are created in order to offer securities with different risk/return profiles. Investors with a limited risk appetite choose highly rated securities, positioned on top of the waterfall in which cash is distributed to investors. Risk is low, and so is the return. Investors looking for high returns purchase deeply subordinated securities, which benefit from a distribution of cash only once all more senior securities have been serviced. These securities are typically rated at the lowest limit of the investment-grade or even noninvestment-grade scale, and their default probability is relatively high.

The level of subordination is the most influential driver, but not always the only one, of the rating. Very senior tranches sometimes benefit from other structural enhancements that support their ratings. The following graph ([Figure 14.2](#)) summarizes the average default rate per rating category of all structured finance securities rated by S&P between 1978 and 2010. It clearly illustrates that the higher the rating, owing to more subordination, the lower the probability of default. No surprise!

Figure 14.2 Global Structured Finance Default Rates (January 1978 to November 30, 2010)

Source: Erkan Erturk, Transition Study: Global Structured Finance Defaults and Downgrades Are Slowing Down as of Nov 30, 2010, Standard & Poor's Financial Services LLC.



Credit Enhancement

The ABS market has witnessed a tremendous evolution over the years primarily to diversify the asset classes being securitized and to strengthen the transactions in order to attract more investors.

In summary, a strong structure cannot compensate for weak collateral. Financial engineers and rating agencies can imagine innovative ways to make the transactions stronger but securitizations backed by fundamentally weak assets are doomed to fail. During the recent crisis, no or few defaults stemmed from weak structures. All were generated by bad collateral, for which no structural mitigation can help.

Let us now review the most common techniques used to strengthen a securitization scheme.

Credit Enhancement of Assets

In Chapter 8, we explained that it was essential to fully understand and assess the credit quality of each individual asset that is securitized.

To further strengthen the quality of each asset, a third-party guaranty can be purchased. This is a form of credit enhancement as, in addition to the credit quality of the borrower, investors in the ABS scheme benefit from the credit strength of the guarantor.

The way it works is that, if a borrower defaults, the party that guaranteed it indemnifies the SPV for all or part of the unpaid amounts. There are two main things to pay attention to:

1. In some cases, the full amount is guaranteed, in some cases only a partial amount. If there is a full loss but the guaranty is only partial, the recovery on the defaulted asset will not be 100 percent.

2. The credit quality of the guarantor must be studied carefully. Before giving any sort of credit to the guarantor when estimating the risk of loss, the analyst has to be comfortable with the claim-paying ability of the guarantor. In case of doubt, only partial credit can be given or no credit at all. Some concentration limits can also be put in place. Full credit is granted if one single company does not guarantee more than, say, 30 percent of the total collateral value.

The largest market with transactions benefiting from collateral-level credit enhancement is residential mortgages. The mortgages can benefit from public or private guaranties:

- **Public:** In many countries, the government tries to encourage home ownership by offering full or partial guaranties to private lenders. In the United States, several major entities, organized as government-sponsored entities or GSEs, buy qualifying mortgages from private lenders and securitize them. They are the Federal National Mortgage Association (Fannie Mae), the Federal Home Loan Mortgage Association (Freddie Mac), the Government National Mortgage Association (Ginnie Mae), the Federal Housing Administration (FHA), and the National Credit Union Administration (NCUA). Although the U.S. government had never guaranteed the financial obligations of Fannie Mae and Freddie Mac, it seized them in 2008 and, operating under the government's conservatorship, recapitalized them and is making good on their obligations. This act confirmed to investors that the GSEs had the backing of the government, a long held presumption in the capital markets, and that MBS issued by those GSEs were safe from default.
- **Private:** Specialized insurance companies also sell guaranties to lenders. These in turn benefit investors in MBS, both those that are backed by the federal agencies and also those without agency guaranties. In the United States, the largest mortgage guarantors consisted of Genworth Financial, MGIC, The PMI Group, and Radian. Their original business model was to guarantee losses between 10 percent and 20 percent of agency-backed mortgages. Since the agencies would only back mortgages with a 20 percent down payment, if a borrower did not put the full 20 percent down, these private mortgage insurers would insure the amounts between 10 percent and

20 percent to make the mortgages eligible for the agency guaranty programs. During the housing boom, the private mortgage insurers got more deeply involved in nonagency-backed mortgages and mortgage securitizations both in volume and in the amount of risk assumed, to their demise. All private mortgage insurers were hit hard by the mortgage crisis. The most notable casualty was PMI, a market leader that filed for bankruptcy protection in November 2011 because it anticipated that it would be unable to honor all existing and future claims on the policies it had issued.

Excess Spread and Cash Reserves

In normal market circumstances, the SPV enjoys a positive cash flow because the sum of the coupons paid to the investors in the securities is typically less than what the interest payments it collects from the borrowers, since interest rates charged to borrowers are higher than the coupons paid to investors. This is good news for the investors because it provides an additional source of funds that can be used to strengthen the transaction.

Many structures use the excess cash flow, known as excess spread, to constitute a reserve for rainy days. If the SPV experiences a shortfall of revenues, due to a higher-than-expected level of collateral default, the cash reserve is tapped to pay the bondholders. If and when payments resume at a more normal level, the cash reserve is replenished.

The cash reserve is designed to compensate for a temporary cash shortfall but not to excessively protect bondholders. Most SPVs sell tranching securities representing various risk/return options. The investors holding the lowest tranches—the equity-like securities—take a lot of risk and expect to be compensated accordingly. Thus, they resist the creation of large cash reserves that benefit the higher tranches, just as investors in corporate equity can resist the build-up of retained earnings that bolster the security of the corporation's debt investors. The size of the cash reserve is, therefore, capped as is the proportion of excess spread that goes to the cash reserve. When one of the two ceilings is reached, cash is released to the equity investors.

When analyzing debt issued by an SPV, the mechanism around the cash reserve has to be thoroughly understood. If it is weak, it may indicate that the transaction is structured to please the equity investors to the detriment of the bondholders. It is not unusual that equity investors expect a quick payout. Rating

agencies play a big role in the sizing of the cash reserve. The larger it is, the higher the securities' ratings.

Overcollateralization

Overcollateralization, or simply OC, means that the special purpose vehicle obtains more assets than the aggregate amount of all securities issued. For instance, a transaction with a 5 percent overcollateralization sells, say, \$100 million worth of securities but the sponsor must provide \$105 million worth of collateral (principal only, future interest payments not taken into account) to receive the full amount of cash. It means that the sponsor must have access to other sources of funding for the \$5 million it originates and transfers to the SPV.

Another way of creating overcollateralization is to use the excess spread, as defined in the previous section, at the beginning of the transaction to repay a portion of the most senior tranches. As the level of debt is gradually reduced, OC is being created. An OC target is set so when the desired level of OC is reached, the distribution of cash flow can resume according to plan, for instance to pay all residual cash to the equity investors.

Investors benefit from OC because they are more likely to receive the payments they expect even if some collateral assets default. Without overcollateralization, the first default translates into an immediate dent in the most subordinated security. As long as less than the overcollateralization amount (5 percent in our example) defaults, all securities are repaid in full. The same applies to the regular interest payments.

Early Amortization

Early amortization refers to an acceleration of the repayment of principal upon occurrence of predefined amounts. The idea is relatively similar to the concept of covenants we reviewed earlier for the loans. Certain conditions are imposed, for instance, to the collateral pool and to the servicer. If they breach the conditions, the deal enters into “early amortization” in order to protect the investors.

There are two main consequences of early amortization:

1. If the transaction includes the reinvestment of repaid collateral assets, as is the case for short-term assets like credit card receivables (Chapter 8), it stops. All the funds collected from the collateral are used to repay the securities and no new assets are purchased.

2. The available cash is used in priority to pay back senior debt. The distribution of money to junior investors is interrupted and resumes only when senior investors are fully repaid. This means that investors in the second-highest tranche and below do not receive any payment until the most senior tranche is repaid in full. If there is money left, the second highest starts being repaid, then the third one, and so on.

Let's examine the most common events that can trigger early amortization:

- A higher level of default than expected. The transaction documentation contains a threshold and a clear definition of the way to measure default.
- The excess spread level is below the desired level. The reasons can be a high level of default, which means less collateral to make interest payments, or, in case of transactions with reinvestments, the market conditions have changed and the newly originated collateral is not priced as well as the original collateral.
- A breach of an OC test. Each tranche of an ABS can have its own OC test. It is measured as a ratio between some collateral value and the size of the tranche. If a tranche-level OC threshold is breached, early amortization ensues.
- The financial distress of the sponsor and/or servicer.

Financial Guaranty: Insurance for Securities

Once sizeable, the financial guaranty industry has almost completely disappeared. The business model was straightforward: specialized companies with AAA ratings guaranteed the timely payments of interest and principle of securities issued by third parties. As a result, securities with a natural, that is, pre-guaranty rating of say, A/A2 were upgraded to the same rating as the financial guarantor, typically the AAA/Aaa. This form of credit enhancement was widely used throughout the capital markets.

The investors could, therefore, rely on the credit quality of the guarantor and be less concerned by the quality of the securities themselves. The industry was dominated by four U.S.-based monoline (meaning that it was their only line of business) insurance companies: Ambac, FGIC, FSA, and MBIA. These companies were active globally, with a focus on the United States and Europe, and a small presence in Japan. Beside them, multiline insurers were occasionally providing similar policies. Monolines sprung up in the 1970s to support the municipal bond market, which is characterized by issuers too numerous (think

school districts, cities, and towns) for even large teams of credit analysts to master. Their value was to provide confidence to investors and, therefore, to help the distribution of municipal bonds.

Thanks to their success in the municipal market, they extended their reach to the ABS market. Issuance was growing at a fast pace and here again the AAA guaranties helped to facilitate the distribution of securities.

Then, starting in the early 2000s, monolines became important players of the growing CDO market (more in Chapter 16). The rationale was that CDO collateral was well understood to them, since it consisted of ABSs. Thus, the monolines felt comfortable taking the CDO credit risk. One of the major differences though was the size of the transactions. It was not unusual for these firms to guarantee issues in excess of \$1 billion, which was far greater than most ABS transactions that they had been underwriting.

When the mortgage crisis started, monolines were hit on several fronts: the “regular” MBS (residential and commercial) portfolios they had guaranteed and the CDOs as well. The amount of losses they accumulated was very large compared to their claim-paying capacity. As a result, Ambac and FGIC filed for bankruptcy protection, FSA was acquired by a smaller monoline, Assured Guaranty, and MBIA reorganized itself.

The future of bond insurance in its traditional form is highly uncertain. Some of this market has been captured by big banks that provide letters of credit and liquidity facilities to the muni market as remarketing agents. In summary, the banks agree to be the market for variable-rate debt obligations, and they will buy the munis at par anytime an investor wants to sell, including after a default event. Upon default, the bank now owning the bonds, negotiates with the issuer to work out a repayment scheme under the LoC. Thus, there are two distinct pieces: liquidity, meaning they will buy the securities at any time, and the LoC, meaning they will extend credit to the issuer by having bought (funded) the bonds that are now worth less than par and work out a repayment scheme.

CHAPTER 15

Credit Insurance, Surety Bonds, and Letters of Credit

In this chapter, we introduce three long-standing and traditional products that protect firms against losses triggered by the default of a counterparty. Although they differ in technique, all the products enable companies to transfer credit risk to banks and insurance companies that provide the products. They are, therefore, useful to risk managers anxious to reduce the amount of credit risk exposure on their own books. Most users of the products consider that the credit risk has been completely or nearly completely eliminated since losses are experienced only when a counterparty *and* the protection seller default simultaneously, which is highly unlikely.

Each product has its own characteristics, some imposed by regulators, some engineered over time by the main market participants, some reflecting the risk appetite of the providers. They are either bought for one's own needs or for the benefit of a third party that demand that they be provided. The buyer of the product may or may not be the beneficiary of the product; the beneficiary is the entity that seeks to transfer its credit risk exposure. Some variations of the products may have an exclusive application, and others compete with each other as substitutes. Credit risk managers' purchasing decisions are driven by what is available, what the objectives are, what they can afford, or what the situation they face requires. [Table 15.1](#) provides a quick overview of the main participants and uses of these products.

[Table 15.1](#) Participants and Products

	Providers	Main Uses	Purchasers	Beneficiary
Credit Insurance	Insurers	Trade receivable	Corporates	Policyholder
Surety bond	Insurers	Construction contracts; Legal obligations	Construction companies; various commercial enterprises	Client (third party to the contract)
Letter of credit	Banks	All kinds of performance, physical or financial; transactions; trade finance	Corporates and banks	Client (third party to the contract)

For much of the chapter, we take the point of view of the company looking to transfer (alternatively known as “distribute”) its credit risk, that is, the ultimate protection user, since we believe that this approach helps to better understand the products. We discuss features and options of the products that may be of interest to anyone seeking credit protection. In the last section, we cover these products as they relate to the risk-assuming company, and we discuss both their credit risk management challenges and how their behavior shapes the products they sell.

CREDIT INSURANCE

The Product

Credit insurance is designed exclusively to protect trade receivables. Simply, it protects a company against the risk of not being paid by its customers after a sale. Coverage is available almost everywhere, is most popular in Europe, and is gaining acceptance in the United States.

The product is relatively simple and an efficient way to avoid credit losses stemming from unpaid receivables. The company buys a credit insurance policy from an insurer. The company's customers or clients, that is, those from whom the company has receivables, are called buyers. The insurance policy pays a certain percentage of real losses incurred after a buyer fails to pay an invoice within the terms that had been agreed upon.

For most companies, the largest single current asset is trade receivables; so losses from these, in excess of what's expected, could dwarf earnings and deplete equity. Thus, for many businesses, controlling this exposure is a critical task.

Market Participants

Three monoline European insurance companies dominate the global market: Euler-Hermes (France and Germany, a subsidiary of Allianz), Atradius (Spain and the Netherlands), and Coface (France). They offer very similar products and have a faithful customer bases. In 2011, they wrote a total of nearly €5 billion of premium and generated €580 billion in net income. It is often mentioned that the relatively large size of the European market can be explained by the high volume of transactions between neighboring countries with different legal systems, different languages and, until 2002, different currencies. Assessing the credit quality of a French customer is a challenging task for a German company, so the easiest way not to worry about payment is to buy insurance. The success in the local markets led to a global expansion, and now branches and subsidiaries of the three leaders can be found in the United States, in Latin America, and in Japan. Ready access to the financials of privately owned European companies is also cited as one of the reasons for such high-coverage penetration in Europe.

In the United States, apart from the local branches or subsidiaries of the European credit insurers, the market participants are specialty-underwriting units of large property and casualty insurance companies such as Ace, AIG, Great American, Houston Casualty, QBE, and Zurich. However, the United States market has been stagnant for a while. American companies are more concerned about protecting against default by their foreign customers rather than against default by their domestic customers for which quality financial information is normally available. In other parts of the world, credit insurance has only a marginal presence despite huge commercial efforts by large insurance companies.

The three European insurers have their direct-sales forces, but the largest distribution channel is through insurance brokers. There is a multitude of brokers involved in the credit-insurance business. Large companies tend to work with the largest brokers like Aon, Marsh, or Willis, but there are a host of smaller specialty brokers who have a large account among their customer base. The websites of Marsh, Aon, and Willis provide valuable information about the market and the services they offer.

Besides credit insurance, nonrecourse factoring is another product enabling a company to transfer the risk of nonpayment of a customer to a third party. Factoring is the sale of accounts receivable to a third party, usually a specialized company (the *factor*), in exchange for cash. By selling its receivables, a

company can receive the cash associated with the sale of a product before the payment term agreed upon with the customer. The factor acquires the receivables from, and pays cash to, the company. The factor then collects the payment from the ultimate customer. As it relates to credit risk, there are two types of factoring. In recourse factoring, the risk of nonpayment remains with the company. This means that in case of a default, the factor will collect back some of the cash amount it advanced to the company. In nonrecourse factoring, the risk of nonpayment is transferred to the factor. In case of default, the factor assumes the loss. Nonrecourse factoring can therefore be viewed as a combination of short-term loan and credit insurance. There are many factors in the United States. Among the largest are GE Capital and CIT.

Coverage Types

Ground-Up Coverage

Most policies provide ground-up coverage, meaning coverage begins to take effect as losses start to occur, in excess of a small deductible retained by the insured party. Such policies provide an efficient protection against the frequency risk (i.e., the risk that many small and medium-sized clients default) and the severity risk (i.e., the default of one large client), because even small losses are indemnified.

Stop-Loss Coverage

Larger businesses may, instead, secure coverage on a stop-loss basis. For example, a policy is structured with a large deductible of \$50 million, and covers aggregate losses up to \$200 million. The policyholder receives up to \$200 million of indemnity, once its own accumulated losses during the policy period reach the deductible amount of \$50 million.

Insurers like ACE, AIG, or Zurich offer stop-loss policies that protect against the more severe losses stemming either from an accumulation of small losses or a large default in excess of a large deductible. The former scenario might arise from a sharp economic slowdown; the latter scenario might happen due to the bankruptcy of a client with a large payable. However, insurers normally control concentration with policy sublimits and grant large limits parsimoniously.

Credit Limits

Credit insurance is no different from other insurance products, and insurers want to both understand and control the losses they agree to cover. During the underwriting process, the insurer wants to know the policyholder's receivables exposures to its counterparties (or buyers, in the jargon of credit insurance), meaning the breakdown of what is owed and by whom and any loss history available. Based on this and other data and criteria, the policy will cover losses in the aggregate based on this pool of receivables. During the lifetime of a contract, policyholders are required to update the insurer on the status of the receivables. However, since business is dynamic, the pool will change, and policyholders are given some discretion to file claims against the policy for new buyers, or for receivables on existing buyers in excess of the amount reported at an earlier time. Thus, these claims will be filed under the discretionary credit limit, the DL, which allows the policyholder to file a claim without explicit review.

Policyholders must secure approval for credit limits in excess of the DLs. If a policy has a discretionary limit of \$2 million and the policyholder did not receive the explicit approval for claims in excess of this, then indemnity would be limited to \$2 million. The insurers, however, agree to indemnify losses below the \$2 million threshold.

Discretionary limits are typically relatively small, say, a few million dollars. When entering or renewing a credit insurance policy, a company can have its buyer list preapproved so that business transactions are not interrupted by insurance coverage negotiations. It is not unusual for insurers to preapprove limits for only part of the policy period, giving them a chance to control their exposures on companies they are unfamiliar or uncomfortable with.

Larger discretionary limits are reserved for the largest and most sophisticated policyholders that have solid credit risk management processes in place and a demonstrated track record of limited credit losses. By giving policyholders more flexibility in deciding with whom to transact business (more freedom with larger DLs), the insurers are, in fact, outsourcing a large part of their underwriting responsibilities to the policyholders. Not all insurers grant these large DLs.

Preapproved limits may be set by country (e.g., maximum claims for all Italian buyers at \$200 million), by industry (e.g., maximum claims for construction businesses of \$50 million), by counterparty (e.g., maximum claims for General Electric at \$10 million), or by other dimensions. Granting limits is a nice source

of revenue for the credit insurers because policyholders need to pay a fee to get limits approved or renewed, and they are valid only for a short period of time. For a company with a large portfolio of buyers, getting them approved can, therefore, be rather costly.

Regardless of the discretionary limit, the insurer typically indemnifies only 90 percent of the incurred loss for all claims on a pro rata basis, meaning if the policy limit were \$200 million in excess of \$50 million, losses would have to be at least \$222 in excess of \$50 million (\$272 million in total) for the policyholder to collect the full \$200 million from the insurer. The insurer's goal with the loss-sharing mechanism is to maintain an alignment of interest with the insured, that is, to give it an incentive to manage its credit book professionally. This is a good illustration of one principle we presented in Chapter 3, namely, “Does the seller keep an interest in the deal?”

Strengths and Weaknesses of Credit Insurance

To recap, credit insurance is a simple and efficient tool. The insurance format provides certainty of coverage and, contrary to some capital markets products like credit derivatives, it is a good match with the nature of exposures. The documentation is straightforward and, thanks to the competition between insurers, prices are reasonable.

The product is not without weaknesses. The product's technical features and overall inflexibility are sometimes mentioned as reasons that the product is not more widely adopted. Yet one can understand why insurers impose certain rules that are essential to managing their credit exposures.

Key weaknesses that are commonly cited:

- **Rigidity:** Most insurers have a very strict underwriting model and rarely accept changes to the product they sell.
- **Only receivables:** As we have seen so far, corporates are exposed to credit risk from a large and growing variety of sources. Credit insurance applies only to trade receivables and strictly excludes other activities generating credit risk. Credit insurance is, therefore, only a partial solution for a risk manager anxious to protect its entire book.
- **Short-term policies:** The coverage period within a policy is limited to three to six months, which represents the typical term of payments to customers. This does not match the needs of some companies that frequently extend payments for longer periods. Think of a heavy-equipment manufacturer

where production can take several years. Whereas the policyholders would like to be covered until the final product is delivered and they are paid in full, the credit insurer may offer only a renewable six-month policy.

- **Whole turnover policy:** Most insurers only cover the entire trade receivables portfolio and do not accept subportfolios of their clients. Insurers do not want to be adversely selected against and need to receive revenues associated with the strongest segments of the portfolio in order to be able to cover the weaker names at a reasonable price. Over the years, especially in the North American markets, the commercial behavior of insurers has evolved, and it is now sometimes possible to avoid insuring the entire portfolio.
- **Cancellation/reduction of credit lines:** This is probably the most serious deterrent for many potential buyers of credit insurance. Most insurers have the unilateral right to reduce or cancel coverage with as little as one day's notice. The insurer will typically honor the outstanding receivables but can stop coverage of new invoices. Insurers use their ability to reduce or cancel a credit line when buyers start showing signs of financial stress, which is precisely the time when the demand for credit insurance grows. Some insurers, especially in the United States, differentiate themselves by offering noncancellable credit lines, which is a strong selling point.

Political-Risk Insurance

Political-risk insurance policies are often bundled with credit insurance policies since they both involve receivables collection problems. In addition to financial stress, nonpayments from foreign clients can occur as a result of their home governments banning currency conversions. This happens in emerging economies during times of economic stress when hard-currency (e.g., euro and U.S. dollar) reserves of a country are depleted. Foreign governments restrict conversion to keep what hard currencies are available to pay for essential commodities like oil. Even if a buyer is able and willing to pay its foreign suppliers, it is prevented from doing so by the ban on currency convertibility. Political-risk insurance policies thus combine credit insurance, that is, the default of the foreign buyer and the risk of nonconvertibility of the currency. They are offered both by private insurers and by public entities (e.g., the Export-Import bank of the United States—[www .exim.gov](http://www.exim.gov)—or the Export Credits Guarantee Department in the U.K., www.ecdg.gov.uk) as a way to support exports.

SURETY BONDS

There are a large variety of surety bonds but their technology is fairly similar. Surety bonds are most common in the construction and real estate industries and in doing business with government entities. Commercial surety bonds, which are a special type of surety bond, also are used by virtually all industry sectors to guarantee legal or fiscal obligations.

The Product

A surety bond is a three-party arrangement in which the fulfillment of a contract, a future payment, or the meeting of a legal obligation is guaranteed by a surety provider, known as a surety. The surety provides a beneficiary (the obligee, a second party) with a monetary indemnification in case the bond purchaser who has the obligation to perform (the principal) does not perform as contracted. To illustrate, the obligee, such as a governmental entity, requests the product; the principal is a contractor with the obligation to perform who purchases the bond; and the surety is the insurance company that issues the bonds. A commonly used surety bond is a construction completion bond—a municipality contracts with an excavation company to build a parking lot and requires that the excavation company post a bond from a surety equal to the value of the contract. The bond protects the municipality in the event that the company does not complete the job. If the company fails to complete the job, the municipality would then receive funds from the surety to complete a partially built parking lot.

A legitimate question is what does performance under the terms of a contract have to do with credit risk because, in most cases, the underlying contract or obligation is not financial? Experience shows that the main reason that companies do not perform and, consequently, that surety bond payments are triggered, is that they are unable to due to finances. The technical ability or willingness to complete a contract is rarely the problem, but financial troubles prevent the execution.

Thus, requiring a surety bond is a way to protect against a credit risk. The beneficiary or obligee loses money only if two entities fail at the same time: the principal and the surety. Because surety bond providers are large insurance companies that are heavily regulated and have strong credit quality, the chance that the surety bond is not honored is remote. (Note that even if the surety were to fail, U.S. state insurance regulators have guarantee funds that may cover the

obligations.)

An important feature of the bond is how payments are triggered. Some bonds are on demand, meaning that the surety commits to pay if the principal or the obligee requests it. Other bonds leave room for negotiation prior to payment, and, therefore, these provide less credit protection. Needless to say, obligees prefer on-demand bonds, but principals and insurers push for less rigid conditions of payment.

Surety bonds are primarily offered by large multiline insurance companies, CNA, Liberty Mutual, and Travelers in the United States, and Tokio Marine & Fire in Japan, and there are few companies whose business is limited to surety bonds. Bonds are bought and sold through insurance brokers.

Principal Families of Bonds

The surety market is split into two subcategories: contract surety bonds, primarily used in the construction industry, and commercial surety bonds, typically required by government agencies. In most countries, contract surety is a much bigger and homogeneous market than commercial surety, which is highly fragmented in terms of products.

Contract Bonds

Contract surety covers various types of bonds required at different stages of a construction project. They are used both in the public construction market, where the client—and beneficiary of the bond—is a public entity, and in the private market where the beneficiary is, for example, a real estate developer. In all cases, they cover an obligation of a construction company. There are variations in each country but we describe the three main types:

- 1.** Bid bonds are requested by developers from construction companies that are bidding on contract work for new projects. Although many companies are anxious to be involved on new, large-scale projects, public and private developers invite only a limited number of contractors to bid in order to simplify what could be an unwieldy process involving numerous contenders. To screen out contenders who are not serious, they require contractors to post a bid bond in order to participate in the selection process. If a contractor wins the bid and then reneges on the project, the bond is drawn. The bond amount is generally set at about 10 percent or 20 percent of the project cost. Note that these bonds may not always cover credit risk per se. A contractor

who walks away may not be doing so for financial reasons, but rather because of a change of strategy, doubt about the financial strength of the client, or work overload.

2. Performance bonds figure prominently in the project cycle. Also known as completion bonds, contractors are required to post these bonds with the developer as the beneficiary. They are drawn if the contractor fails to complete the project according to the contract's terms, including the timetable and quality criteria. In most countries, the amount of the performance bond is set at 10 percent of the contract amount. However, in the United States, performance bonds will cover 100 percent of the contract amount. In surety contracts, there is often a replacement provision allowing the surety provider the right to replace the defaulted contractor by a new contractor to complete the work. This provision keeps the surety provider from making a large cash outlay to the beneficiary and helps to control the costs associated with the surety bond.

3. Advance payment bonds involve the credit risk exposure that the developer has to the contractor throughout the project life. Usually, the developer makes advance payments to the contractor to provide liquidity to cover ongoing expenses. The risk for the developer is that the contractor defaults on the contract and the advance payments are not refunded. Contractors are, therefore, required to post a bond for an amount roughly equal to the advance payment received.

Commercial Bonds

Companies in virtually all industries require commercial bonds in certain circumstances. The main use of the bonds is to guaranty a legal or financial obligation. The public entity requesting the bond requires access to an additional source of payment in case the company it is engaged with fails to meet its obligation.

Court bonds are a form of commercial bond. Within this category, appeal bonds are a product used in the United States. If a defendant loses a case and appeals the decision, the court will require an appeal bond. The court's goal is to deter defendants from appealing and to cover some legal costs. The bond amount is normally the same amount as the defendant's payment required by the court's decision. This amount can be in the hundreds of millions of dollars. If the defendant loses again and is unable to pay, the bond is drawn to compensate the

plaintiffs. Defendants' appeal bonds usually require collateral, since the exposure that the surety faces can be substantial.

Commercial bonds are highly varied and can be customized for various transactions and types of obligations. In another example, bonds are used by importers to accelerate customs clearance. Because the exact calculation of import duties can be time consuming and delay the release of imports, importers post bonds that allow them to access their products immediately and to pay their import duties later. The tax authorities are comfortable with bonds issued by strong insurers that give them assurance that they will ultimately collect what is owed. Foreign car manufacturers are, for instance, heavy users of surety bonds since having cars in the dealer showroom is preferable to having them sitting in a port waiting for customs clearance. In this instance, the credit risk that the tax authorities would face, were imports allowed to enter before collecting duties, is now mitigated by the posting of the bond.

LETTERS OF CREDIT OR LoCs

The Product

A letter of credit (LoC, or simply LC) is a written commitment by a bank to make a payment to a third party when the bank's client requests it or when the third party requests it. It is, therefore, particularly well adapted for a company or a government entity that wants protection in the event that a counterparty does not perform something it has committed to do.

Similar to surety bonds, LoCs may not be a financial guaranty per se but effectively protect against default risk because financial problems are the most common cause of why a company does not perform. Letters of credit can explicitly cover risks of nonpayment, that is, a default risk, which we cover later.

The concept behind LoCs is that they provide a financial backstop. They enhance the credit quality of a counterparty by having a strong financial institution behind the counterparty should it fail to perform. Letters of credit, therefore, offer an additional protection because an entity would lose money only if its counterparty and the issuing bank were to default at the same time.

In LoCs, contract wording is clear, standardized, and well tested. Little room is left open for negotiation once payment is requested, thereby minimizing legal risk. As such, they are considered to provide the best protection against the

nonperformance of a company.

Below are two examples of wording used in LoCs in which the LoC is requested by Company A to cover the commitment of Company B and issued by Bank ABC:

1. We hereby authorize Company A to draw on us, Bank ABC, for the account of Company B up to an aggregate amount of \$10 million . . .
2. We hereby establish our irrevocable letter of credit in favor of Company A for the account of Company B for the amount of \$10 million available at sight, drawn on Bank ABC, by your request for payment at sight. . . .

The objective of requiring an LoC is to avoid taking any kind of credit risk, including having to monitor the credit quality of counterparties and their guarantors. Standard market practice is to require the bank issuing the LoC to have a minimum financial rating of, for example, A/A2, and at least, for example, \$3 billion of assets. Standard contracts also require the replacement of the issuing bank should its rating or assets fall beneath these criteria. Standard market practice also treats an LoC issued by a strong bank as the equivalent of cash. Thus, when LoCs stand behind credit exposures, the notional exposure is reduced by the amount of the LoC, without haircut.

We conclude this section by explaining three common features of LoCs:

1. **Irrevocable:** The issuing bank cannot cancel the LoC before its stated expiration date. If the financial condition of its client deteriorates, the bank must handle the consequences.
2. **Stand-by:** An LoC is a contingent obligation of a bank; it is not a loan, nor is it funded. That is why LoCs are often referred to as stand-by letters of credit, to underscore the fact that they are contingent.
3. **Evergreen:** If the LoC is evergreen, although the contract wording contains a termination date, the LoC will be automatically renewed unless the issuing bank informs its client and the beneficiary that it will nonrenew.

Illustration of LoC

In the following section, we present examples in which LoCs are used. One of the most common applications is trade finance, and it is hard to imagine trade finance operating without LoCs. Another usage area of LoCs is in the reinsurance industry, and most transactions involving foreign or offshore reinsurers make use of LoCs.

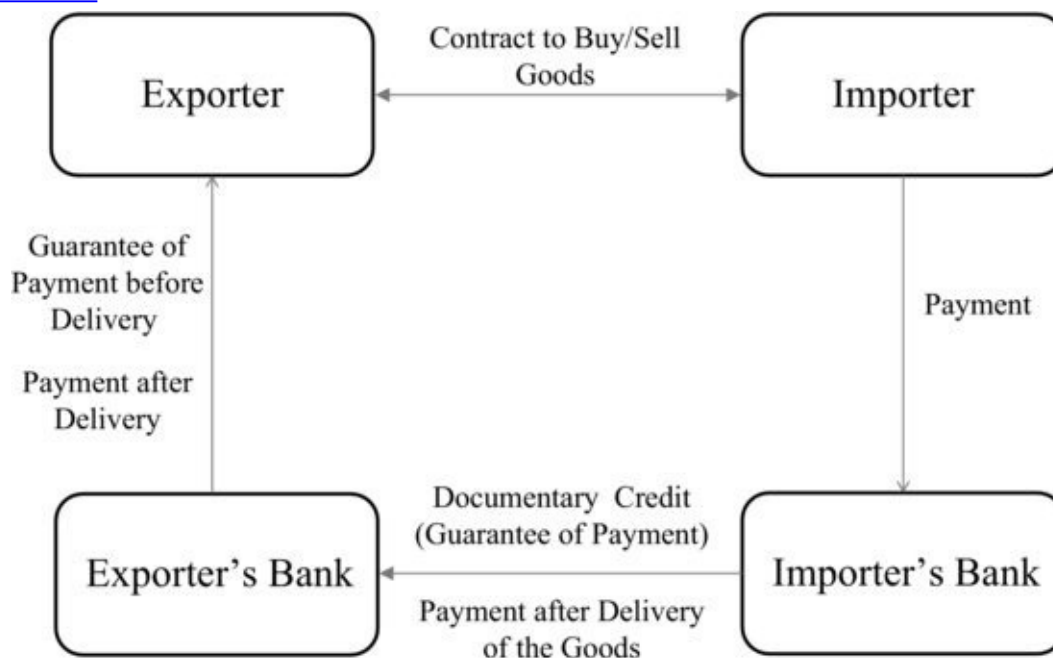
Trade Finance

Trade finance refers to the financial arrangement developed by banks to facilitate the exchange of goods between two companies located in different countries. This represents a major activity for large commercial banks across the globe to support their corporate clients.

One of the main challenges faced by exporters is to get paid by clients operating in a different legal environment. The rewards of selling goods outside its own country can be big, but so is the credit risk. At issue is getting comfortable with the ability of a remotely located client to honor an invoice. The risks can be acceptable in developed economies in which reliable accounting and legal systems are in place but more problematic in emerging economies.

This is where LoCs come into play. It is common for a company selling its product abroad (the exporter) to request the assistance of its bank to secure payments from its client (the importer). The goal is to transfer the credit risk of the importer to the bank. This is achieved in several steps, listed here (and see also [Figure 15.1](#)):

Figure 15.1 Trade Finance LoC



- A contract is made between the importer and the exporter that stipulates the rights and obligations of each party, such as the nature of the products to be delivered, the price, and the payments terms granted to the importer.
- The exporter's bank agrees to relieve its client from the importer's credit risk

but requires that a local bank, whose credit risk is considered to be stronger than the importer's, guaranty the payment of the importer in an irrevocable way. The exporter makes this request to the importer.

- The importer then asks its bank to issue a specific form of LoC called documentary credit to the exporter's bank. This guaranties payment upon successful completion of the trade. The LoC is then sent to the exporter's bank.
- The exporter's bank notifies its client that the LoC has been received. This means that the bank has obtained the documents it needs to guaranty the payments and that the sale can take place. The bank, therefore, takes credit risk on the importer's bank.
- After delivery of the goods, the exporter receives payments from its bank. From its point of view, the transaction is completed and there is no credit risk remaining. However, its bank still has to collect the funds from the importer's bank and, therefore, carries a credit risk on it.
- The exporter's bank then requires payment from the importer's bank, which transfers the funds.
- The importer's bank requires payment from the importer and receives the funds, which completes the transaction.

The LoC provided by the importer's bank is the cornerstone of the entire process. Its issuance triggers the chain of events, which makes the transaction possible. Without it, the exporter's bank would not accept to guaranty the payment, and the exporter would not sell.

If the exporter's bank is confident that its client can deliver what it promised and that the importer's bank can pay, it may elect to prefinance the exports. This means that the exporter can actually receive cash from its bank even before delivering its goods. In other words, the strong language of the LoCs is a security that most banks feel so comfortable with that they will advance money against them, giving exporters a source of working capital.

Letter of Credit in the Insurance Industry

The insurance industry is also a large consumer of LoCs. Why? Credit risk is a by-product of insurance contracts and insurance companies are not prepared to take this risk, thus, they demand LoCs to secure these contracts.

A common example is with reinsurance contracts, which are insurance contracts purchased by insurance companies to cover the exposures they

accumulate in their normal course of business. When one insurer buys a policy from a reinsurer, premium payment is often made up front, and it can be sizeable, in the hundreds of millions of dollars. The reinsurer promises to pay claims given certain events under the terms of the reinsurance contract. The credit risk arises because the reinsurer could fail to pay if claims payments were to become due. Unless the reinsurer's credit rating is very high or unless there are offsets that can be used to mitigate the exposure (similar to the offsets used in derivatives netting, which we covered in Chapter 13), the insurer may require the reinsurer to post an LoC. The amount of the LoC can be variably defined in the LoC itself, for example, varying with the size of the premium or with the loss experience of the insurer's underlying policies.

Letters of Credit versus Surety Bonds

Virtually all uses of surety bonds also can be fulfilled by LoCs. Whenever a private or public entity requires a bond, an LoC can be provided instead. Risk managers of developers and of public entities, therefore, can choose between asking for a bond or an LoC. When the beneficiary is indifferent between the two, companies (principals), have a choice. There are many instances in which banks, proposing an LoC, and insurance companies, pushing for a bond, are competing to support their clients.

Letters of credit utilize language that is clearer, more standard, and stronger than a surety bond, and beneficiaries often feel more secure with an LoC versus a bond. Why, then, are bonds still prevalent?

One important factor that explains why surety bonds are still utilized is that they tap an additional funding source and source of risk-bearing capacity which have natural scarcity. There are three main reasons for this:

1. Banks have limited credit capacity, and, internally, LoCs compete with loans for this limited capacity. As we discuss later in the chapter, LoCs and loans are commonly part of a same credit facility so, from a user's perspective (principal), using an LoC limits the amount it can borrow.
2. Letters of credit are expensive. Insurance companies have a different profitability model than banks, and they may be able to offer credit risk capacity at prices banks would not accept.
3. Letters of credit are easily drawn by beneficiaries, whereas the softer language of most bonds leaves the door open to negotiation. Principals may believe that they have the chance to avoid a bond being drawn, whereas that

chance is virtually impossible with an LoC. For instances in which the beneficiary is indifferent to a bond versus an LoC, the principal will prefer to use a bond.

Furthermore, the bond industry has, generally speaking, a good track record in most countries. Market participants are accustomed to quickly and efficiently handling large volumes of bonds and, when necessary, claims. Bond issuers provide value to the beneficiary that helps maintain and develop the acceptance of their products.

THE PROVIDERS' POINT OF VIEW

Credit Insurance

For insurers, credit insurance generates large portfolios characterized by a very large number of buyers (all the insured's clients) and peak exposures on the largest companies in the world. Just think of how many companies sell to large retailers like Wal-Mart in the United States, Carrefour in France, or Tesco in the United Kingdom. When a supplier to these large companies purchases credit insurance, this generates additional exposure to the insurer that adds to what it already has in its portfolio from other policyholders.

Credit insurance portfolios have primarily short-term credit risk exposure because most sales carry 30-day or 60-day payment terms. The exposures are direct (as opposed to contingent) but unfunded, meaning the insurer has not made any cash outlay when the policies incept. In case of default of a buyer, the insurer indemnifies its policyholders and is granted the right to collect money from the buyer. The legal term allowing the insurer the right to do this is subrogation. In these instances, credit insurers are treated as senior unsecured creditors when trying to collect.

The main challenge of the credit insurers is, therefore, to manage their accumulation on peak names. There are three main techniques used to shape the portfolio:

1. First, the insurer will limit the capacity it offers to their clients at the point of origination. When a policy is sold, the insured knows that its indemnity on some names is capped at a certain amount, whereas the rest of the portfolio may benefit from full coverage. Exposures of related companies (e.g., subsidiaries of a parent company) are aggregated under one limit to

avoid concentration. Capacity will be more limited for instances in which the buyer's industry has fewer players, such as large retail.

2. Second, the insurer will reinsure its exposures to third parties, such as to Hannover Re or Munich Re. Each year, credit insurers and reinsurers sign a treaty in which a portion of the originated exposures is transferred from the insurer to the reinsurer, thereby reducing the credit insurers' exposure to peak risks.

3. Finally, after origination, insurers can reduce the capacity originally made available during the lifetime of the policy. This is, of course, not popular with clients. When a buyer's credit deteriorates, policyholders are informed that the existing exposure is covered but that future receivables may not be. This method may work to reduce the insurer's losses in certain cases but not always. When the buyer's circumstances become so dire that it needs to restructure its liabilities, banks may ask the insurer to maintain coverage to help the buyer stay afloat. If the company subsequently defaults, insurers may lose money in the same proportion as the banks.

Credit insurers, thanks to their activities, have come to own a very valuable database capturing payment histories of tens of millions of companies around the world. One interesting thing is that most market participants share their data. The competitive advantage of a credit insurer does not come from a superior quality of information but rather from the way it analyzes the data. Some credit insurers sell their analysis. The @rating service of Coface (www.coface.com) is one such provider.

The International Credit Insurance & Surety Association (ICISA) has information on the largest credit insurers and reinsurers from all over the world and provides relevant information about the products and the market. Its website is www.icisa.org.

Surety Bonds

Insurers will request an indemnity agreement from their clients (the principals). This means that, if the beneficiary of the bond triggers a payment, the insurer provides funds but subsequently requests reimbursement from its clients (the principals). The indemnity agreement is the legal way that insurers get exposed to the principal's credit risk. The exposures are either contingent on their clients' failure to fulfill an obligation or direct when the bond has been triggered. In case of bankruptcy, insurers are considered to be senior unsecured creditors.

When underwriting a bond, insurers primarily focus on the credit quality of their client. If they are comfortable with it, they issue the bond without collateral. With less strong companies, insurers can request security such as liquid collateral assets or even an LoC. A secondary analysis focuses on the purpose of the bond and the wording of the legal document. Naturally, since insurers want to avoid disbursing cash to the beneficiaries, they focus on types of bonds they are comfortable with. For example, on-demand bonds are thought to be too risky by many insurers. Favorable wording does not reduce the credit risk taken by the issuer, it merely contributes to the avoidance or delay of a contingent credit risk being transformed into a direct funded risk.

From a credit risk management point of view, managing the accumulation of single-name exposures is a challenge. Insurers can limit their exposure on certain names by simply ceasing to issue new bonds. This tactic is not the best way to manage long-term client relationships, so sureties will often secure more capacity by reinsuring their portfolio.

The other big challenge is lack of diversification from industry concentration. Because surety bonds are primarily used in construction projects, construction companies dominate surety providers' portfolios. The construction industry is cyclical, and most companies' fortunes rise and fall at the same time (i.e., they contribute systematic risk to the insurer's portfolio). To attempt to diversify, sureties write commercial bonds that provide exposure to a variety of sectors.

Letters of Credit

Letters of credit are a basic product of a commercial bank and one that banks must offer to anchor a commercial relationship. Letters of credit contribute to the credit risk portfolio generated by bank activities. A few items of note:

- Companies that need LoCs from time to time arrange a generic facility that enables quick execution at known conditions. Commercial banks provide capacity either on a stand-alone basis or, more frequently, as part of a credit facility. As the risk is similar to loans, the credit facility covers various types of loans (e.g., revolver, swing line) and LoCs at the same time. The legal conditions, which are contained in the credit agreement, have certain sections that are common to all kinds of facilities and some are specific to LoCs. From a credit risk management standpoint, the most important sections relate to covenants and pricing, as discussed in Chapter 14. If the amount is large, the entire facility is syndicated among several banks, that is

to say, that a bank takes the lead in the negotiations and then distributes the risk to other banks that wish to participate.

- Requests in trade finance across clients tend to involve transactions with the same countries and within these countries, involving the same local banks. For instance, there are only a handful of Chinese banks with which Western banks are comfortable. A company that sells to a Chinese company will request an LoC posted by a bank from this short list. This creates a concentration issue that must be managed carefully because an accumulation of large exposures on certain names and countries (e.g., China, Russia, Brazil) can happen quickly.
- Trade finance is competitive and exporters typically contact several banks when shopping for an LoC, which sets off a competitive round of offers. The exporter is working on sales and simultaneously negotiating with various banks on the LoC. Thus, the terms offered are competitive, such as low fees and high cash advances. This can put pressure on the risk analyst working for the bank to accept less-than-desirable conditions.

FINAL WORDS

In this chapter we presented readers with an overview of traditional markets for credit risk transfer. Credit insurance, surety, and LoCs are traditional products that work well and in which there is little basis risk, meaning that the coverage is more or less fitted to the exposure. For most companies, the largest single current asset is trade receivables, and credit insurance is a relatively simple and efficient way to manage losses with this asset, including small losses. Surety bonds are commonplace in the construction industry allowing that market to function. Trade credit is an established market with many banks competing for the business.

Although not without weaknesses, these traditional markets benefit from having well-established and standardized contracts and regulatory infrastructure that, on balance, helps to protect users from counterparty risk. The market also is accessible to traditional corporate risk managers, including those of smaller companies, and brokers help to facilitate the transactions.

From the provider's point of view, the challenge common to all these products lies in managing the accumulation of peak credit exposures.

CHAPTER 16

Credit Derivatives

Few financial products enjoy a reputation as negative as credit derivatives. Warren Buffett's comment in his 2002 annual shareholder letter that “in my view, derivatives are financial weapons of mass destruction” helped to foster this reputation, even though his comment did not specifically address credit derivatives. The role that some highly specialized forms of credit derivatives subsequently played during the 2007 crisis reinforced the negative perception they carry. Before rendering an opinion on the virtue of credit derivatives, it helps to understand the mechanics of the product and the legitimate role that it can play in the risk manager's toolbox.

THE PRODUCT

Credit derivative is a generic term that captures all derivative products related to the transfer or assumption of credit risk only. There are a few products that can be included in this category but one of them, the credit default swap (CDS), constitutes the overwhelming majority of all transactions. Another type of credit derivatives is a credit-linked note (CLN), which we reviewed in Chapter 8. The expressions *credit derivative* and *credit default swap* are almost interchangeable, and in this chapter, we will focus only on the most common form of credit derivative, the CDS. The CDS market plays a critical role in credit risk transfer and credit risk trading. As of June 2011, the total notional amount of CDSs outstanding was \$32.4 trillion.¹

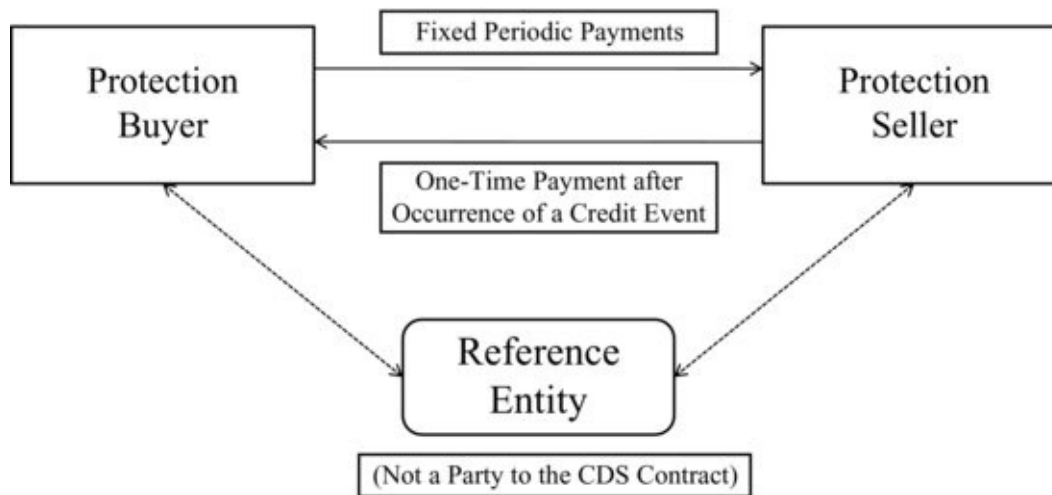
A CDS is not an insurance product per se, even though it feels like one. It is fundamentally an option, rather than either a swap or an insurance policy. There is a protection buyer, who wants to transfer the credit risk it may face on an entity, and a protection seller, who is ready to accept the credit risk on the same entity. The contract is between the protection buyer and the protection seller. The entity whose credit risk is transferred via the CDS is called the reference entity and is neither involved nor even aware that a transaction is taking place. In exchange for protection against the default of the reference entity, the protection buyer pays a fee, technically called a fixed amount but generally referred to as a spread or premium, to the protection seller. In case of default of the reference

entity, the protection seller pays the protection buyer according to a mechanism that we describe later. In these respects, a CDS feels very much like a credit insurance policy.

However, one of the reasons that CDSs are not insurance products is that protection buyers can receive money even though they do not suffer a loss, that is, unlike insurance policies, a CDS does not indemnify the protection buyer. As a matter of fact, any person can buy protection and be paid, regardless of whether he or she is exposed to the credit. In terms of insurance, the buyer is not required to have an insurable interest. The expression *protection* is a bit of a misnomer because protection may be irrelevant to the transaction.

[Figure 16.1](#) presents a schematic of the entities involved in a transaction. A contract occurs between buyer and seller. A third party, the reference entity, has no involvement with the transaction. The buyers pay a periodic or up-front premium (fee) to the seller and the seller, should a credit event occur, pays a sum to the buyer.

Figure 16.1 Basic CDS Structure



The reference entity can be a corporation (e.g., General Electric), a country (e.g., France), or an asset-backed security (e.g., a residential mortgage-backed security). Although conceptually they work in the same way, the legal contracts will differ among the three. For instance, the definition of a credit event for a corporation is different from that of a sovereign entity.

The legal contract documenting a CDS is, to the extent possible, standardized, primarily to facilitate the execution between the parties. Like other derivative contracts, market participants use the standard forms developed by the International Swaps and Derivatives Association (ISDA). There will be regional

adaptations, for example, like the specific definition for bankruptcy of Japanese reference entities. We invite readers to visit the ISDA website, www.isda.org and to return to Chapter 13 for some more detail on these contracts.

Credit default swap contracts are denominated by what is called the floating rate payer calculation amount, more commonly known as the notional amount. This is the largest payment that could occur should a default occur and the relevant obligations of the reference entity being valued at zero. Notional amounts are normally round numbers such as \$5 million or \$10 million.

The premium, often called spread, is a percentage of the notional amount. It is expressed on an annual basis, even though payments occur quarterly, and in basis points, or bps (1 basis point = 0.01 percent, e.g., 100 bps = 1 percent). Since the rate itself may be low, often less than one percent for creditworthy entities, utilizing basis point terminology is more convenient than percentages, for example, 85 basis points is more understandable than 0.85 percent.

In some CDSs such as North American single-name corporate CDSs, part of the premium is paid up-front at the inception of the contract, then a standard running spread of either 100 bps (for investment-grade reference entities) or 500 bps per annum (p.a.) for speculative grade reference entities is paid quarterly. The up-front payment is essentially the present value of the difference between the actual CDS spread and the standard running spread. Such a CDS might be priced at 10 percent + 500 bps, meaning that the protection buyer would pay 10 percent of the notional amount at inception, plus 500 bps per annum, paid quarterly. The up-front payment can, therefore, be very substantial, particularly if the reference entity is distressed.

For investment-grade entities trading with a 100 bps p.a. coupon, the convention among market participants is to present conventional spreads, that is, the actual spread paid, irrespective of the fact that payments occur up front (from buyer to seller when the spread is over 100 bps p.a. and from seller to buyer when the spread is below 100 bps p.a.) and on a quarterly basis for the 100 bps coupon.

For example, on April 17, 2012, the five-year CDS on \$10 million notional of Australian sovereign debt was 65 bps p.a., meaning, for a contract offering protection up to five years, the buyer would pay 0.65 percent on \$10 million per year, or \$65,000 per year. Most CDS contracts provide protection for tenors of one, three, five, or seven years. Longer tenors are possible but rare. The majority of CDSs have five-year tenors.

Corporates, insurance companies, hedge funds, and banks are the biggest

buyers of CDSs. On the other side, banks and hedge funds sell protection. The largest market participants in volume are investment banks such as Deutsche Bank, J.P. Morgan, and UBS. Risk managers anxious to get a sense of the availability and prices can find indications of pricing of CDSs on www.markit.com or on Bloomberg, or by calling their banks who act as market makers.

THE SETTLEMENT PROCESS

One of the fundamental features of a CDS is that the payment to the protection buyer in the event of default of the reference entity, is not triggered by any actual loss experienced by the protection buyer but by the occurrence of publicly observable events called credit events. In addition, a feature of the CDS market is that, in all but the most customized CDSs, the amount of payment is the same for all buyers of CDSs on the same reference entity and is set as the result of a credit-event auction.

Credit Events

The payment process, called the settlement process, starts with the occurrence of credit events, which are specified in the transaction documents. Their definitions are intended to capture circumstances in which most creditors may lose money. The list and definitions are standardized and all participants rely on the ISDA wording. Credit events are adapted to each family of reference entities (REs) such as a corporate, a sovereign entity, or an ABS. We outline next the two events that are standard credit events for a corporate entity, and two others that apply in some circumstances.

- 1. Bankruptcy:** The reference entity (RE) or its creditors petition for bankruptcy protection or any equivalent law. In the United States, this corresponds to Chapter 11 or Chapter 7.
- 2. Failure to pay:** The RE misses an interest or principal payment on borrowed money in a specified amount, after any grace period expires (some CDSs do not grant any grace period and are triggered immediately after a missed payment).
- 3. Debt restructuring:** The RE renegotiates the terms of its debt with the banks and the result is that debt holders are worse off after the restructuring than before. Typical examples include an extension of maturity (e.g., the

repayment date of a loan is extended by two years) or an increase of the interest rate, itself not undesirable but reflective of the maturity extension, worsening of other terms, and general credit deterioration.

4. Obligation default, obligation acceleration, repudiation/moratorium: ISDA defines these events in its documentation (the 2003 ISDA Credit Derivatives Definitions) but they do not apply to most CDSs and are rare, so we will not detail them further.

The list appears redundant, but it protects the CDS buyer from the situation in which a reference entity's financial stress causes losses and yet the CDS would not be triggered. Thus, the likely situations are covered, and only one event needs to happen to trigger payment. Two parties may agree that some credit events are irrelevant, in which case they can decide to enter a CDS with a shortened list of credit events. These instances are rare and not recommended for the CDS buyer.

In most cases, the credit event is black and white, for instance, filing for bankruptcy protection. In some cases, though, events fall into a grey area. An example is the restructuring of Greece's sovereign debt during the summer of 2011. The restructuring was engineered partially with the intention to avoid triggering a credit event on all outstanding CDSs, as it was feared that it would lead to large losses for many banks! The ambiguity of what defines a credit event and the possibility for multiple opinions about their occurrence led ISDA to create five regional credit derivatives determinations committees, or simply DCs, to decide on credit events and ensuing cash settlements. The members of the DCs are investment bankers and institutional investors. In nearly all cases, the process is smooth, but there have been a few instances in which DC members disagreed and sought the opinion of external parties. More information can be found on the ISDA website.

The occurrence of a credit event also means the early termination of the CDS prior to maturity. The protection is no longer available after a credit event, even if the defaulted entity keeps operating and defaults again, which happens from time to time.

Cash versus Physical Settlement

At the risk of repeating ourselves, upon a credit event, the seller pays the buyer regardless of whether the buyer has suffered a loss. The amount paid is now primarily determined by a cash settlement process, which is in contrast to a

physical settlement that prevailed up until the early 2000s. Some of our readers may have longer term CDSs still in place that call for physical settlement, thus we will review that here. Also, understanding the physical settlement process helps to understand the mechanics of the cash settlement process that has become the norm over the last decade.

Physical settlement was prevalent in early credit derivatives because it was presumed that buyers would use CDS contracts to protect actual investments in corporate bonds and instruments of similar seniority like loans and sought to be made whole if an issuer defaulted. To achieve this, they would deliver the bond or loan they held to the CDS seller, who would pay them par value. The expression *physical settlement* reflects the physical delivery of the obligation itself from the buyer to the seller. At that point, the seller, as the new owner of the obligation, would become a creditor of the defaulted entity and would recover whatever was available from the sale of the issuer's assets. More frequently, protection sellers would simply sell the bonds and other obligations at deep discounts to third-party investors who specialize in distressed securities.

The physical settlement process worked efficiently as long as CDS buyers owned bonds or loans that they could deliver. When speculators and other types of buyers entered the market, physical settlement showed its shortcomings. If a CDS buyer did not own an appropriate bond, it had to purchase the bond in the market. In practice, even a buyer that did own a deliverable bond or loan would always strive to obtain and deliver the particular bond that was cheapest to deliver. Bonds were often difficult to buy, and the rush to buy them after a credit event led to inflated prices, which reduced the net amount that a CDS buyer would ultimately collect after considering the cost of buying the bond at the inflated price. This phenomenon, called a bond squeeze, was formidable for many companies after major bankruptcies such as Enron in the early 2000s. As the market continued to develop with more buyers not owning deliverable bonds, the disconnect between protection being bought and sold in the CDS market and the value of the outstanding bonds widened. In fact, for many CDSs, the aggregate outstanding notional is usually a multiple of the deliverable bonds issued.

The bond squeeze and other technical difficulties, such as buyers delivering long-dated bonds to sellers of short-term protection, led to the gradual marginalization of physical settlement and the advent of cash settlement. Although cash settlement prevails now, physical settlement is still an option in CDS contracts.

Cash Settlement and Credit-Event Auction

In cash settlement, upon a credit event, the CDS seller pays the CDS buyer a portion of the notional amount of the CDS, which completes the transaction between the two parties. The portion of the notional is intended to reflect the amount that a senior unsecured creditor would lose after recovery, that is $(1 - \text{recovery rate}) \times [\text{notional CDS amount}]$. The working assumption behind a CDS contract is that buyers are senior unsecured creditors and have a recovery expectation similar to the bondholders.

The objective of the cash settlement is to make investors, who will experience some recovery, whole when the entity defaults. The issue then becomes what the recovery is likely to be. After a credit event, buyers seek to be paid right away, but the actual recovery rates on bonds or loans remain unknown for quite some time as bankruptcy proceedings ensue. Thus, the technique to work around this logistical hurdle is for CDS dealers to participate in a credit-event auction, a valuation method devised by ISDA, controlled by regional ISDA determinations committees, and administered by two private companies, Markit (www.markit.com) and Creditex, a subsidiary of IntercontinentalExchange-ICE (www.creditex.com). The auction establishes a price for the distressed reference security, which becomes the recovery rate used for the cash settlement of CDS contracts. The market price is disseminated quickly after a credit event, usually well within a month. This establishes the net payment from seller to buyer. Dealers that desire to buy bonds, and thus have the equivalent of physical settlement, may participate in the auction.

For example, a \$10 million CDS contract on an entity that defaults has some recovery value. The protection seller is obliged to pay the buyer the \$10 million less the recovery value. Shortly after default, a credit event auction is held and the result of the auction establishes a price of 40 cents on the dollar for the senior unsecured recovery. Protection sellers then settle with the buyers by paying them \$6 million, which is the \$10 million of notional protection less the market's price of the recovery value, which is \$4 million. The auction process makes the assets' value transparent and allows for quick settlement, both of which have helped foster more usage and innovation in the CDS market. Technical information about the way the auction is conducted can be found at www.creditfixings.com, a site run jointly by Markit and Creditex. Results and ongoing auctions are also listed at www.isda.org/credit. [Table 16.1](#) shows examples of recent auctions following credit events.

Table 16.1 Auction Prices of Reference Securities Following Credit Events

Source: Creditex and Markit.

Reference Entity	Date	Result
Eastman Kodak Co	February 22, 2012	23.88
Hellenic Republic	March 19, 2012	21.50
AMR Corp. (American Airlines)	December 15, 2011	23.50
Dynegy Holdings LLC	November 29, 2011	71.25

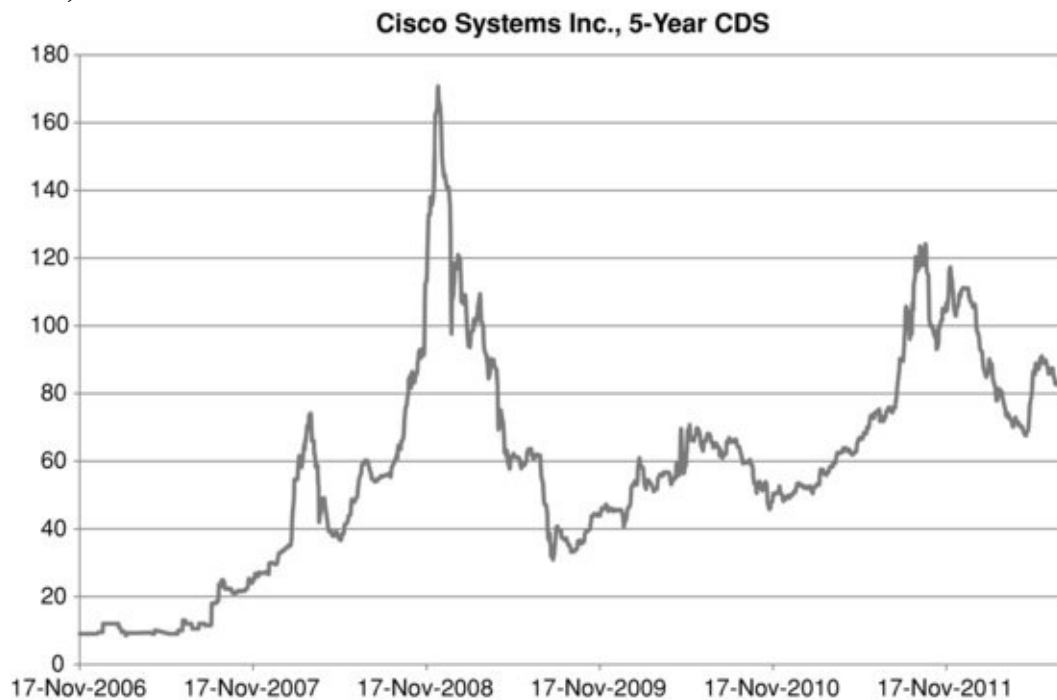
Some buyers may have credit exposure to the entity but may have a different recovery expectation than most senior unsecured creditors. These buyers would need to simply scale the amount of notional they buy based on whether they expect to receive, upon default, more or less than the cash settlement of the reference bond. For buyers who do not actually have any credit exposure on the reference entity, and who, instead, are simply taking a view on an entity's creditworthiness, the amount of notional purchased would be a function of the buyer's desired level of exposure and allocation of capital toward CDS fees, that, upon no credit event, is money never seen again.

VALUATION AND ACCOUNTING TREATMENT

The U.S. GAAP and IFRS require that CDSs, like other derivatives products, be marked to market (MTM) with changes in their values recognized in income of both the protection seller and the protection buyer. Because CDS prices often have significant volatility, they generate large swings in income. [Figure 16.2](#) shows the CDS price over time of Cisco Systems Inc., the giant information technology company. As one can see, there is tremendous price volatility. The chart for Johnson and Johnson that we presented in Chapter 7 paints a similar picture. The volatility may reflect general market uneasiness, which is not necessarily related to the fundamental credit quality of the reference entity. The volatility is one reason why corporations, particularly public ones, are reluctant to purchase CDSs to protect their credit exposures. Even if having the protection is attractive, corporate executives believe that their main stakeholders both shun and misunderstand swings in income especially from noncore, derivatives activities. This feature restrains corporates from buying CDSs, even if doing so would help to remove credit exposures from their balance sheets.

Figure 16.2 Price of Five-Year CDS for Cisco Systems Inc.

Source: Fitch, Inc.



As with other financial instruments, if the prevailing market price of a CDS, for the same reference entity and the remaining tenor of the contract, is higher than the price that the buyer paid for the contract, the buyer benefits. The MTM is, therefore, positive. If the price decreased, it would be the other way around: the protection buyer records a loss. In this sense, the MTM calculation is similar to other instruments.

However, the precise MTM calculation is more involved than for other financial instruments. Although the CDS itself may have an observable price, the position associated with having bought or sold the CDS has to be valued. At a high level, the MTM value of a CDS is the present value of the difference between the prevailing market price the day of the valuation and the transaction price. For instance, if a CDS contract was concluded at 100 bps p.a. and the current market price (for the remaining tenor) is 150 bps p.a., the MTM is the present value of $150 - 100 = 50$ bps p.a. In this case, the protection buyer records a profit (which makes sense intuitively because the protection buyer purchased for 100 something that is worth 150) and the protection seller records a loss (because the protection seller sold for 100 something that is worth 150).

What complicates the MTM valuation for a CDS position is a two-way cash flow that transpires over time. Since buyers pay both up front and over time, the buyer's valuation of its position is the current price of the CDS less the present value of the cash outflows it expects to make under the contract. Similarly, the

seller's valuation of its position is the present value of the cash inflows it expects to receive less the present value of the protection leg payment it would make given a default event.

The time dimension itself is not complicated. The complication arises from the fact that there may be a credit event, and if so, the buyer no longer has to make (and the seller no longer receives) the quarterly payments, other than what has accrued from the previous quarter's payment to the point in time of the credit event. Thus, the cash outflows (and inflows) are uncertain based on the chance of a credit event happening at any point over the tenor of the contract. This uncertainty throughout the contract's life is what complicates the math needed for the valuation. For example, the chance that the reference entity defaults in the eighth quarter of the contract's term is predicated on not having defaulted in the prior seven quarters. The chance that default happens in the twelfth quarter is predicated on not having defaulted in the first eleven quarters, and so forth.

In addition, both buyers and sellers adjust the MTM valuations of their CDS positions for the creditworthiness of themselves and their counterparties, known as credit and debit valuation adjustments, respectively, which we discussed in Chapter 12. Because there is counterparty credit risk on both sides, they are permitted under accounting guidelines to mark down the values of what's owed to them and also to mark down their own obligations for their own credit risk.

The principles just described constitute the fundamental basis underlying the methodologies employed in the industry. Given the mathematical complexity in calculating MTM positions, the valuation function is handled by a firm's quantitative specialists or it is outsourced to valuation specialists, and each industry participant will develop its own view about the most accurate and practical MTM methodology. We invite readers interested in knowing more about this topic to refer to the many publications on this topic.

USES OF CDSs

There are three predominant uses of CDSs in the market. The first is to secure credit protection. Market participants with credit exposures, such as bonds or loans, may buy a CDS. A second use is an investment in credit by selling the CDS and earning a credit spread, similar to a credit spread earned on a bond of the same reference entity. This gives the investor an exposure to the credit of the reference entity without funding a bond and without exposure to interest rate

risk. Third, an investor can short a reference entity's credit by buying a CDS without having an underlying exposure to protect. In this case, market participants gain when the reference entity defaults. We discuss each strategy next.

Protection of a Credit Exposure

Credit default swaps were originally created to protect or hedge credit exposures owned by commercial and investment banks, primarily stemming from bonds and loans. In fact, the creation of CDSs is usually attributed to portfolio managers from J.P. Morgan and other banks, anxious to manage their peak exposures without alienating customer relationships.

Today, simply hedging an exposure remains one frequent motivation of protection buyers. Corporates and financial institutions purchase CDSs as part of the active management of their credit portfolios. Needs arise when origination success leads to proportionally high exposures or when the financial situation of a counterparty deteriorates. Credit default swaps provide a convenient way to quickly execute a transaction without being in the undesirable position of informing the client or customer that its credit is not well regarded.

Many credit managers, however, are not seduced by CDSs as a hedging option. In addition to income statement volatility, one big issue is basis, which is the difference between the actual loss and the compensation received from the settlement. Since all CDS buyers receive the same amount relative to the notional as a result of the credit-event-auction process, the settlement amount may not cover any single protection buyer's exposure after recovery. Or, the settlement amount could surpass one's net exposure, resulting in a profit being made. Either way, there is uncertainty about the amount that may be received. This is *basis risk*, that is, the chance that there is a difference between the actual loss and the compensation received from the settlement. The simple existence of basis risk is a strong deterrent for some companies that prefer pure insurance solutions that provide a clear indemnification of the actual losses suffered.

Investment in Credit: Long Credit

The motivation of most protection sellers is to make money by taking an exposure to credit risk, that is, to invest in credit risk. Their credit analysis process is similar to that of a bond buyer or a lending institution. After a thorough credit analysis, if the seller is comfortable with the creditworthiness of

the reference entity and if the pricing is adequate for the risk taken, the seller puts its capital at risk in exchange for the CDS premium. Note that, in principle, selling a CDS and simultaneously buying a U.S. Treasury bond is the financial equivalent, meaning it has the same cash payoff as investing in a corporate bond. In the former case, one invests cash into a Treasury bond and earns a risk-free return, which is supplemented by the CDS premium that captures incremental return for assuming the credit risk of the reference entity (the corporate in question). In the latter case, one invests cash into a corporate bond and earns a return that is comprised of two pieces—a risk-free return plus a spread for assuming the corporate's credit risk. Thus, both strategies have the same return. If the corporate defaults, both strategies have the same downside: The CDS seller loses the notional less the recovery value (must pay the protection buyer) and the corporate bond investor loses the amount of the bond less recovery.

There are two main advantages of selling CDSs over buying a bond or other ways of taking views on credit. First, CDSs offer the possibility to take credit risk on a stand-alone basis, that is, isolated from the other types of risks typically present in bonds and other products. In the preceding example, we described the financial equivalence of two investment strategies, but the CDS investor need not purchase the Treasury bond. The CDS can be bought a la carte, allowing the investor to take a position only on an entity's credit. Unlike a corporate bond or loan, the CDS is immune from interest-rate risk, for the most part. Credit quality is somewhat related to interest rates since both are affected by the macroeconomic environment and CDS values are discounted for time value of money. However, by and large, the evolution of interest rates does not affect the value of a CDS. What drives the CDS prices is the perceived credit quality of the reference entity, and the general price of credit risk in the marketplace.

Second, taking a position on credit risk does not require cash. Unlike buying a corporate bond, which requires funding, selling a CDS does not require a cash investment, which is attractive for companies (banks) for whom cash and liquidity are deployed parsimoniously. Even for entities with access to large amounts of cash, taking a credit risk position without using cash may be preferable to taking one requiring cash because it increases financial flexibility. However, while financial flexibility may be achieved, note that selling the CDS is fundamentally a leveraged bet. In many cases, no cash has been fronted, so if the default event occurs, the seller may not have the cash available to make good. The CDS seller can be selling multiple CDSs with an aggregate notional far in excess of the cash and liquid resources it possesses. This is why most buy-

side counterparties require sellers to post collateral against the CDS contract, especially if the seller is not highly rated.

Starting in the early 2000s, dozens of insurance companies and banks sold large quantities of CDSs, building portfolios of tens of billions of dollars of corporate credit and mortgage-related products, and generating revenue far greater than what would be achievable using limited cash. We still refer to these activities as investments rather than speculation because the positions are long or “long the credit,” since their view is that the reference entity will not default, and also are generally held until expiration rather than being traded.

Speculation in Credit: Shorting Credit

Although CDSs were not designed for speculation, their simplicity enables it. In particular, hedge funds often monetize a view on the credit trend of a company or of a country. Often, the view is a negative one and the hedge fund will “short the credit,” that is, buy protection via a CDS without having any exposure. The transaction delivers a profit in case the reference entity deteriorates or defaults. The accumulation of short positions can result in a run on a company or a run on a country. Often, the presence of the large short positions calls into question the reference entity's creditworthiness, and thereby restricts its sources of liquidity and capital that might otherwise have been available in the lending markets. On top of this, speculators can easily accumulate large and costly positions such that they have an incentive to take whatever measures are available to trigger a default. Without judging these transactions, we present how they work:

- Step 1: The fund manager believes that the credit quality of Company A will deteriorate over time and that the market has not yet figured this out. The CDS price is low compared to what it could be when the deterioration materializes. Let us assume 100 bps p.a. for a five-year trade.
- Step 2: The fund manager buys protection with a five-year CDS on Company A from several counterparties. Let's assume it buys \$100 million of notional. It costs the fund manager \$1 million per year. The transaction is called a naked short, “naked” because the fund manager has no exposure to protect and “short” because the fund will profit if the value of the reference entity falls.
- Step 3: What the fund manager forecasted to happen actually occurs: after two years, the financial situation of Company A deteriorates and the CDS price jumps to 300 bps p.a. The fund manager wants to take profits off the

table and decides to collect (or crystallize) them, which can be done in one of two ways. First, the fund manager can negotiate with the protection sellers for an early termination (unwinding) of the contracts. Most broker dealers routinely agree to unwind a trade, as they commit to maintain a two-way market to provide liquidity. Thus, the unwind would realize the MTM value of the position, which would be approximately $200 \text{ bps} \times \$100 \text{ million} \times 3 \text{ remaining years}$, or \$6 million, for the fund manager. We remind readers that one reason why the calculation above is an approximation is that the MTM value valuation takes into account the probability of default of counterparty. If unwinding is not possible, the fund manager can sell protection at current market prices, which will cancel out the short position. For example, the fund manager could sell three-year protection on \$100 million at 300 bps p.a., thus receiving \$9 million over time. After making remaining payments on the original CDS, the net economic result is the same—\$6 million net for the fund manager, which will approximate its MTM position gain. Some disadvantages of the multiple positions are greater credit exposure to counterparties, use of credit lines, and the possible cost of posting collateral.

Regulators and government officials dislike naked short CDSs because they could accelerate the demise of a company or of a country. For precisely this reason, in 2011 certain European countries forbade naked short positions on sovereign credits such as Greece and Italy. The impact of such measures is hard to assess; some observers believe the restrictions are useless at best and counterproductive at worst.

CREDIT DEFAULT SWAPS FOR CREDIT AND PRICE DISCOVERY

In Chapter 7, we discussed how CDS prices are a source of information regarding an obligor's credit quality. Since the CDS market promotes credit risk transfer and trades, the ensuing prices reflect all the market's information about the credit quality of an obligor and tend to react quickly to changes in circumstances. Thus, apart from entering into a contract to actually hedge a risk, invest in credit, or speculate on an entity's creditworthiness, the CDS market is a valuable resource for the credit risk manager needing to have early warning signs about an obligor, or to use for pricing a transaction in which credit risk is

present. That being said, there are caveats in using CDS prices and those discussed in Chapter 7 are as relevant here in understanding the limitations of CDSs as a form of credit protection and credit investment.

CREDIT DEFAULT SWAPS AND INSURANCE

To recap the beginning of this chapter, CDSs are not an insurance product because they do not indemnify the protection buyer according to their actual losses. Any person can buy protection regardless of any existing risk and can receive money regardless of whether losses are suffered. That said, insurance companies were among the largest sellers of CDSs prior to the 2007 mortgage crisis. They used their financial strength to sell protection to banks on structured finance instruments like residential mortgage-backed securities (described in Chapter 8) or collateralized-debt obligations (Chapter 17). They generated significant revenues but also took significant amounts of credit risk, and in turn they experienced huge losses when the mortgage market collapsed.

Today, most insurers have ceased selling CDSs. Their activities are limited to buying protection to hedge the corporate bonds they own as part of the investment portfolio. Most U.S. insurance regulators frown on licensed insurance carriers from engaging in derivative transactions and require disclosure and/or approval and steep capital charges. As a result, the larger insurers established wholly owned broker-dealer subsidiaries with a parental guaranty, securing a high credit rating and thus securing better terms in dealing with counterparties.

INDEXES, LOAN CDSS, MCDSS, AND ABS CDSs

To conclude this chapter, we will summarize some other varieties of CDSs.

Indexes

Credit default swap indexes have developed over time, and are owned today by Markit Group Limited. However, they can be traded by anyone. Markit publishes

prices every day at www.markit.com. The three main families of corporate CDS indices are CDX, referencing North American corporate reference entities, iTraxx Europe, and iTraxx Asia-Pacific. Subfamilies include indices dedicated to North American investment-grade names (e.g., CDX.NA.IG) and noninvestment-grade names (e.g., CDX.NA.HY). For instance, CDX.NA.IG index contains 125 names rated from AA to BBB, equally weighted, representing various industry sectors, available in tenors of 3, 5, 7, and 10 years. The index price reflects the average of the spread of each reference company in the index. Every six months, a new series is launched, and the list of constituents revised. Of the total CDS notional outstanding as of June 2011, over one-third was comprised of multiname indices.²

For the credit risk manager, indices are of limited interest because they do not enable hedging a precise exposure but only a basket of exposures and the risk manager cannot change the contents of the basket. Credit traders utilize indices, and they can build positions by combining indices and single name CDSs. They are also useful to hedge the systematic MTM risk associated with single name CDSs. For instance, a risk manager who has purchased protection on a large number of entities via several CDSs can be concerned with MTM losses stemming from a general tightening (i.e., decline) of the credit spreads. The risk manager can sell protection on an index because the tightening would result in an MTM gain, which would partially offset the losses on the single-name positions.

LCDSs

Loan CDSs, or loan-only CDSs, are known as LCDSs. Whereas CDSs are designed to mirror the credit risk of a bond, a senior unsecured loan and, in general, any senior unsecured exposure, LCDSs are meant to cover leveraged, syndicated, secured credit exposures. As such, the only reference obligation that can be physically delivered in case of default is a secured loan. Therefore, LCDSs can be of interest for risk managers anxious to protect exposures on noninvestment-grade names.

Municipal Obligation CDSs (MCDSs)

Municipal obligation CDSs (MCDSs) are CDS contracts designed to reference municipal obligations. Prior to April 2012, MCDSs were nonstandardized, especially as they related to credit events and settlement, in part because of the

variation in legal environments across municipal issuers. As of April 2012, ISDA changed the protocol for MCDSs to align with credit and sovereign CDSs, including the use of credit event auctions and granting the Americas DC committees binding authority over determining credit events. Although the overall volume of MCDS contracts outstanding is relatively small (\$62 billion in CDSs against over \$3.7 trillion of municipal bonds outstanding), after standardization took effect, the volume of MCDS activity rose markedly.³

ABS CDSs

Similarly, ABS CDSs are related to asset-backed securities. They were widely used in the mid-2000s to build synthetic collateral debt obligations as we will see in the next chapter. Today, they almost belong in the museum of credit history!

¹ *Source*: BIS, Table 19, “Statistical Release,” November 2011.

² BIS, November 2011 release.

³ Katy Burne, “A Backstop for Muni Bonds,” *Wall Street Journal*, April 17, 2012.

CHAPTER 17

Collateral Debt Obligations (CDOs)

This chapter presents the basics of collateral debt obligations, or CDOs. The peak of the market was reached in 2006 when more than \$550 billion worth of CDOs were issued globally. Today, the market is much smaller, and in 2011, close to \$110 billion of CDOs were issued globally. That being said, a credit analyst needs to know the basics of CDOs because it is still a product handled by many different types of institutions. Hedge funds, pension funds, and insurance companies still invest new money in CDOs. Investment banks structure them and commercial banks use CDOs to hedge their loan portfolios. The market is, however, limited to a subfamily of CDOs, called collateralized loan obligations or CLOs, involving leveraged loans. For any person interested in credit risk management, understanding how CDOs work and the specific role that they played in the 2007 crisis is imperative.

Collateral debt obligations are nothing more than a special type of asset securitization, which we covered in Chapter 8. As such, readers already possess an understanding of them. If you have a good grasp of asset securitization, you will benefit most from what follows.

WHAT ARE CDOs?

Collateral debt obligation is a generic name for securitization transactions in which the collateral consists of debt instruments such as commercial loans or asset-backed securities (ABSs). Any given CDO is commonly identified by the special purpose vehicle (SPV) that issues the securities sold to capital-markets investors and uses the proceeds to buy loans or ABSs. Investing in a CDO means buying securities issued by the SPV.

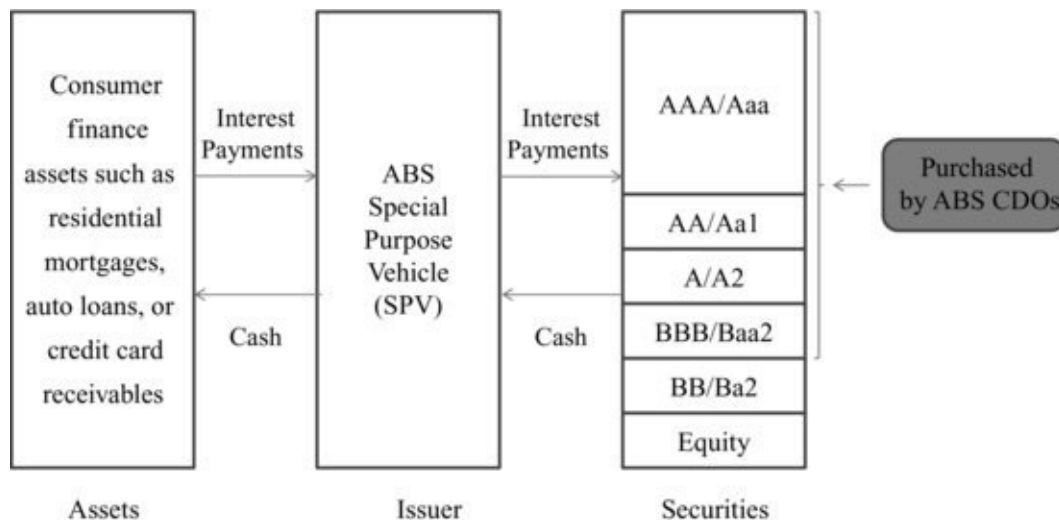
What differentiates the major families of CDOs is the nature of the collateral. Otherwise, CDOs are structured the same way as any securitization scheme, for the most part. CDOs are, therefore, primarily characterized by the assets they own and by the technique used to acquire these assets, cash investments, or CDSs.

On the liability side, the method of structuring different tranches of equity and debt, each with a different level of seniority, is the same as what we described in Chapter 8. To avoid confusion with the CDO's assets, which may consist of ABSs, the expression ABSs is not used to describe securities issued by a CDO. Instead, the securities issued by the CDO are commonly referred to as notes.

The two main families of CDOs are:

1. CLOs, collateralized loan obligations. The collateral is a pool of leveraged (i.e., noninvestment-grade) loans or, less frequently, of loans to small and medium-sized corporations. There are two subfamilies of CLOs. Firstly, balance sheet CLOs are a risk management tool used by banks to buy protection on the loans they extend to their clients. Secondly, investment banks arrange arbitrage CLOs to fund loans originated by commercial banks and sold to third-party investors. We will explain the basics of these two subcategories later in this chapter.
2. ABS CDOs, asset-backed securities collateral debt obligations (also called structured finance CDOs, or SF CDOs). The collateral is composed of securities, themselves issued by securitization schemes. Typically, the collateral consists of sequential paying, nonagency residential mortgage-backed securities. Multisector CDOs are a subsegment of ABS CDOs but, in addition to these nonagency sequential mortgage-backed securities, the collateral contains other forms of securities like commercial mortgage-backed securities (CMBS) or even notes issued by CLOs. Recall the basic principle of securitization, in which equity and debt of various credit qualities are sold to finance a diversified portfolio of (primarily) consumer assets such as mortgages or credit cards. The securities created in the process are called asset-backed securities or ABSs. CDOs purchase these ABS, as can be seen in [Figure 17.1](#).

Figure 17.1 Assets in the CDO



The expression *cash CDO* or *cash flow CDO* is used for both CLOs and ABS CDOs when assets, loans, or ABSs are physically acquired by the CDO in exchange of cash. In contrast, the term *synthetic CDO* refers to structures in which the credit risk attached to the loans or the ABSs is transferred to the CDO via a CDS, without exchange of cash. We will review this later.

ABS CDOs have disappeared today. Too many investors have lost money on their CDO investments after the 2007 crisis and are not willing to come back. There is no need for ABS CDOs anyway, because the limited number of ABSs issued to finance mortgages, credit card receivables, or auto loans are absorbed by traditional institutional investors like pension funds or insurance companies.

Therefore, investors focus on CLOs. Their attractiveness resides in the superior return they generate compared to similarly rated instruments. [Table 17.1](#) shows the spread over LIBOR of CLOs as it compares to the spread over LIBOR of corporate bonds as of April 2012. Note that the CLO spreads are significantly greater than the bond spreads.

[Table 17.1](#) Babson CLO 2012-1: Example of CLO Structure and Pricing, April 2012

Tranche	Spread over LIBOR, bps	Size	Rating Moody's/S&P	Corporate Bonds spread over U.S. Treasuries, bps
A-1	143	233.0	Aaa/AAA	76
A-2	200	27.2	Not rated/AA	128
B	250	31.0	Not rated/A	179
C	400	18.0	Not rated/BBB	255
D	500	12.0	Not rated/BB	N/A
Sub-Note	N/A	39.1	N/A	N/A

Source: CreditFlux CLO-i, as of April 12, 2012, and Merrill Lynch (Merrill Lynch Bond Indices, C0A1, C0A2, C0A3, and C0A4 as of April 30, 2012).

COLLATERALIZED LOAN OBLIGATIONS OR CLOs

Collateralized loan obligations (CLOs) are CDOs involving loans to industrial and service companies.

We already explained in Chapter 14 the basics of the loan market. Loans to (large) investment-grade companies are unsecured, mostly unfunded (i.e., the borrower can draw money if and when it needs to do so) and stay on the balance sheets of commercial banks. Loans to noninvestment-grade companies, also called leveraged loans or high-yield loans, are fully funded and secured by the borrower's assets. A third segment is loans to small and medium-sized enterprises (SMEs), involving entities with only tens or hundreds of millions dollars of revenues.

In the United States, most banks always had a limited appetite for noninvestment-grade loans, since they are both risky and require large amounts of economic and regulatory capital. As a consequence, leveraged loans are primarily sold to third-party cash investors like other banks, hedge funds, pension funds, or insurance companies.

For the most part, leveraged loans are sold individually or pooled in a CLO where, like in any other securitization schemes, several classes of debt, rated between AAA and BB, and equity are created and backed by the cash flow generated by the pool of noninvestment-grade loans. Transactions are possible when the weighted average coupons paid on the notes is lower than the amount of interest paid by the loans to the CDO, thus enabling equity investors to be properly compensated for the risk they take. The expression *arbitrage CLO* is

used for these transactions because they are based on the arbitrage between high interest rates on leveraged loans and lower weighted average interest rates on the CLO notes.

At their peak in 2006, new issuance of arbitrage CLOs exceeded \$100 billion in the United States and \$40 billion in Europe. This was primarily due to an unprecedented level of leveraged buyouts (LBOs) structured by private equity companies. The typical technique was to purchase the company from the previous owner and to restructure the liabilities by taking on more debt to finance the acquisition. CLOs were the primary buyers, up to 60 percent in certain years, of the new loans hitting the market. Today, new arbitrage transactions total less than \$15 billion a year in the United States and have disappeared in Europe.

One of the main reasons is that, in the aftermath of the 2007 crisis, interest rates on leveraged loans are relatively high, frequently in excess of 3.5 percent over LIBOR. Many investors, looking for high return in a difficult environment, are attracted by these loans and buy them directly. Similarly, the market expects high coupons on CLO notes, as can be seen from [Table 17.1](#), which makes the arbitrage described earlier difficult. If the weighted average coupon paid on the various classes of notes is too high, the loan portfolio does not generate enough interest payments to service the CLO debt.

In Europe, banks typically keep leveraged and SME loans on their balance sheet, but the aggregate amount can be too high for their risk appetite or their regulatory capital constraints. To protect themselves, from time to time, they structure a CLO, which transfers the credit risk attached to a loan portfolio they select to capital markets investors. Because the motivation of the banks is to protect their balance sheet, such transactions are called balance sheet CLOs. Frequent issuers of balance sheet CLOs are Deutsche Bank, Barclays, and Standard Chartered Bank. There is still a healthy market of balance sheet CLOs in Europe, even though the arbitrage CLO market is non-existent. New issuance of balance sheet CLOs reached close to \$100 billion in 2011.

ARBITRAGE CLOs

To recap, the only active CLO market in the United States at this point in time is the arbitrage CLO market. In Europe, this market has disappeared. Next, we describe the collateral, the structure, and the collateral manager of these CLOs.

The Collateral

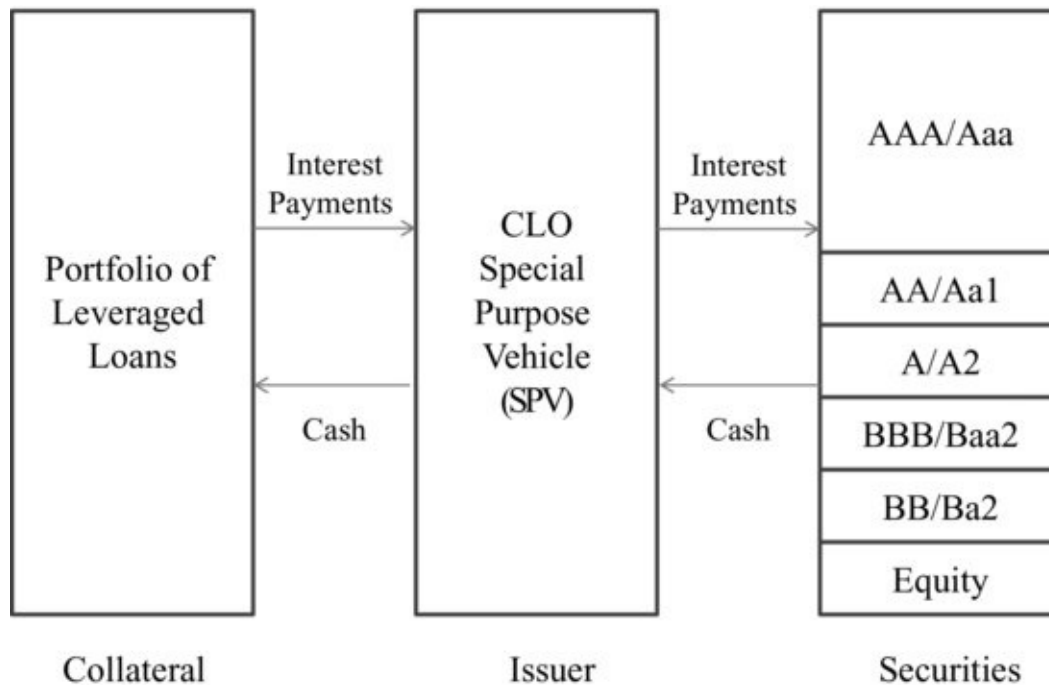
There are no limitations to the type of loans that can be included in a CLO, but the market is centered on noninvestment-grade companies, both relatively large and publicly rated (leveraged loans), and on loans to small and medium-sized enterprises (SMEs). They are attractive for CLO investors as, in case of default, they historically provide higher recovery rates than other asset classes. As we explained in Chapter 14, this is due to the fact that these loans are always secured by some of the issuers' assets. In case of default, the borrower takes possession of the assets and sells them, which provide a high recovery. Leading investment banks like Bank of America, Merrill Lynch, or J.P. Morgan originate and structure the loans and are willing to bear the warehousing risk to develop relationships with borrowers (and their owners for those controlled by large private equity companies like KKR or Blackstone) and sell them other services like M&A advisory. Because they have no appetite to retain the risk, they sell pieces of the loan in a process known as syndication to traditional institutional investors, either directly or via CLOs.

The Structure

Like all securitization schemes, a CLO is centered around a special purpose vehicle that raises money by selling notes to investors and uses the proceeds to purchase loans. This is an example of cash flow CLO as there is a real exchange of cash between the investors and the CLO. A CLO is created with an expected lifetime of several years exceeding the legal life of a typical leveraged loan. Although investors start receiving interest payment right away, principal repayments may be deferred by a few years as proceeds from repaid loans are reinvested in new loans.

Several tranches of notes are created. They differentiate themselves by the priority of payment. The most subordinated ones absorb the first losses on the portfolio. The most senior ones benefit from the credit enhancement provided by the subordinated notes and are typically rated AAA/Aaa. CLOs are not very large. The typical size is a few hundred million dollars and rarely exceeds \$500 million. [Figure 17.2](#) shows the typical structure of an arbitrage CLO.

Figure 17.2 Arbitrage CLO Structure



The Collateral Manager

Collateralized loan obligations are dynamically managed. This means that the portfolio of loans is not static. The collateral that the investors see when making their investment decisions will not be the same as when the transaction matures. The main reason is that, even if leveraged loans have a legal maturity of five to seven years, they are often repaid early. When a loan is repaid or sold prior to maturity, the proceeds are not used to repay the notes but to invest in new loans. Managing the loan portfolio and making investment decisions is the role of a collateral manager. The original selection of loans influences the performance of a CLO, but the ability of the manager to reinvest money in performing loans is key.

The second major role of the manager is to monitor the performance of each individual loan. This includes reviewing financial statements when they became available but also speaking frequently with the borrower's management team. If signs of deterioration surface, the manager has to make a decision, either to keep it in the CLO, at the risk of experiencing a loss in case of default later on, or to sell it at a discount. When loans default, CLO managers owning large positions may become part of the creditors' committee and try to extract the most value for investors.

When considering an investment in the CLO, thoroughly reviewing the profile

and track record of the manager is essential. We will come back to this topic in later.

In the early 2000s, when the CLO market was growing at a fast pace, many management firms were created. As managers' fees are relatively high, a small management outfit could survive with mandates for only a few CLOs. When the market shrunk in the aftermath of the 2007 crisis, a good number of these firms disappeared and their mandates were transferred to larger companies.

Market leaders are specialized companies like Highland Capital Management, and Ares Capital Management, but also subsidiaries/divisions of large private equity firms such as Blackstone, Babson, or The Carlyle Group. [Table 17.2](#) lists the top 10 CLO managers ranked by CLO assets under management.

Table 17.2 CLO Managers by Assets under Management as of June 29, 2012

Ranking	Manager	U.S. CLOs		European CLOs		All CLOs	
		Par (\$bn)	No.	Par (€bn)	No.	Par (\$bn)	No.
1	Babson Capital Management	12.5	24	6.5	9	21.3	33
2	Carlyle	11.3	24	6.6	10	20.1	34
3	Highland Capital Management	13.7	17	3.1	7	17.8	24
4	Blackstone Debt Advisors	14.1	26	2.0	4	16.7	30
5	Alcentra	4.1	11	9.3	21	16.6	32
Ranking	Manager	U.S. CLOs		European CLOs		All CLOs	
		Par (\$bn)	No.	Par (€bn)	No.	Par (\$bn)	No.
6	Ares Capital Management	12.4	21	0.8	2	13.5	23
7	Credit Suisse Asset Management	10.2	17	1.9	4	12.8	21
8	CIFC Deerfield	12.6	30			12.6	30
9	Harbourmaster Capital Management			8.9	14	11.9	14
10	Invesco	7.4	17		7	10.7	24

Source: Creditflux CLO-i.

BALANCE SHEET CLOs

Banks with large commercial loan portfolios need from time to time to hedge

some of their positions. This is particularly true for the loans and leveraged loans to small and medium-sized enterprises (SMEs), which contain risk and require a lot of regulatory capital.

To protect their balance sheet and reduce their regulatory capital requirements, they structure CLOs, which transfer the credit risk of a portfolio of loans to the capital markets. One of the main differences with arbitrage CLOs is that no collateral manager is involved. The bank selects the portfolio and places it into the CLO. When loans are repaid, the transaction either gradually amortizes or the portfolio is replenished with similar loans meeting predefined criteria so as to maintain the same average quality.

Cash Flow Balance Sheet CLOs

When banks are not prevented, from a commercial or legal perspective, to sell the loans, they do so. The structure of the CLO is then exactly the same as the one presented earlier in [Figure 17.2](#). Notes are issued by an SPV and the proceeds are used to physically purchase loans from a bank. Such transactions are examples of cash flow CLOs.

Their sizes are much larger than the ones of arbitrage CLOs. For instance, in March 2012, Lloyds Bank (UK) structured, for its affiliate Lloyds TSB Commercial, a \$2.4 billion transaction called Sandown Gold 2012-1.

Synthetic Balance Sheet CLOs

Particularly in Europe and Asia, banks sometimes want or have to keep the direct relationship with the borrower and do not want to sell the loans to investors. As we reviewed in Chapter 16, that is where credit default swaps (CDSs) come into play. It is actually the very reason they were created in the late 1980s. Contrary to cash flow CLOs, which purchase loans with cash, synthetic CLOs acquire the credit risk attached to the loan, and do not acquire the loan itself, via a CDS. That is why the market refers to them also as synthetic CLOs by comparison with cash CLOs.

To avoid confusion, let us clarify that the expression *synthetic* refers to the fact that the transfer of credit risk is achieved with a CDS. The term *balance sheet* refers to the fact that the purpose of the transaction is to protect a loan portfolio that stays on the balance sheet of the issuing bank. In other words, *synthetic* and *balance sheet* refer to two different characteristics of these transactions and are compatible. The former is related to the technique used to acquire the assets, the

latter to the motivation of the issuing bank.

Borrowers are not involved and not aware of the transaction. Loans remain on the bank's balance sheet and, in case of financial difficulty, borrowers negotiate with the bank, not with capital market investors like hedge funds, as they might in a cash CLO.

To facilitate the execution of the transaction, the bank, anxious to protect its portfolio, does not buy CDSs on single entities but on a portfolio of entities, which becomes the reference portfolio of the CLO. The amount of protection on each entity does not have to be the same. The CDS can reference \$10 million on certain names and \$5 on others.

Also the bank does not necessarily protect its entire exposure. It can include in the CLO \$10 million on a company, whereas its full exposure is \$15 million. What dictates its choice is (1) the amount of unhedged exposure it is comfortable retaining, and (2) the necessity to create a homogeneous portfolio without peak exposures.

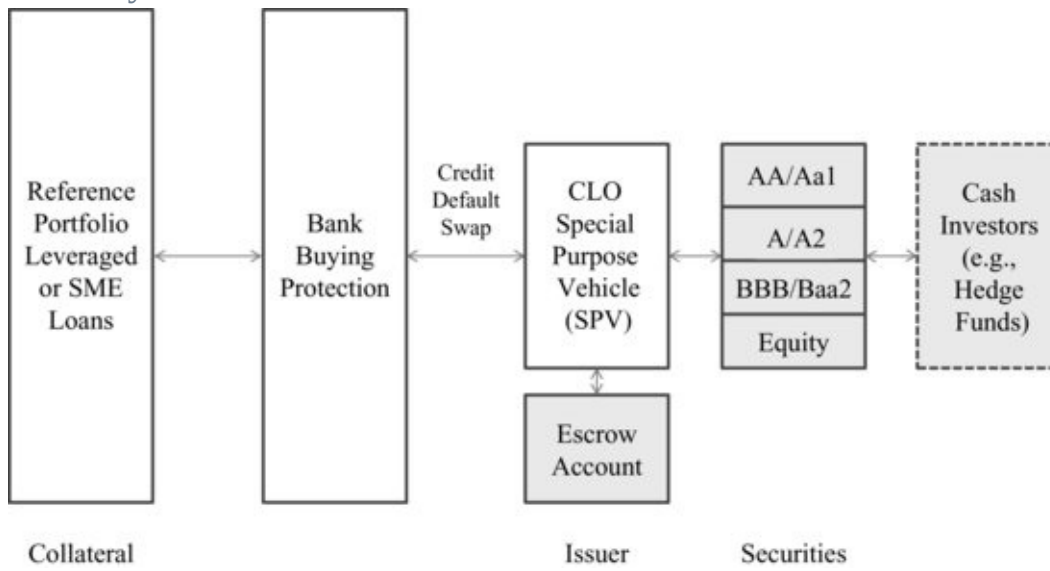
One major characteristic of these transactions is that the bank does not buy protection on the aggregate notional amount of the portfolio, which reduces the cost. For instance, a bank can protect a portfolio of loans with an aggregate amount totaling \$2 billion but purchase only \$300 million of protection. It is reasonable because, in normal economic conditions, only a small proportion of borrowers will default. In our example, if less than 15 percent ($300/2,000$) of the loans default, the bank is fully protected. What motivates its decision is the size of the regulatory or economic capital that is transferred compared to the cost of doing so.

As no cash is needed to finance the acquisition of the loans, the CLO could, in theory, enter into credit default swaps with investors. In case of default in the reference portfolio, the CLO would collect money from the CDS counterparties and compensate the bank for its losses. In reality, investors in subordinated tranches of CDOs are specialized funds with a low credit quality. The CDO, in order to be able to indemnify the bank in case of default in the reference portfolio, cannot take a credit risk on the CLO investors. Therefore, full cash collateralization is required. That is to say, an investor who is ready to take a credit risk up to, for example, \$25 million in a CLO tranche, has to deposit in advance \$25 million.

The collateralization is achieved through the issuance of credit-linked notes or CLNs, which we already presented in Chapter 8. Notes are sold but the proceeds are placed into an escrow account and invested in liquid and high-quality

collateral. If the reference portfolio experiences a default and the CDO has to pay the bank under the term of the CDS, the CDO draws cash from the escrow account. Absent default, the money held in the escrow account is given back to the investors when the transaction matures. [Figure 17.3](#) shows a schematic of a synthetic balance sheet CLO.

Figure 17.3 Synthetic Balance Sheet CLO



ABS CDOs

ABS CDOs have completely disappeared today. Up until 2007, they were primarily used to finance nonagency-backed mortgages to individuals and investors. With the 2007 crisis, investors lost all appetite for the asset class.

ABS CDOs were considered to be one of the most complicated financial products ever invented and simply understanding them was a complex endeavor. The structures of the ABS were complex and the quality of the collateral hard to assess as the borrowers represented a previously untapped market (e.g., subprime) as well as new forms of instruments (low documentation and high loan-to-value). Even experienced, well-resourced, and sophisticated professionals had trouble analyzing them.

The Collateral

The main source of the complexity resided on the asset side. ABS CDOs invested in ABSs issued by SPVs that funded consumer assets (as in [Figure](#)

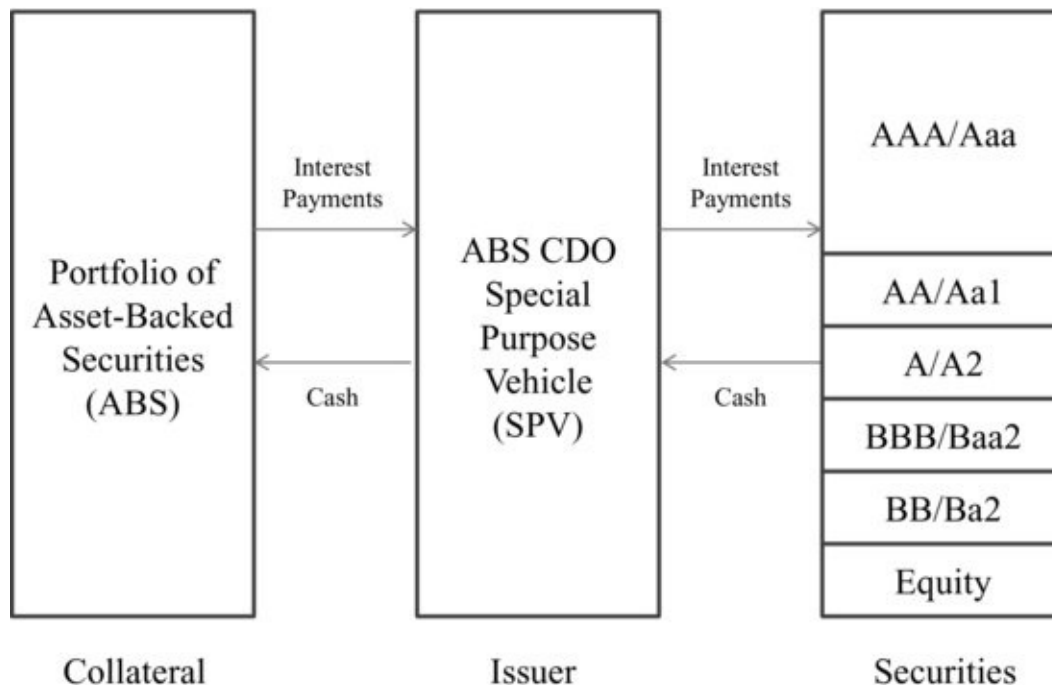
[17.1](#)). A typical ABS CDO owned more than 100 securities, each being backed by a pool of consumer assets, sometimes as many as 1,000 mortgages. To really understand the assets that the ABS CDO owned, one had to go through the ABS, which was complex enough, because an ABS's prospectus is a long and dense document, and drill down to the individual loan level. In the previous example, a CDO would have an economic interest in $100 \times 1,000 = 100,000$ mortgages. This involved the handling of a high volume of data and an actual ability to exploit it.

ABS CDOs differentiated themselves by the credit quality of their assets. We saw that ABSs are issued at diverse levels of priority of payments that influence their default probability and, therefore, their ratings. A typical ABS transaction involves more than 10 tranches rated between BBB/Baa2 and AAA/Aaa. High-grade ABS CDOs invested in tranches rated AAA/Aaa, AA/Aa1, and occasionally A/A2. Mezzanine ABS CDOs purchased the lowest tranches, between BBB/Baa2 and A/A2, and were, therefore, riskier.

The Liability

High-grade and mezzanine ABS CDOs had very different liability structures. Prior to the crisis, highly rated ABS had a low probability of default. Therefore, notes of high-grade ABS CDOs were primarily highly rated. Only a small cushion was necessary to reach AAA/Aaa level. High-grade CDOs were, therefore, very leveraged, meaning not much subordination existed below this level to absorb losses, should they occur. It was not unusual to have close to 95 percent of the total number of notes issued rated AAA/Aaa! In contrast, the AAA/Aaa rated tranches of mezzanine ABS CDOs benefited from larger subordination, sometimes reaching 30 percent. [Figure 17.4](#) presents the structure of a typical ABS CDO.

[Figure 17.4](#) ABS CDO Structure



The Collateral Manager

The selection of assets was delegated to a collateral manager, remunerated with several types of fees (typically a senior fee based on the size of the CDO and a junior fee dependent on the performance of the assets). Originally, managers were divisions of large money-management firms with long experience investing in ABSs. As the business developed and the demand for managers grew, former employees primarily of asset managers created many small firms. Their size and their level of sophistication varied greatly. Some devoted time and resources to build a robust infrastructure. Others just invested in the bare minimum infrastructure and were mocked in the industry as “a few guys and a Bloomberg terminal.”

The role of the manager was primarily to select the original portfolio, to monitor the performance of the securities, and to perform various administrative and reporting functions. One of the key success factors was to have access to the major investment banks structuring ABSs. As they needed to purchase ABSs for their CDOs, it was essential to be well connected with the banks to have a chance to be shown bonds for sale and buy the ones meeting their investment criteria. The competition was so intense in the years leading to the 2007 crisis that it was widely known that banks, in order to save time, placed their first calls to the largest managers able to purchase more or less whatever was produced.

Although each investment was supposed to be thoroughly analyzed, in reality there was little time to do so.

ABS CDOs and the 2007 Crisis

Anyone interested in credit risk management must understand the way ABS CDOs worked because they played a central role in the 2007 crisis. As we saw, ABS CDOs offered an additional distribution channel for ABSs. Traditionally, ABSs were purchased by long-term investors such as pension funds or insurance companies. The investment process was rigorous. Each security was dissected to thoroughly understand the underlying collateral and the structure of the deal. If satisfied, the investor would place an order. ABS CDOs brought to the market a new breed of investors, competing with the traditional ones. The success of ABS CDOs was such that the vast majority of nonagency residential mortgage-backed securities were purchased by CDOs.

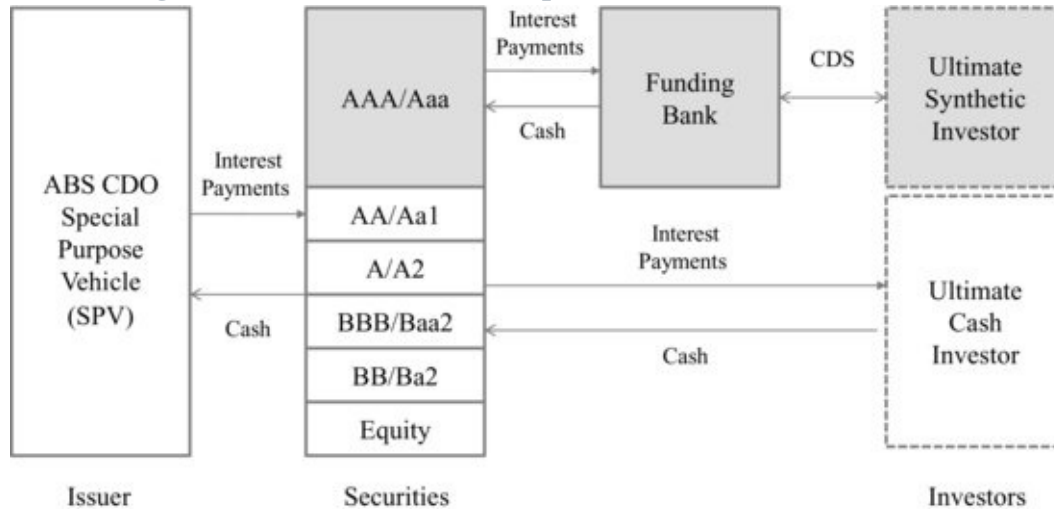
The most conservative investors were focusing on high grade ABS CDOs, thinking that they were safer investments than mezzanine CDOs. It was a reasonable assumption because the track record of AAA/Aaa rated securities was outstanding, so investing, via a CDO, in a portfolio of AAA/Aaa securities was a safe bet. Alas, when borrowers started to default, the expected strong lines of defense embedded in the structure exploded quickly, and many tranches defaulted, regardless of their ratings. The wave of RMBS defaults triggered the default of the CDO notes as well, which led to tens of billions of losses for investors.

The exponential development of ABS CDOs was a result of two major factors. First, banks, notably European ones, were flush with cash to invest. As ABS CDOs were large, up to \$2 billion each, they provided great opportunities to deploy cash quickly. The banks were, however, not interested in taking the credit risk associated with the ABS CDO notes. They much preferred the stable and high credit quality of other financial institutions, notably monoline insurance companies and other large and highly rated insurance companies. Insurers were attracted by the potential revenues and the low-risk profile of ABS CDOs, but they did not want to deploy cash to buy notes. Their focus was on the AAA/Aaa rated tranches that were large in size (sometimes up to \$2 billion) and low in default probability—so low that they were called the super-senior tranches.

This is where CDSs were used and provided the key ingredient: Banks purchased the ABS CDOs notes and, at the same time, the bank purchased

protection on these notes from insurers via a CDS. These became known as the negative basis trade in which the CDS spread paid was less than the credit spread embedded in the CDO's coupon paid to them, seemingly providing a form of arbitrage, or risk-free profit, for the bank. The bank was essentially providing a funding mechanism (buying the CDO), not taking much risk, and making a profit. [Figure 17.5](#) illustrates the structure of the negative basis trade.

Figure 17.5 Negative Basis Trade for Super-Senior AAA/Aaa Tranche



The convergence of the high amount of liquidity available, the appetite of insurers, and the allure of making riskless profits were the major reasons behind the rapid expansion of the ABS CDO market. Once they had secured the commitment of a funding bank and of the insurer, which could represent 95 percent of the total amount of notes to sell, investment banks structuring ABS CDOs only had to sell the most subordinated notes. They were typically purchased by hedge funds, pension funds, or retained by the banks themselves. Thus, these transactions were relatively easy for the bank to execute.

All the CDOs created at the same time by the largest players like Merrill Lynch and UBS were actively looking for ABSs to purchase, which created a strong incentive for mortgage originators to create assets. Thus, attractive mortgage products were created to entice individuals to take on mortgages to buy real estate.

We will not elaborate further on this topic but wanted to provide our readers with an overview of the techniques used in the mid-2000s to finance consumer assets and notably mortgages. As we saw, ABS CDOs and CDSs played crucial roles.

CREDIT ANALYSIS OF CDOs

In Chapter 8, we provided a framework for analyzing a securitization scheme that provides a basis for understanding CDOs. Next, we give an overview of other relevant topics for CDOs and will focus on CLOs because they are the only active market at this time.

Quality of Collateral

Each CLO comes with special parameters that constitute the guidelines that the collateral manager must respect when building the portfolio and reinvesting the cash available during the lifetime of the structure. These parameters provide a first opportunity for investors to judge if they are interested in the CLO or not.

One of the key parameters is the weighted-average rating factor, or WARF. This is a number that's calculated with a formula developed by rating agencies. For instance, Moody's assigns the value 1 to a loan rated Aaa and the value 10,000 to a loan rated Ca. A CLO with a minimum WARF of 2,000 has, on average, a better portfolio than a CLO with a target WARF of 2,300. The higher the number, the more aggressive the CLO is. The notes may generate higher interest but the risk of default is also higher.

Another parameter is the weighted-average spread, or WAS. Arbitrage CLOs, not created to protect a balance sheet but to distribute leveraged loans, are based on the principle that, by creating tranches of different ratings, the aggregate interest payments on the notes are less than the amount of interest generated by the collateral assets. To verify that this is actually the case, CLOs are created with a minimum WAS, which guarantees that when assets are selected, the amount of interest they pay is taken into account. Overall, WAS guarantees that there is enough cash generated by the assets to service the notes and provide a decent return to equity investors.

We mentioned earlier that leveraged loans are highly secured by some assets of the borrowers. In case of default, the lenders can access the assets in priority, thus increasing the recovery. A few years ago, rating agencies started forecasting the recovery in case of default (which we discussed in Chapter 14), and they assign a recovery rating. CLOs typically include a weighted-average recovery rating, or WARR, aimed at selecting assets with a minimum amount of expected recovery, which improves the creditworthiness of the CLO.

Not all leveraged loans have the same structure, and some of them are

inherently prone to default. Collateral managers are commonly restricted from purchasing too many risky types such as second liens or debtor-in-possession loans that are extended to defaulted companies. (We will review these loans in Chapter 18 in the context of bankruptcy.)

Finally, let us mention various parameters designed to avoid concentration and create diversification in the portfolio. The most common ones are the single obligor concentration, the maximum industry sector concentration, and the diversity score, also calculated with a formula proposed by rating agencies.

Structural Mitigants

Because the CDO's assets are risky by nature, structural mitigants are in place to accelerate the repayments to notes buyers if the portfolio deteriorates. The general principles were explained in a previous chapter, but let us mention the two most important tests for a CLO.

The first one is the overcollateralization test or O/C test for a specific tranche. It is a ratio measuring the aggregate notional of assets over the notional of the tranche and the previous tranches. The exact calculation is a little complicated, but the idea is that there is always more collateral than the outstanding amount of notes to be repaid. Similarly, all CLOs include interest coverage, or I/C, ratio, aiming at ensuring that the collateral pool generates more interest payments than the amount of interest to be paid to investors in the notes. Breaching an O/C test or a I/C test commonly triggers the immediate amortization of the CLO. The notes become immediately due, no new investment is allowed and interest payments to junior investors are suspended (or diverted) until senior investors are fully repaid.

Assessing the Manager

In today's market, collateral managers are strong companies, as the smallest entities did not survive the 2007 crisis. However, there are still notable differences between managers. The main areas to pay attention to are:

- Track record: Most managers have been involved in the management of CLOs for a number of years. The best indicator of their performance is the behavior of their CLOs over the years and particularly at times when defaults were high. Assessing the performance of their CLOs during the 2007 crisis period provides a real life test. Investors can verify how many

CLOs experienced O/C test breaches, if dividends payments to equity investors were suspended, and how long this lasted. Also, one of the key questions is how many defaulted companies they invested in. When asking this question, note that sometimes managers sell CLOs at deep discount slightly before a default to improve their statistics.

- Financial strength: Not all managers have the same level of funding, which can be an issue because it is indispensable for managers to have the necessary resources to hire quality professionals and to invest in a robust infrastructure. Some managers are part of large organizations with access to resources. Some are much smaller firms or they are independent and only involved in the management of CLOs. Investors should not be afraid to require full disclosure of the financial statements.
- Key personnel: The quality of the staff is obviously important. Good portfolio managers are professionals who have been involved in the business a long time and who have a deep knowledge of the way the market works. Some individuals are so necessary to the performance that it is usual to have a key-man provision that allows investors to change managers if these individuals leave the firm.

FINAL WORDS

Collateral debt obligations are perceived as being one of the key ingredients of the 2007 crisis, and many institutions do not want to invest in any kind of CDOs. However, there is still a place for those not backed by ABSs but by leveraged and SME loans. Properly structured with assets that can be understood, CLOs offer noninvestment-grade credits access to the funding markets and offer investors a way to assume diversified credit exposure at returns that may be attractive relative to the risk taken. It remains to be seen whether the broader asset class of ABS CDOs will see a rebirth.¹

¹ We covered CDOs at a basic level, which is sufficient to have a reasonable understanding of the product and the marketplace. For readers interested in learning more, many books provide comprehensive and excellent coverage, including Lucas, Goodman, and Fabozzi's *Collateralized Debt Obligations* (John Wiley & Sons, 2006).

CHAPTER 18

Bankruptcy

Throughout this book, we have attempted to provide help on how to avoid credit losses. Alas, even the best analysts and the most clever portfolio managers will at times face bankruptcies in their portfolio. In this chapter, after defining bankruptcy, we outline the common characteristics of companies that end up in bankruptcy proceedings, and some early warning signals of the soon-to-declare bankruptcy companies. We conclude with some examples of recent high-profile cases.

WHAT IS BANKRUPTCY?

What is bankruptcy exactly and how is it related to default? An obligor's default is defined as its failure to live up to the terms and conditions of the contract between it and its counterparty. This is, most noticeably, failure to make timely interest, principal, or other payments under the contract. When the obligor defaults, its counterparty has various contractual rights to take action against the obligor, such as to claim assets or to take control of the organization and replace management. Usually when failure to make a payment occurs, the counterparty will immediately exercise its contractual rights. Most firms have multiple counterparties, and a default of one contract often means actual or imminent default of other contracts. Therefore, creditors will work fast and furiously to capture what assets they believe are rightfully due to them. The obligor, to protect itself from the onslaught of creditors, files for protection under bankruptcy laws. As soon as bankruptcy is filed, the creditors must subsume their claims to a bankruptcy proceeding. In the United States, these are administered by the debtor-in-possession or a Chapter 11 trustee.

Although each country has its own bankruptcy law, the laws function in more or less the same way around the globe, and we will focus only on United States bankruptcies in this chapter. In the United States, there are two main chapters of U.S. federal bankruptcy law for commercial enterprises. Chapter 11 is a bankruptcy law for reorganization that allows the obligor to work out and restructure its obligations for the purposes of a fresh start such that it emerges from the bankruptcy proceedings as a viable entity. Chapter 7 is a bankruptcy

law for liquidation in which the obligor is assumed to be unlikely to survive, even with a restructuring; thus it undergoes liquidation.

At bankruptcy proceedings, all creditors are represented. At the table are lenders (banks and bondholders), suppliers, shareholders, and institutions such as the Pension Benefit Guaranty Corp., which has to take over the pension liabilities if the company defaults. Chapter 11 status provides an opportunity to renegotiate all contracts, and nothing is off the table. The amount of debt can be reduced, labor contracts with employees renegotiated, and pension obligations cancelled. Ultimately, the reorganization plan must be approved by the court and by the creditors. Pursuant to a plan of reorganization, a debtor is able to repay only a portion of its debt to its creditors, hence the plan proposed is often unpalatable to the creditors.

Difficult negotiations occur, as the interests of all parties are not aligned. For instance, lenders want shareholders to abandon all their rights. On the contrary, shareholders want lenders to absorb losses on the money they lent in the past. Among lenders, all parties try to secure as many assets as possible to provide new financing.

Often, obligors file for protection under Chapter 11 only to discover that creditors do not approve the reorganization plan or that the plan doesn't work out. If so, the assets would then be liquidated and proceeds used to pay off the creditors, who would, in most instances, receive less than 100 percent of the debt. In the United States., the bookseller Borders Inc. tried, as part of a Chapter 11 reorganization plan, to shut unprofitable stores in order to keep the profitable ones as ongoing businesses, but they ultimately liquidated. Circuit City, the electronics retailer, initially filed for Chapter 11 with the same intention; then, when no alternatives were found, it switched its filing to Chapter 7 to accelerate the liquidation.

For both Chapter 11 and Chapter 7, one of the priorities is to maintain access to liquidity during the bankruptcy process. Specialized institutions provide debtor-in-possession or DIP financing that enables a company to keep operating. Credit analysts involved in DIP have to decide what level of collateral to require. The DIP lender has priority against all cash collected as a result of the sale of assets and liquidation, or upon reorganization with new financing, DIP is repaid.

Most bankruptcy proceedings are lengthy. In rare cases, prepackaged bankruptcies are presented to a judge. In such cases, negotiations between all stakeholders are concluded prior to the filing and the company. All parties agree so that the company can start operating in a new context right after the filing. In

the United States, the 2009 bankruptcy of the large conglomerate CIT was prearranged and is often cited as a success.

PATTERNS OF BANKRUPT COMPANIES

In Chapter 7 of this book, we presented the two pillars underlying the traditional credit analysis of a company. As a reminder, the two pillars are the qualitative analysis, such as the quality of management and the competitiveness of the products, and the quantitative analysis that consists of an extensive review of the financial statements. In this chapter, we instead describe high-level patterns among companies that ultimately declare bankruptcy.

Many companies that default on their obligations suffer from fundamental flaws in their business models, cost structures, or financial structures. Often the flaws are not obvious to management and wishful thinking keeps them from making needed, and sometimes radical, changes to keep the business afloat. When management cannot turn things around, ultimately the company runs out of cash and defaults on its financial obligations.

Well-informed credit analysts are usually aware of an obligor's flaws. This does not mean that they won't approve of extending credit to the obligor, but rather, they might recommend a low notional, short-term exposure, sufficient collateral, strong covenants, or a combination of these mitigating techniques.

Flaws in the Business Model

Flaws in business models can involve overly optimistic assumptions about the demand for a product or the ability of the company to cross-sell across its product line. Many mergers and acquisitions deals involve overly optimistic assumptions about business synergies that ultimately result in a diminution of value for shareholders and bondholders alike, such as the infamous AOL Time Warner merger. Examples in the manufacturing industry include the products themselves, which are no longer adapted to consumer needs. They may be too complicated, obsolete, too expensive, or simply useless. Think of companies like Kodak or Nokia (which has not defaulted but is fighting to stay afloat), which, at one point, dominated their industries. As technological innovations and the changing shape of customer needs continue at a rapid pace, obsolescence will prevail and bankruptcies will follow.

In the service industry, changes in consumer habits, such as the growth in

online shopping at the expense of the brick and mortar model have been behind recent bankruptcies. This was the case with Borders that defaulted in 2011 as digital books gradually replaced physical books and the company, unlike its competitors Amazon.com or Barnes & Noble, did not have an adequate offering of e-readers. The airline industry is thought to be operating under a flawed business model; a huge capital investment (the cost of the aircraft) can never be fully recouped in the pricing since airlines have huge pressure to cover their operating costs, and thus they compete with each other on a marginal cost, rather than average cost, basis. It is not surprising that companies in the airline industry are frequently in bankruptcy court.

Flaw in the Cost Structure

Credit analysts pay close attention to the cost structure of a company, including following key ratios and other financial metrics that we outlined in Chapter 7 of this book. At a higher level, many companies default because their cost structure is out of synch with their market and competitors. When competition prevents sellers from transferring some costs onto their customers, operating margins become thin or even turn negative, debt becomes unserviceable, and ultimately they default. A cost problem can happen anywhere in the operations, investment, or financing of a company, but we discuss three areas where we have seen most problems occur.

The first area is in operating costs, and within this, labor costs. Wages and social contributions such as health insurance, social security tax, payroll tax, pension costs, and worker's compensation insurance premiums, present a formidable hurdle for many companies. In many developed countries, media and the politicians lament the loss of manufacturing jobs by the hundreds of thousands, but the reality is that many companies cannot survive if they keep their production in their home markets. Some companies that waited or were too late to send their production overseas paid a high price. We now are hearing that the fully loaded cost of moving production overseas is beginning to equilibrate with that of home-country production, so some of the exodus from the 2000s is starting to or may soon start to reverse course.

High-cost structures also involve the firm's financial structure. High leverage can pose a problem because of the costs of servicing this debt load, namely high interest payments and large principal payments. Although principal can often be refinanced, most situations involving high leverage are designed to be

temporary, with the debt amortizing over time. Vulnerable companies include those purchased by private equity companies, where the acquisition costs are primarily financed by additional debt. Examples of leveraged buy-outs that ended badly abound. A good example of this is the case of high-end retailer Barney's, whose flagship store on Madison Avenue attracts shoppers from all over the world. When it changed hands in 2007, the new owner burdened the company with \$500 million of additional debt. Needless to say, restructuring firms were brought in in February 2012 when it became clear that the company would not be able to repay \$200 million that had come due.

Finally, we mention the brewing problem of defined-benefit pension-fund costs. Although most companies no longer offer a defined-benefit pension to new employees, the accumulated promises that they have made to existing employees over the years have amassed into a large liability that, for most corporate sponsors, is not fully funded. Unlike a defined-contribution plan, a defined-benefit plan puts the onus on the pension sponsor (i.e., the corporation) to make contractual payments to retirees until death. Companies are required to set aside funds to pay for these obligations, but most have set aside inadequate amounts. First, most companies fund at the legal minimum amount. Second, rates of return recently have fallen short of expectations. Third, people are living significantly longer than what companies assumed when they originally made the promises, thus extending their obligations further out into the future (presenting sponsors with longevity risk, which is the risk that people live longer than expected). Finally, many companies also offered other postretirement benefits such as health care, whose inflation has outpaced that of any other sector, again amplifying the corporate sponsor's future obligations.

Pensions have placed significant burdens on some companies. Many companies will not experience a cash crunch until the retirement spike hits their workforce but recognition of the liabilities heightened in 2006 with the Pension Protection Act, and, on paper, many firms are poised for becoming insolvent in the near future. For some, the insolvency has already happened. Both American Airlines and General Motors were recent casualties of insolvency and companies whose pension costs were their largest financial burdens. As this book goes to print, American Airlines is working on presenting a reorganization plan to the court, which entails the pension fund and other creditors accepting losses.

Flaws in the Financial Structure

Credit analysts have to pay more attention now than in the past to the refinancing risk of a company's debt. Being dependent on refinancing is a precarious situation to be in. No one can take for granted the readiness of existing lenders to extend their loans or new lenders to replace maturing debt with new loans. For industrial companies, the maturity of the loans should be spread out over time, so that no single large amount needs refinancing at any point in time.

Since banks and lending institutions rely on short-term financing, refinancing risk is more pronounced. Large institutions that sell commercial paper every day face the risk that one day investors turn their backs. Recent high-profile examples of banks unable to refinance their obligations are Dexia, a French and Belgian bank, with close to \$100 billion of short-term debt, that was bailed out by the two governments in 2011, and MF Global, which we will discuss later on in this chapter.

SIGNALING ACTIONS

When financial difficulties become overwhelming, management commences taking radical actions to save their companies. These actions, which become publicly known, confirm to the credit analyst that the situation is dire.

Following is an incomplete list of actions that companies fighting to survive commonly use. Note that these actions are also used during a reorganization phase after a filing for bankruptcy protection.

- Healthy companies have large lines of credit available but typically do not draw on them. They are in place just in case a need arises in the future. As we saw in Chapter 14 of this book, bank loans and bond indentures contain covenants that, when breached, prevent the borrower from having access to liquidity. Therefore, companies in need of cash tend to draw the full amount of the facility just prior to breaching some covenants. We will review the case of Kodak later on, which ultimately filed for bankruptcy protection. The first visible sign that their situation was dire was when it became known, in September 2011, that it had tapped its credit line. Kodak's stock price lost 25 percent of its value the following day as observers awakened to the tough times that lay ahead.
- Although there are good reasons to sell assets, when a firm decides to sell strategic properties or subsidiaries, it is usually a signal that it needs to raise cash quickly.

- Companies that raise capital in the absence of large acquisitions or planned investments may be doing so to simply raise cash to meet operational or financing obligations. Existing shareholders, either directly or via the company's directors, may approve this plan knowing that dilution is preferable to having nothing if the firm is unable to raise the cash it needs and the firm heads to bankruptcy court. A good example is Japan Airlines, which filed for bankruptcy protection once, emerged a few months later, but subsequently tried to raise capital from U.S. airlines.
- Hiring bankruptcy lawyers, investment banks, or specialized advisers to review strategic options is almost always a sign that a company is preparing itself for a default. The role of these advisers is to try to find a solution outside the bankruptcy courts whenever possible. They start discussions with the various stakeholders and quickly define options, such as finding a suitor to help the company stay alive. If no alternative to a bankruptcy filing is found, they typically stay involved during the reorganization process.

EXAMPLES OF BANKRUPTCIES

Eastman Kodak

Kodak's bankruptcy is a classic example of a company whose success was linked to a technology that gradually became obsolete and that was unable to reinvent itself to compete in a new environment. When Kodak filed for bankruptcy protection in January 2012, few people were surprised. Rumors about the filing had been circling the company for some time. A few months earlier, the media reported that Kodak drew on its bank lines, which was a sign that the company was running out of cash and drawing on its lines before it was too late. The management had naturally dismissed the filing rumors, but by mid-January 2012, the bankruptcy made the headlines of the global media.

Kodak was no ordinary company, and there was an aspect of nostalgia in the articles written and the comments made on TV. For many people, the little yellow boxes were synonymous with happy family vacations. Before the advent of digital cameras, souvenirs were immortalized in pictures taken on Kodak films. Kodak film was available all over the world, dominating the global market, with Fujifilm of Japan being a distant second.

In 1881, George Eastman created The Eastman Dry Plate Company and two

years later, he moved it to Rochester, in the northern part of New York State, close to the Canadian border. The company specialized in cameras and films for the general public, such as the Kodachrome series of films, introduced in 1935. In the early 1990s, Kodak employed more than 130,000 staff and made \$16 billion of sales.

Kodak quickly understood the threat of the digital technology to their main business of films and film processing. Kodak invested early in digital cameras that directly competed with film. Rather than seeing competing products gradually making its film obsolete, Kodak decided to occupy the territory and not let the camera makers, primarily Japanese companies like Olympus or Canon, take away its business. The move was successful, and Kodak's digital cameras were one of the first to hit the market in the late 1990s.

Unfortunately, the competition quickly caught up, and Japanese and Korean competitors surpassed Kodak's sales of digital cameras. To make things worse, smartphones with high-quality built-in cameras reduced the demand for digital cameras altogether. One of the first decisions made after the bankruptcy filing was to shut the digital-camera unit, a move made to save precious cash. Kodak's other attempt to diversify away from film also was not successful. It entered the printer market, but its market share was small compared to leaders like Hewlett-Packard and Lexmark.

Early in 2012, Kodak was running out of options, and, burdened by high costs, filed for bankruptcy. As this book goes to print, Kodak expects that the exit from some markets, the sale of its patent portfolio, and some pension-fund restructuring will provide sufficient resources to allow it to emerge from bankruptcy as a smaller, focused enterprise.

MF Global

MF Global (MF) was by no means a household name. However, when it filed for bankruptcy protection in October 2011, it became the eighth largest bankruptcy in U.S. history in terms of assets, just ahead of Chrysler ([Table 18.1](#)).

Table 18.1 Ten Largest Public Company U.S. Bankruptcy Filings since 1980

Company	Bankruptcy Date	Description	Assets
Lehman Brothers Holdings Inc.	09/15/08	Investment Bank	\$691,063
Washington Mutual, Inc.	09/26/08	Savings and Loan Holding Co.	\$327,913
WorldCom, Inc.	07/21/02	Telecommunications	\$103,914
General Motors Corporation	06/01/09	Manufactures and Sells Cars	\$91,047
CIT Group Inc.	11/01/09	Banking Holding Company	\$80,448
Enron Corp.	12/02/01	Energy Trading, Natural Gas	\$65,503
Conseco, Inc.	12/17/02	Financial Services Holding Co.	\$61,392
MF Global Holdings Ltd.	10/31/11	Commodities and Derivatives Broker	\$40,541
Chrysler LLC	04/30/09	Manufactures and Sells Cars	\$39,300
Thornburg Mortgage, Inc.	05/01/09	Residential Mortgage Lending Company	\$36,521

Listed in descending order by Pre-Petition Assets (Assets in \$mil)

Source: BankruptcyData.com New Generation Research, Inc.

The failure of MF is a good example of a financial company dependent on short-term funding. Less than one week went by between the time it was downgraded and when it defaulted. Equally impressive was that it was liquidated shortly after its Chapter 11 filing because no company showed interest for any part of the business.

MF Global was a broker-dealer, heavily involved in some futures markets. Its clients were primarily institutional investors but also traders, and end-users such as farmers who were MF Global's customers, due to its big presence in agriculture derivatives products.

The problems of MF Global started when it was revealed that, in order to increase profitability, it had made massive purchases of European sovereign bonds. When European economic troubles increased, the bonds lost value. Because MF Global had financed them with borrowed money, it had to provide additional collateral to compensate for the loss of value. Then, in mid-October, rating agencies realized that the size of the bond holdings was too large compared to its balance sheet. As a result they downgraded the company and it took less than a week before all stakeholders lost complete confidence in MF Global. Clients that had deposited money with the firm took it back, and

derivatives counterparties requested more collateral. MF Global was unable to supply the amount of cash requested.

The company filed for bankruptcy protection a week after the first downgrade. Soon thereafter, media reported that another firm had considered a takeover up until a couple of hours before the Chapter 11 filing, but the suspicion of fraud deterred the suitor. As things now stand, large sums of customer funds are missing, and the suspicion is that these funds were used to meet collateral calls from counterparties, an illegal action in the United States.

The lessons learnt from the demise of MF Global are multiple. First, financial institutions depend on borrowed money and it does not take much for investors to lose confidence, which triggers a run on the bank that quickly leads to bankruptcy. In contrast to industrial companies like Kodak, the demise of a financial institution happens quickly. Other examples include Lehman Brothers and Bear Stearns each of whose fates were sealed over a weekend. Another lesson is the danger of fraud or alleged fraud. There is not much that a credit analyst can do when the company is involved in illegal transactions or presents inaccurate financial statements. Without the discovery that MF Global had misappropriated customers' funds, the company might have been taken over to the likely benefit of all creditors. Its client base was attractive, and several competitors considered purchasing the firm. All attempts fell apart after MF Global's management was unable to explain the missing customer funds.

FINAL WORDS

In this chapter we provided some context and color around bankruptcies. Recall that a key variable in loss-given-default, MTM valuation, CVaR, and other measures of credit risk exposure, is the recovery value should an obligor default. The recovery value is determined in large part by the bankruptcy proceeding. How the negotiation, restructuring, or liquidation unfolds, as well as the actions of the obligor, its constituents, and the trustee immediately before, during, and post reorganization, will be key drivers of the ultimate recovery.

About the Authors

Sylvain Bouteillé is head, Key Account Management and a member of the management team of the North American division of Swiss Re Corporate Solutions. He started his career in Japan at the French Embassy and as general representative for a large French construction company. In 1996, he joined Swiss Re in Zurich (Switzerland) in the newly created credit risk management division. He was in charge of a large portfolio of counterparties and was instrumental in developing credit guidelines and portfolio management activities. In 1998, he moved to New York where, as U.S. head of credit risk management, he was responsible for credit risk aspects of all insurance and capital markets transactions. In 2003, he became U.S. head of structured credit underwriting, where he originated and structured credit derivatives and financial guaranty reinsurance transactions. Since 2008, he has been working with risk managers of Fortune 500 companies to develop traditional and nonstandard insurance solutions. Sylvain has an MS in civil engineering from ENTPE (France) and an MBA from INSEAD (France). Since 2011, he teaches credit risk management to students in the MS program in risk management at Queens College, City University of New York.

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