2024 FRM®
Exam Prep

SchweserNotes™
Credit Risk Measurement and Management

PART II BOOK 2

KAPLAN SCHWESER

Book 2: Credit Risk Measurement and Management

SchweserNotes™ 2024

FRM Part II

SCHWESERNOTES™ 2024 FRM® PART II BOOK 2: CREDIT RISK MEASUREMENT AND MANAGEMENT

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CONTENTS

READINGS AND LEARNING OBJECTIVES

STUDY SESSION 4

17. Fundamentals of Credit Risk

Sylvain Bouteille and Diane Coogan-Pushner, *The Handbook of Credit Risk Management: Originating, Assessing, and Managing Credit Exposures, 2nd Edition* (Hoboken, NJ: John Wiley & Sons, 2022). Chapter 1.

After completing this reading, you should be able to:

a. define credit risk and explain how it arises using examples.
b. explain the distinctions between insolvency, default, and bankruptcy.
c. identify and describe transactions that generate credit risk.
d. describe the entities that are exposed to credit risk and explain circumstances under which exposure occurs.
e. discuss the motivations for managing or taking on credit risk.

18. Governance

Sylvain Bouteille and Diane Coogan-Pushner, *The Handbook of Credit Risk Management: Originating, Assessing, and Managing Credit Exposures, 2nd Edition* (Hoboken, NJ: John Wiley & Sons, 2022). Chapter 2.

After completing this reading, you should be able to:

a. define risk management responsibilities in an organization and explain the three lines of defense framework for effective risk management and control.
b. explain the processes that lead to risk taking including credit origination, credit risk assessment, and credit approval processes.
c. discuss the following key principles underlying best practice for the governance system of credit risk: Guidelines, Skills, Limits, and Oversight.
d. describe the most common parameters of a credit-sensitive transaction.
e. describe the roles of the credit committee in an organization.

19. Credit Risk Management

Hennie van Greuning and Sonja Brajovic Bratanovic, *Analyzing Banking Risk, Fourth Edition* (World Bank Group, 2020). Chapter 7.

After completing this reading, you should be able to:

a. describe key elements of an effective lending or financing policy.
b. explain the importance and challenges of setting exposure and concentration limits.
c. describe the scope and allocation processes of a bank's credit facility and explain bank-specific policies and actions to reduce credit risk.
d. discuss factors that should be considered during the credit asset classification process.
e. describe and explain loan loss provisions and loan loss reserves.
f. identify and explain the components of expected loss and distinguish between expected loss and unexpected loss.
g. explain the requirements for estimating expected loss under IFRS 9.
h. describe a workout procedure for loss assets and compare the following two approaches used to manage loss assets: retaining loss assets and writing off loss assets.
i. explain the components of credit risk analysis.
j. explain the components of credit risk management capacity, and outline key questions that the board of directors of a bank should ask.

20. Capital Structure in Banks

Gerhard Schroeck, *Risk Management and Value Creation in Financial Institutions* (New York, NY: John Wiley & Sons, 2002). Chapter 5, pages 170–186.

After completing this reading, you should be able to:

a. evaluate a bank's economic capital relative to its level of credit risk.

b. identify and describe important factors used to calculate economic capital for credit risk: probability of default, exposure, and loss rate.
c. define and calculate expected loss (EL).
d. define and calculate unexpected loss (UL).
e. estimate the variance of default probability assuming a binomial distribution.
f. calculate UL for a credit asset portfolio and the UL contribution of each asset under various scenarios of portfolio composition, asset characteristics and size.
g. describe how economic capital is derived.
h. explain how the credit loss distribution is modeled.
i. describe challenges to quantifying credit risk.

21. Introduction to Credit Risk Modeling and Assessment

Michalis Doumpos, Christos Lemonakis, Dimitrios Niklis, and Constantin Zopounidis, *Analytical Techniques in the Assessment of Credit Risk: An Overview of Methodologies and Applications* (Springer, 2019). Chapter 1.

After completing this reading, you should be able to:

a. explain the capital adequacy, asset quality, management, earnings, and liquidity (CAMEL) system used for evaluating the financial condition of a bank.
b. describe quantitative measurements and factors of credit risk, including probability of default, loss given default, exposure at default, expected loss, and time horizon.
c. estimate capital adequacy ratio of a financial institution.
d. describe the judgmental approaches, empirical models, and financial models to predict default.
e. apply the Merton model to calculate default probability and the distance to default and describe the limitations of using the Merton model.
f. compare and contrast different approaches to credit risk modeling, such as those related to the Merton model, Credit Risk Plus (CreditRisk+), CreditMetrics, and the Moody's-KMV model.
g. apply risk-adjusted return on capital (RAROC) to measure the performance of a loan.

22. Credit Scoring and Rating

Michalis Doumpos, Christos Lemonakis, Dimitrios Niklis, and Constantin Zopounidis, *Analytical Techniques in the Assessment of Credit Risk: An Overview of Methodologies and Applications* (Springer, 2019). Chapter 2.

After completing this reading, you should be able to:

a. compare the credit scoring system to the credit rating system in assessing credit quality and describe the different types of each system.
b. distinguish between through-the-cycle and point-in-time credit rating systems.
c. describe the process for developing credit risk scoring and rating models.
d. describe rating agencies' assignment methodologies for issue and issuer ratings, and identify the main criticisms of the credit rating agencies' ratings.

23. Credit Scoring and Retail Credit Risk Management

Michel Crouhy, Dan Galai, and Robert Mark, *The Essentials of Risk Management, 2nd Edition* (New York, NY: McGraw-Hill, 2014). Chapter 9.

After completing this reading, you should be able to:

a. analyze the credit risks and other risks generated by retail banking.
b. explain the differences between retail credit risk and corporate credit risk.
c. discuss the "dark side" of retail credit risk and the measures that attempt to address the problem.
d. define and describe credit risk scoring model types, key variables, and applications.
e. discuss the key variables in a mortgage credit assessment and describe the use of cutoff scores, default rates, and loss rates in a credit scoring model.
f. discuss the measurement and monitoring of a scorecard performance including the use of cumulative accuracy profile (CAP) and the accuracy ratio (AR) techniques.
g. describe the customer relationship cycle and discuss the trade-off between creditworthiness and profitability.
h. discuss the benefits of risk-based pricing of financial services.

24. Country Risk: Determinants, Measures, and Implications

Aswath Damodaran, *Country Risk: Determinants, Measures, and Implications – The 2022*

***Edition* (2022)**

After completing this reading, you should be able to:

a. identify and explain the different sources of country risk.
b. evaluate the methods for measuring country risk and discuss the limitations of using those methods.
c. compare and contrast foreign currency defaults and local currency defaults.
d. explain the consequences of a country's default.
e. discuss measures of sovereign default risk and describe components of a sovereign rating.
f. describe the shortcomings of the sovereign rating systems of rating agencies.
g. compare the use of credit ratings, market-based credit default spreads, and CDS spreads in predicting default.

STUDY SESSION 5

25. Estimating Default Probabilities

John C. Hull, *Risk Management and Financial Institutions, Sixth Edition* (John Wiley & Sons, 2023). Chapter 17.

After completing this reading, you should be able to:

a. compare agencies' ratings to internal credit rating systems.
b. describe linear discriminant analysis (LDA), define the Altman's Z-score and its usage, and apply LDA to classify a sample of firms by credit quality.
c. describe the relationship between borrower rating and probability of default.
d. describe a rating migration matrix and calculate the probability of default, cumulative probability of default, and marginal probability of default.
e. define the hazard rate and use it to define probability functions for default time as well as to calculate conditional and unconditional default probabilities.
f. describe recovery rates and their dependencies on default rates.
g. define a credit default swap (CDS) and explain its mechanics including the obligations of both the default protection buyer and the default protection seller.
h. describe CDS spreads and explain how CDS spreads can be used to estimate hazard rates.
i. define and explain CDS-bond basis.
j. compare default probabilities calculated from historical data with those calculated from credit yield spreads.
k. describe the difference between real-world and risk-neutral default probabilities and determine which one to use in the analysis of credit risk.
l. using the Merton model, calculate the value of a firm's debt and equity, the volatility of firm value, and the volatility of firm equity.
m. using the Merton model, calculate distance to default and default probability.
n. assess the quality of the default probabilities produced by the Merton model, the Moody's KMV model, and the Kamakura model.

26. Credit Value at Risk

John C. Hull, *Risk Management and Financial Institutions, Sixth Edition* (John Wiley & Sons, 2023). Chapter 19.

After completing this reading, you should be able to:

a. compare market risk value at risk (VaR) with credit VaR in terms of definition, time horizon, and tools for measuring them.
b. define and calculate credit VaR.
c. describe the use of rating transition matrices for calculating credit VaR.
d. describe the application of the Vasicek model to estimate capital requirements under the Basel II internal-ratings-based (IRB) approach.
e. interpret the Vasicek's model, Credit Risk Plus (CreditRisk+) model, and the CreditMetrics ways of estimating the probability distribution of losses arising from defaults as well as modeling the default correlation.
f. define credit spread risk and assess its impact on calculating credit VaR.

27. Portfolio Credit Risk

Allan Malz, *Financial Risk Management: Models, History, and Institutions* (Hoboken, NJ: John

Wiley & Sons, 2011). Chapter 8, Sections 8.1, 8.2, and 8.3.

After completing this reading, you should be able to:

a. define and calculate default correlation for credit portfolios.
b. identify drawbacks in using the correlation-based credit portfolio framework.
c. assess the impact of correlation on a credit portfolio and its Credit VaR.
d. describe the use of a single factor model to measure portfolio credit risk, including the impact of correlation.
e. define beta and calculate the asset return correlation of any pair of firms using the single factor model.
f. using the single factor model, estimate the probability of a joint default of any pair of credits and the default correlation between any pair of credits.
g. describe how Credit VaR can be calculated using a simulation of joint defaults.
h. assess the effect of granularity on Credit VaR.

28. Structured Credit Risk

Allan Malz, *Financial Risk Management: Models, History, and Institutions* (Hoboken, NJ: John Wiley & Sons, 2011). Chapter 9.

After completing this reading, you should be able to:

a. describe common types of structured products.
b. describe tranching and the distribution of credit losses in a securitization.
c. describe a waterfall structure in a securitization.
d. identify the key participants in the securitization process and describe conflicts of interest that can arise in the process.
e. compute and evaluate one or two iterations of interim cashflows in a three-tiered securitization structure.
f. describe the treatment of excess spread in a securitization structure and estimate the value of the overcollateralization account at the end of each year.
g. Explain the tests on the excess spread that a custodian must go through at the end of each year to determine the cash flow to the overcollateralization account and to the equity noteholders.
h. describe a simulation approach to calculating credit losses for different tranches in a securitization.
i. explain how the default probabilities and default correlations affect the credit risk in a securitization.
j. explain how default sensitivities for tranches are measured.
k. describe risk factors that impact structured products.
l. define implied correlation and describe how it can be measured.
m. identify the motivations for using structured credit products.

29. Credit Risk

John C. Hull, *Options, Futures, and Other Derivatives, 11th Edition* (Pearson, 2022). Chapter 24.

After completing this reading, you should be able to:

a. assess the credit risks of derivatives.
b. define credit valuation adjustment (CVA) and debt valuation adjustment (DVA).
c. calculate the probability of default using credit spreads.
d. describe, compare, and contrast various credit risk mitigants and their role in credit analysis.
e. describe the significance of estimating default correlation for credit portfolios and distinguish between reduced form and structural default correlation models.
f. describe the Gaussian copula model for time to default and calculate the probability of default using the one-factor Gaussian copula model.
g. describe how to estimate credit VaR using the Gaussian copula and the CreditMetrics approach.

30. Credit Derivatives

John C. Hull, *Options, Futures, and Other Derivatives, 11th Edition* (Pearson, 2022). Chapter 25.

After completing this reading, you should be able to:

a. describe a credit derivative, credit default swap (CDS), total return swap, and collateralized debt obligation (CDO).
b. explain how to account for credit risk exposure in valuing a CDS.
c. identify the default probabilities used to value a CDS.
d. evaluate the use of credit indices and fixed coupons in pricing CDS transactions.

e. define CDS forwards and CDS options.
f. describe the process of valuing a synthetic CDO using the spread payments approach and the Gaussian copula model of time to default approach.
g. define the two measures of implied correlation: compound (tranche) correlation and base correlation.
h. discuss alternative approaches used to estimate default correlation.

STUDY SESSION 6

31. Derivatives

Jon Gregory, *The xVA Challenge: Counterparty Credit Risk, Funding, Collateral, and Capital, 4th Edition* (West Sussex, UK: John Wiley & Sons, 2020). Chapter 2.

After completing this reading, you should be able to:
a. define derivatives and explain how derivative transactions create counterparty credit risk.
b. compare and contrast exchange-traded derivatives and over-the-counter (OTC) derivatives, and discuss the features of their markets.
c. describe the process of clearing a derivative transaction.
d. identify the participants and describe the use of collateralization in the derivatives market.
e. define the International Swaps and Derivatives Association (ISDA) Master Agreement, the risk-mitigating features it provides, and the default events it covers.
f. describe the features and use of credit derivatives and discuss potential risks they may create.
g. describe central clearing of OTC derivatives and discuss the roles, mandate, advantages, and disadvantages of the central counterparty (CCP).
h. explain the margin requirements for both centrally-cleared and non-centrally-cleared derivatives.
i. define special purpose vehicles (SPVs), derivatives product companies (DPCs), monolines, and credit derivatives product companies (CDPCs) and describe the limitations of using them as risk mitigating methods.
j. describe the approaches used and the challenges faced in modeling derivatives risk.

32. Counterparty Risk and Beyond

Jon Gregory, *The xVA Challenge: Counterparty Credit Risk, Funding, Collateral, and Capital, 4th Edition* (West Sussex, UK: John Wiley & Sons, 2020). Chapter 3.

After completing this reading, you should be able to:
a. describe counterparty risk and differentiate it from lending risk.
b. describe transactions that carry counterparty risk and explain how counterparty risk can arise in each transaction.
c. identify and describe institutions that take on significant counterparty risk.
d. describe credit exposure, credit migration, recovery, mark-to-market, replacement cost, default probability, loss given default, and the recovery rate.
e. describe credit value adjustment (CVA) and compare the use of CVA and credit limits in evaluating and mitigating counterparty risk.
f. identify and describe the different ways institutions can quantify, manage, and mitigate counterparty risk.
g. identify and explain the costs of an OTC derivative.
h. explain the components of the X-Value Adjustment (xVA) term.

33. Netting, Close-Out, and Related Aspects

Jon Gregory, *The xVA Challenge: Counterparty Credit Risk, Funding, Collateral, and Capital, 4th Edition* (West Sussex, UK: John Wiley & Sons, 2020). Chapter 6.

After completing this reading, you should be able to:
a. explain the purpose of an International Swaps and Derivatives Association (ISDA) master agreement.
b. summarize netting and close-out procedures (including multilateral netting), explain their advantages and disadvantages, and describe how they fit into the framework of the ISDA master agreement.
c. describe the effectiveness of netting in reducing credit exposure under various scenarios.
d. describe the mechanics of termination provisions and trade compressions and explain their advantages and disadvantages.

e. provide examples of trade compression of derivative positions, calculate net notional exposure amount, and identify the party holding the net contract position in a trade compression.
f. identify and describe termination events and discuss their potential effects on parties to a transaction.

34. Margin (Collateral) and Settlement

Jon Gregory, *The xVA Challenge: Counterparty Credit Risk, Funding, Collateral, and Capital, 4th Edition* (West Sussex, UK: John Wiley & Sons, 2020). Chapter 7.

After completing this reading, you should be able to:

a. describe the rationale for collateral management.
b. describe the terms of a collateral agreement and features of a credit support annex (CSA) within the ISDA Master Agreement including threshold, initial margin, minimum transfer amount and rounding, haircuts, credit quality, and credit support amount.
c. calculate the credit support amount (margin) under various scenarios.
d. describe the role of a valuation agent.
e. describe the mechanics of collateral and the types of collateral that are typically used.
f. explain the process for the reconciliation of collateral disputes.
g. explain the features of a collateralization agreement.
h. differentiate between a two-way and one-way CSA agreement and describe how collateral parameters can be linked to credit quality.
i. explain aspects of collateral including funding, rehypothecation, and segregation.
j. explain how market risk, operational risk, and liquidity risk (including funding liquidity risk) can arise through collateralization.
k. describe the various regulatory capital requirements.

35. Central Clearing

Jon Gregory, *The xVA Challenge: Counterparty Credit Risk, Funding, Collateral, and Capital, 4th Edition* (West Sussex, UK: John Wiley & Sons, 2020). Chapter 8.

After completing this reading, you should be able to:

a. define a central counterparty (CCP) and describe the mechanics of central clearing.
b. explain the concept of novation under central clearing.
c. define netting, multilateral offset, and compression and provide examples of each.
d. describe the application and estimation of margin and default funds under central clearing.
e. discuss the risks faced by a CCP and the ways it manages its exposures.
f. provide examples of a loss waterfall.
g. explain the different methods of managing the default of one or more members of a CCP.
h. compare bilateral and central clearing.
i. compare initial margin and default fund requirements for clearing members in relation to loss coverage, cost of clearing, and moral hazard.
j. describe the advantages and disadvantages of central clearing.

36. Future Value and Exposure

Jon Gregory, *The xVA Challenge: Counterparty Credit Risk, Funding, Collateral, and Capital, 4th Edition* (West Sussex, UK: John Wiley & Sons, 2020). Chapter 11.

After completing this reading, you should be able to:

a. describe and calculate the following metrics for credit exposure: expected mark-to-market, expected exposure, potential future exposure, expected positive exposure and negative exposure, effective expected positive exposure, and maximum exposure.
b. compare the characterization of credit exposure to VaR methods and describe additional considerations used in the determination of credit exposure.
c. identify factors that affect the calculation of the credit exposure profile and summarize the impact of collateral on exposure.
d. identify typical credit exposure profiles for various derivative contracts and combination profiles.
e. explain how payment frequencies and exercise dates affect the exposure profile of various securities.
f. explain the general impact of aggregation on exposure, and the impact of aggregation on exposure when there is correlation between transaction values.
g. describe the differences between funding exposure and credit exposure.
h. explain the impact of collateralization on exposure and assess the risk associated with the remargining period, threshold, and minimum transfer amount.

i. assess the impact of collateral on counterparty risk and funding, with and without segregation or rehypothecation.

37. CVA

Jon Gregory, *The xVA Challenge: Counterparty Credit Risk, Funding, Collateral, and Capital, 4th Edition* (West Sussex, UK: John Wiley & Sons, 2020). Chapter 17.

After completing this reading, you should be able to:

a. explain the motivation for and the challenges of pricing counterparty risk.
b. describe credit value adjustment (CVA).
c. calculate CVA and CVA as a spread with no wrong-way risk, netting, or collateralization.
d. evaluate the impact of changes in the credit spread and recovery rate assumptions on CVA.
e. describe debt value adjustment (DVA) and bilateral CVA (BCVA).
f. explain the distinctions between unilateral CVA (UCVA) and BCVA, and between unilateral DVA (UDVA) and BCVA.
g. calculate DVA, BCVA, and BCVA as a spread.
h. explain how netting can be incorporated into the CVA calculation.
i. define and calculate incremental CVA and marginal CVA and explain how to convert CVA into a running spread.
j. explain the impact of incorporating collateralization into the CVA calculation, including the impact of margin period of risk, thresholds, and initial margins.
k. describe wrong-way risk and contrast it with right-way risk.
l. identify examples of wrong-way risk and examples of right-way risk.
m. discuss the impact of collateral on wrong-way risk.
n. identify examples of wrong-way collateral.
o. discuss the impact of wrong-way risk on central counterparties (CCPs).
p. describe the various wrong-way modeling methods including hazard rate approaches, structural approaches, parametric approaches, and jump approaches.
q. explain the implications of central clearing on wrong-way risk.

38. The Evolution of Stress Testing Counterparty Exposures

Akhtar Siddique and Iftekhar Hasan (eds.), *Stress Testing: Approaches, Methods, and Applications*, (London, UK: Risk Books, 2013). Chapter 4.

After completing this reading, you should be able to:

a. differentiate among current exposure, peak exposure, expected exposure, and expected positive exposure.
b. explain the treatment of counterparty credit risk (CCR) both as a credit risk and as a market risk and describe its implications for trading activities and risk management for a financial institution.
c. describe a stress test that can be performed on a loan portfolio and on a derivative portfolio.
d. differentiate between stressed expected loss and stress loss of a credit portfolio, and calculate the stress loss on a loan portfolio and the stress loss on a derivative portfolio.
e. describe a stress test that can be performed on CVA.
f. calculate the stressed CVA and the stress loss on CVA.
g. calculate the DVA and explain how stressing DVA enters into aggregating stress tests of CCR.
h. describe the common pitfalls in stress testing CCR.

39. An Introduction to Securitization

Moorad Choudhry, *Structured Credit Products: Credit Derivatives & Synthetic Securitization, 2nd Edition* (New York, NY: John Wiley & Sons, 2010). Chapter 12.

After completing this reading, you should be able to:

a. define securitization, describe the securitization process, and explain the roles of participants in the process.
b. explain the terms over-collateralization, first-loss piece, equity piece, and cash waterfall within the securitization process.
c. analyze the differences in the mechanics of issuing securitized products using a trust versus a special purpose vehicle (SPV) and distinguish between the three main SPV structures: amortizing, revolving, and master trust.
d. explain the reasons for and the benefits of undertaking securitization.
e. describe and assess the various types of credit enhancements.

f. explain the various performance analysis tools for securitized structures and identify the asset classes they are most applicable to.
g. define and calculate the delinquency ratio, default ratio, monthly payment rate (MPR), debt service coverage ratio (DSCR), the weighted average coupon (WAC), the weighted average maturity (WAM), and the weighted average life (WAL) for relevant securitized structures.
h. explain the prepayment forecasting methodologies and calculate the constant prepayment rate (CPR) and the Public Securities Association (PSA) rate.

The following is a review of the Credit Risk Measurement and Management principles designed to address the learning objectives set forth by GARP®. Cross-reference to GARP assigned reading—Bouteille and Coogan-Pushner, Chapter 1.

READING 17

FUNDAMENTALS OF CREDIT RISK

Study Session 4

EXAM FOCUS

This reading provides the definition of credit risk and the circumstances under which credit exposure occurs as well as the motivations for taking on or mitigating credit exposure. For the exam, be able to differentiate between the events that give rise to credit risk, and be able to distinguish between insolvency, default, and bankruptcy, which are related but distinct concepts. Also, be able to identify and describe the most common transactions that generate credit risk. Finally, be familiar with the types of entities that are exposed to credit risk (i.e., financial institutions, corporations, and individuals) and what creates credit exposure for the subgroups of these entities.

MODULE 17.1: CREDIT RISK DEFINITION AND TRANSACTION TYPES

LO 17.a: Define credit risk and explain how it arises using examples.

Credit risk is the probability that one party (e.g., a creditor) will lose money if a counterparty fails to honor its financial obligation due to either:

- an inability to repay the obligation,
- an unwillingness to repay the obligation (e.g., due to a dispute), or
- nontimeliness of honoring the obligation.

PROFESSOR'S NOTE

Borrower, obligor, counterparty, and bond *issuer* are typically used synonymously to signify the party receiving funds (credit), which has an obligation to repay it. *Lender*, *creditor*, and *obligee* are primarily used to signify the party providing credit.

Losses often arise when a company borrows funds for capital expansion, but is later unable to repay funds owing to creditors when the obligation becomes due. Losses may also happen because a company's product becomes obsolete (e.g., video cassettes, fax

machines) or under any scenario when an entity is unable to cover its financing costs like interest and principal payments. A nonpayment of obligations generates a credit loss for lenders or creditors. Even if obligations are honored but with a delay, the delay can create credit risk for the creditor as it can lead to lost interest income.

Unanticipated and uninsured events like macroeconomic factors could also cause an entity to miss repaying its obligations, which in turn creates credit risk for its creditors. The most recent example is the COVID-19 pandemic—consider a restaurant that saw a significant decline in service and needed to close, causing it to default on a bank loan that it took out previously to fund its operations or expansion.

Nonpayment of an obligation can also happen due to deliberate actions (e.g., an unwillingness by a borrower to honor its obligation, perhaps because of a dispute around the validity of the original contract). Such disputes may be settled between the two parties, or they may end up in court. An infrequent—but not unusual—example is when a sovereign state chooses to default on its international debt obligations, or force a conversion of its foreign currency debt obligations into domestic currency. This typically creates a credit loss for lenders because of the significant devaluation of the domestic currency following these events. A relatively recent example is the 2002 "pesification" in Argentina.

Generally, the longer the term of the contract, the greater the credit risk is to creditors. In assessing this credit risk, creditors generally want to assess (1) the amount of credit risk, (2) the probability of counterparty default, and (3) the recovery amount and timing of payment receipt.

Insolvency vs. Default vs. Bankruptcy

LO 17.b: Explain the distinctions between insolvency, default, and bankruptcy.

A counterparty's inability to pay its financial obligations can be due to insolvency, default, or bankruptcy.

Insolvency refers to a scenario where a counterparty's liabilities exceed its assets (i.e., it has negative equity). While insolvency and bankruptcy are related, insolvent entities are not necessarily bankrupt.

Default describes a scenario where a counterparty fails to meet its contractual obligations. A common reason for default is the inability or unwillingness to pay when an obligation is due.

Bankruptcy is a legal procedure where an entity, typically in default, seeks legal protection through a court. In a bankruptcy process, the court negotiates with the entity's management, creditors, and other stakeholders. The two forms of bankruptcy are dissolution/liquidation (Chapter 7 in the United States) and restructuring/reorganization (Chapter 11 in the United States).

Transactions That Generate Credit Risk

LO 17.c: Identify and describe transactions that generate credit risk.

Credit risk does not arise solely through traditional lending activities that involve the immediate exchange of money. It can arise out of many more complex activities, including trade transactions involving future payments, derivatives transactions, claims on collateral, and contingent liabilities. In the United States, corporate obligations constitute the largest source of credit exposure, concentrated in domestic financial companies. However, globally, the largest source of credit exposure by notional value is from derivatives—estimated at $600 trillion in June 2020, with most from interest rate derivatives.

The main transaction types that generate credit risk are as follows:

1. *Lending*. When a lender loans funds to a borrower, the lender is exposed to the risk that the borrower will not repay the loan in the future.
2. *Leases*. A lessor (the owner of an asset who often finances the asset with borrowed funds) is exposed to the credit risk that the lessee (the entity using the asset for a period of time) will not make all scheduled lease payments in the future.
3. *Receivables*. If a product or service is sold to a buyer where the buyer has some time (days, weeks, or months) to pay, the seller is exposed to the credit risk of not receiving the payment.
4. *Prepayment*. Prepaying for goods or services exposes the entity making the payment to the risk that the goods or services will not be delivered in the future (e.g., due to the bankruptcy of a company).
5. *Deposits*. Customers are exposed to potential losses (i.e., credit risk) from their banks if they do not have timely access to their bank deposits. Unfortunately, most customers do not evaluate credit risk when choosing a bank. On the other hand, large corporations engage in in-depth due diligence of banks to protect their deposits and minimize credit exposure and risk.
6. *Contingent claims*. Contingent claims are claims that depend on the occurrence of a future event. For example, an insurance policyholder is exposed to the risk that the insurer (insurance company) will not make a payment when a claim is submitted in the future. Similarly, pension plan participants are exposed to the risk that the sponsor's assets are insufficient to meet the fund's liabilities in the future.
7. *Derivatives*. Derivatives create credit risk through indirect exposure to a financial asset, even if no cash flow occurs at the onset. Because each party under a forward or swap agreement could be required to make a payment in the future, each party is exposed to the credit risk of the other party throughout the life of the derivatives transaction. For example, in a currency swap, parties are exposed to the exchange rate fluctuations of two currencies. Other derivatives that give rise to credit risk are repurchase agreements and options.

Figure 17.1 summarizes the credit exposure and loss type relating to the main types of transactions that generate credit risk.

Figure 17.1: Credit Risk Transaction Types

Transaction	Key Credit Exposure	Loss Type
Loans	Slow or no repayment	Interest and face value; time value of money (TVM)
Leases	Nonpayment	Asset recovery; marketing costs
Receivables	Nonpayment	Face value
Prepayments	Slow or no delivery of asset or service	Replacement costs; incremental operating costs; friction costs
Deposits	No repayment	Face value; TVM; friction costs
Contingent claims	Slow or no repayment	Face value; TVM; friction costs
Derivatives	Nonpayment due to default	Replacement costs (i.e., mark-to-market value)

MODULE QUIZ 17.1

1. Which of the following set of factors is most critical in helping creditors assess credit risk?
   A. Amount of credit risk, probability of counterparty default, recovery amount/timing.
   B. Foreign currency exposure, amount of credit risk, amount of illiquid counterparty assets.
   C. Probability of counterparty default, counterparty management strength, recovery amount.
   D. Recovery amount/timing, amount of uninsured assets, probability of counterparty insolvency.

2. Acquaria Corporation's year-end balance sheet shows $280 million in assets and $320 million in debt to creditors. Acquaria's management estimates that it will continue to be able to meet its upcoming payment obligations. The company is best characterized as being:
   A. bankrupt.
   B. insolvent.
   C. in default.
   D. nonperforming.

MODULE 17.2: CREDIT RISK EXPOSURE

LO 17.d: Describe the entities that are exposed to credit risk and explain circumstances under which exposure occurs.

Exposure to credit risk is not inherently bad; it often arises from the daily operating activities of corporations, governments, and other entities, and can even result from the activities of individuals. For example, a tenant prepaying a full year of an apartment lease or a store selling its products on credit exposes them to credit risk. In the United States, the financial sector has the most credit exposure—primarily from the activities of depository institutions and mutual funds, followed by insurance companies, pension plans, and finance companies.

Financial Institutions

Banks

The daily operations of banks expose them to significant credit risk from their individual and corporate borrowers and through their derivatives activities and exposure. Banks tend to be among the most sophisticated institutions in managing credit risk, although the sector's overall risk appetite has declined noticeably in the last few years.

Repurchase agreements and other forms of collateralized lending expose banks to the potential that a counterparty will not repay its obligations or will default. The collateral, which the bank has access to and can sell, mitigates this risk; however, in fast-moving markets, the collateral value may decline and no longer sufficiently cover the amount owed to a bank under the lending contract. Similarly, banks are exposed to counterparty credit risk through their derivatives hedges and portfolio. For example, in 2020, JPMorgan Chase had derivatives receivables credit exposure in excess of $700 billion.

Asset Managers

Asset managers invest client funds to generate returns while meeting their risk objectives, where the objectives vary from low-return, low-risk investments, to high-return-potential, high-risk investments. As a result, asset managers are exposed to credit risk on behalf of their clients. The risk management team of asset managers provides the risk assessment and oversight of the fund managers' investment decisions. A significant amount of the risk management goals is to mitigate these risks by analyzing the creditworthiness of corporate and government entities that issue bond, equity, and other securities.

Hedge Funds

Hedge funds typically have a higher risk tolerance than other investors and have aggressive mandates to invest in risky financial instruments like private equity and debt and alternative investments. They may also sell protection against a decline in a borrower's creditworthiness, or make long and short investments in distressed securities.

Unlike asset managers, hedge fund managers may look at default as an investment opportunity rather than a risk to avoid or hedge. For example, a manager may short sell the debt or equity securities of companies that the manager believes are in significant distress or may default. Exposure does not have to be direct—for example, derivatives like credit default swaps (CDSs) offer significant indirect return potential. Of course, making significant investments in securities that the hedge fund manager expects will decline in value creates significant risk. For example, in 2021, the hedge fund Melvin Capital entered into short sale transactions on GameStop Corp., anticipating a share price decline. When the GameStop share price increased significantly (from $10–$15 to $350), Melvin had to buy back the shares at significantly higher prices than it sold

initially, suffering extremely large losses that resulted in its bailout by other hedge funds to avoid a default.

Insurance Companies

Insurance companies are unique in that they can have credit exposure from multiple aspects of their operations, including underwriting, investments, and reinsurance:

- *Underwriting*. As part of their underwriting activities, insurers collect premiums from policyholders, invest the premiums in a combination of low-risk and high-risk investments, and later pay out claims when losses occur and claims are made. Insurers must balance the goals of generating significant income and long-term returns from investments for shareholders with the goal to minimize risk for policyholders.
- *Investments*. Insurers (e.g., life insurance companies) may manage significant amounts of investments on behalf of their clients in separate accounts. These assets are segregated from the company and do not belong to shareholders; therefore, losses do not impact shareholder returns. However, significant losses could impact the insurer's reputation and could adversely impact future business opportunities.
- *Reinsurance*. A significant portion of an insurance company's risk of policy claims can be transferred to reinsurance companies like Swiss Re and Munich Re under reinsurance contracts. Insurance companies face credit risk from the time lag between when a policyholder submits a claim to when the reinsurer verifies the claim and makes a payment. The more significant the claim, like earthquake- or hurricane-related losses, the greater the credit risk. Further, for certain types of claims, there could be a very long time (often decades) between collecting the premiums and settlement of any claims. The estimated value of these claims is recorded on the insurance company's balance sheet as a reinsurance recoverable because it represents a contingent claim on the reinsurer—and, therefore, a significant source of credit risk for the insurance company.

Pension Funds

Similar to asset managers who invest funds on behalf of their clients, pension funds invest funds on behalf of pension plan members. Investments in credit-risky securities can generate significant credit risk for members. Increasing pension regulation for both private and public pension funds has mandated significant risk management guardrails for these funds to protect plan members.

Corporations

Corporations typically face credit risk from many sources. Most corporations allow customers to pay later for the products they purchase. Changing customer habits, like the significant decline in demand during the recent pandemic for hospitality services or the increasing popularity of online shopping, can create significant losses for corporations. The five main sources of credit risk for corporations are as follows:

1. *Account receivables*. When a corporation sells goods to customers in advance (the customer receives the product today but pays for it later), it creates credit risk for

the corporation because the customer may be unable or unwilling to pay for the product when payment is due. As a result, corporations attempt to assess the credit quality of customers. For large and established corporate customers, this is done relatively easily; however, for smaller corporate customers and for most individuals, this assessment is more difficult. Corporate risk managers often need to assess customer risk based on incomplete data, although they may be able to rely on customer credit scores. Corporations could mitigate receivables credit risk in the following three ways:
   - Buying insurance on their account receivables
   - Selling their receivables to another company (i.e., factoring)
   - Securing foreign transactions through documentary credit (i.e., a form of guarantee that the seller will receive payment)
2. *Short-term investments and bank deposits*. Corporations face credit risk when they invest in short-term securities because the issuer of the security may fail to make good on its interest or principal obligations. Deposits with banks also create credit risk because banks may be unable to pay out deposits when they face significant liquidity distress, generating losses for corporations. Corporations mitigate this risk by diversifying their deposits across several banks.
3. *Derivatives*. Corporations hedge the price risk of the raw materials they need through commodity derivatives, including commodity forwards and futures. Commodity futures create relatively little credit risk because trades are subject to margin requirements and a clearinghouse guarantees performance. However, forwards and swaps are over-the-counter (OTC), nonstandardized contracts that create credit risk on both sides. A counterparty default on a derivatives trade may force a corporation to buy raw materials at a high price on the open market. Corporations that have significant derivatives exposure often have sophisticated risk management functions that analyze and help mitigate risk exposures.
4. *Vendor financing*. Corporations with financing arms that help customers buy on credit or lease their products, called vendor financing, face credit risk from a customer default or nonpayment.
5. *Supply chain*. Corporations that rely on a single supplier for a component of their product face credit risk from the default of the supplier because a default could generate significant losses for the corporation. Corporations that rely on significant shipments from suppliers could also suffer losses if a supplier's goods do not arrive or are lost. For example, the 2021 grounding of a large container ship in the Suez Canal caused billions of dollars in maritime traffic losses.

Individuals

Individuals can also be exposed to credit risk in several ways. The prepayment of goods or services, like prepayment on contracting services or prepaying rent, creates credit risk and could generate a loss if the goods or services are not delivered at a later date. Individuals are also exposed to the credit risk of a bank failure through their bank deposits, and through their investments with asset managers. The risk of losses from

deposits is mitigated in some countries (including in the United States and Canada) through federal deposit insurance.

Managing Credit Risk

LO 17.e: Discuss the motivations for managing or taking on credit risk.

Credit risk arises out of the consequences of company/management decisions—and because the company is in control of these decisions, it represents controllable risk exposure. Understanding how to manage credit risk is critical. Improper risk management can have costly adverse consequences for the company, its managers, and its shareholders more broadly. Successful companies maintain a sufficient equity buffer to absorb some of the anticipated and unanticipated losses, while considering the company's survival, profitability, and return on equity:

- *Survival*. Managing credit risk ensures that companies avoid large losses, and therefore, do not face bankruptcy.
- *Profitability*. Managing credit exposure and avoiding losses will help increase profitability.
- *Return on equity*. Successful companies find the right balance between debt and equity to maximize their return on equity.

MODULE QUIZ 17.2

1. A bank has entered into a $25 million, 6-month repurchase agreement with an investment grade corporate client, collateralized by $26 million notional value, 10-year state bonds. The bank has:
   A. no credit risk because the repurchase agreement matures before the bonds.
   B. no credit risk because the client is rated investment grade; therefore, counterparty default is unlikely.
   C. no credit risk because the notional value of the bonds exceeds the value of the repurchase agreement.
   D. credit risk because if the client defaults, the bank may not be able to sell the bonds to cover the full amount of the repurchase agreement.

2. Which of the following options would a corporation least likely select to mitigate its receivables credit risk?
   A. Factoring.
   B. Insurance.
   C. Derivatives.
   D. Documentary credit.

KEY CONCEPTS

LO 17.a

Credit risk is the probability of losses if a borrower fails to honor its financial obligations. This failure can be due to an inability or unwillingness to repay the obligation, or lack of timeliness to repay.