risk management and value creation in financial institutions

GERHARD SCHROECK

John Wiley & Sons, Inc.
risk management and
value creation
in financial institutions

GERHARD SCHROECK
To Tiger
For your invaluable support

My ventures are not in one bottom trusted,
Nor to one place; nor is my whole estate
Upon the fortune of this present year;
Therefore, my merchandise makes me not sad.

—Antonio, in: *The Merchant of Venice*,
   Act I, Scene I
   by William Shakespeare
From an empirical as well as a personal point of view, risk management in the financial industry has been one of the most exciting and most researched areas over the last decade. Depositors and regulators claim that risk management is necessary, and many banks argue that superior risk management can create (shareholder) value. However, from a theoretical point of view, it is not immediately clear if and how risk management at the corporate level can be useful. Very little research has been conducted as to why there is an economic rationale for risk management at the bank level.

This book provides a closer and a more differentiated view on the subject than previous research and is intended to describe both the theory and the practice of corporate risk management in financial institutions. It is different from other works on this subject in the following significant ways.

First, it addresses the question of under which circumstances risk management at the corporate level can help to maximize value. These conditions require a deviation from standard neoclassical finance theory because in (risk) efficient markets corporate risk management could destroy value, especially if it comes at a cost, and it is shown that risk management at the bank level is not restricted to hedging activities in such a world.

Second, the book agrees in principal with what other publications find are the correct building blocks on which risk-management decisions in banks should be based in such a world, namely economic capital and RAROC (risk-adjusted return on [economic] capital). It also explains, that in the circumstances under which corporate risk management can add value, the conclusions of classical finance theory are not valid in general, and that the Net Present Value (NPV) rule might not always be the correct measure to decide whether a (risk management) transaction adds or destroys value.

Third, this book, therefore, develops the foundations for a model that would allow banks to identify comparative advantages that, in turn, would enable them to select those risk-management strategies that really add value.

Fourth, the approach presented in this book is able to reconcile the debt holders’ (who are averse to default risk) and the shareholders’ (who prefer more volatility rather than less because they are option holders on the firm’s value) perspectives and to identify those activities that are helpful to all
constituents/stakeholders of a financial institution because they avoid the consequences of a bank run.

Even though the following Chinese proverb:

* A smart man learns from his own mistakes,
* A wise man learns from the mistakes of others,
* And a fool never learns

applies to both risk management and writing a manuscript on this subject, I hope this book will be a valuable contribution to the ongoing discussion.

There are undoubtedly errors in the final product both orthographically and conceptually that remain my own responsibility, and certainly further research needs to be done. Thus, I encourage anybody with constructive comments to send them on to me.

All views presented in this book represent the author’s views and do not necessarily reflect those of Oliver, Wyman & Company.
acknowledgments

No book is solely the effort of its author. Many people have played a crucial part in making this book happen and suffered from me writing it. I am indebted to both academics and practitioners who have made excellent and useful suggestions. Even though the following list is almost surely incomplete, many people deserve special thanks for their help:

First and foremost, I owe a great deal to my academic teacher and Ph.D. supervisor Prof. Dr. Manfred Steiner (University of Augsburg, Germany) for leaving both the necessary and sufficient degrees of freedom in my research.

I am grateful to John D. Stroughair (also for helping to coordinate the required time off from Oliver, Wyman & Company), Til Schuermann, Martin Wallmeier, and, last but not least, Victoria Sheppard for their helpful criticism when reviewing my manuscript.

From the bottom of my heart, I would like to thank my family and especially Bettina Klippel for the sacrifices they have made on behalf of this book. The loyal support and encouragement of my parents throughout my life—whichever way it took me—are truly appreciated. Heartfelt thanks to Bettina for enduring late nights and long weekends consumed to write this book; without her help and understanding, I would not have made it!

Gerhard Schröck
Bad Homburg, Germany
CHAPTER 1

Introduction 1

CHAPTER 2

Foundations for Determining the Link between Risk Management and Value Creation in Banks 9

Value Maximization in Banks 10
  Value Maximization as the Firm’s Objective 10
  Valuation Framework for Banks 14
  Problems with the Valuation Framework for Banks 16
    Empirical Conundrum 16
    Other Stakeholders’ Interests in Banks 21
Risk Management in Banks 23
  Definition of Risk 24
  Definition of Risk Management 25
  Role and Importance of Risk and Its Management in Banks 28
Link between Risk Management and Value Creation in Banks 30
CONTENTS

Goals of Risk Management in Banks 31
Choice of the Goal Variable 31
Choice of the Stakeholder Perspective 33
Choice of the Risk Dimension 34
Choice of the Risk-Management Strategy 38
Ways to Conduct Risk Management in Banks 39
Eliminate/Avoid 40
Transfer 41
Absorb/Manage 41
Empirical Evidence 43
Summary 48
Appendix 48
Part A: Bank Performance 48
Part B: Systematic versus Specific Risk 49

CHAPTER 3
Rationales for Risk Management in Banks 55
Risk Management and Value Creation in
the Neoclassical Finance Theory 58
The Neoclassical Finance Theory 58
Corollaries from the Neoclassical Finance Theory
with Regard to Risk Management 61
The Risk Management Irrelevance Proposition 64
Summary and Implications 70
Discrepancies Between Neoclassical Theory and Practice 72
Risk Management and Value Creation in
the Neoinstitutional Finance Theory 74
Classification of the Relaxation of the Assumptions
of the Neoclassical World 75
The Central Role of the Likelihood of Default 80
Agency Costs as Rationale for Risk Management 81
Agency Costs of Equity as a Rationale for Risk Management 82
Agency Costs of Debt as a Rationale for Risk Management 91
Coordination of Investment and Financing 97
Transaction Costs as a Rationale for Risk Management 105
The Costs of Financial Distress 105
The Costs of Implementing Risk Management 113
The Costs of Issuance 114
The Costs of a Stable Risk Profile 114
Taxes and Other Market Imperfections as Rationales
for Risk Management 116
Taxes 116
Contents

Other Market Imperfections 121
Additional Rationales for Risk Management in Banks 122
Summary and Conclusions 123
Appendix 127

CHAPTER 4
Implications of the Previous Theoretical Discussion for This Book 129

CHAPTER 5
Capital Structure in Banks 137
The Role of Capital in Banks 138
Capital as a Means for Achieving the Optimal Capital Structure 138
Capital as Substitute for Risk Management to Ensure Bank Safety 140
The Various Stakeholders’ Interests in Bank Safety 141
Available Capital 145
Required Capital from an Economic Perspective 150
Determining Capital Adequacy in the Economic Perspective 160
Summary and Consequences 162
Derivation of Economic Capital 164
Types of Risk 164
Economic Capital as an Adequate Risk Measure for Banks 166
Ways to Determine Economic Capital for Various Risk Types in Banks (Bottom-Up) 170
Credit Risk 170
Market Risk 186
Operational Risk 196
Aggregation of Economic Capital across Risk Types 210
Concerns with the Suggested Bottom-Up Approach 212
Suggestion of an Approach to Determine Economic Capital from the Top Down 219
Theoretical Foundations 221
Suggested Top-Down Approach 225
Assessment of the Suggested Approach 235
Evaluation of Using Economic Capital 236
Summary 237

CHAPTER 6
Capital Budgeting in Banks 239
Evolution of Capital-Budgeting Tools in Banks 239
RAROC as a Capital-Budgeting Tool in Banks 242
Definition of RAROC 242
Advantages of RAROC 245
Assumptions of RAROC 247
Deficiencies of RAROC 253
   Deficiencies of the Generic RAROC Model 253
   Modifying RAROC to Address Its Pitfalls 259
   Fundamental Problems of RAROC 261
Evaluation of RAROC as a Single-Factor Model for Capital Budgeting in Banks 267
New Approaches to Capital Budgeting in Banks 268
   Overview of the New Approaches 269
   Evaluation of RAROC in the Light of the New Approaches 272
   Implications of the New Approaches to Risk Management and Value Creation in Banks 273
      Implications for Risk-Management Decisions 274
      Implications for Capital-Budgeting Decisions 279
      Implications for Capital-Structure Decisions 279
   New Approaches as Foundations for a Normative Theory of Risk Management in Banks 280
   Areas for Further Research 282
   Summary 285

CHAPTER 7
   Conclusion 287

References 293

Index 311
Figure 1.1  Integrated view of value creation in banks.

Figure 2.1  Average bank performance versus broad market index.
Figure 2.2  Deviations in bank performance.
Figure 2.3  Best bank performers.
Figure 2.4  Worst bank performers.
Figure 2.5  Systematic versus specific risk in the banking industry.
Figure 2.6  Overview of ways to conduct risk management.
Figure 2.7  Deutsche Bank.
Figure 2.8  Energy industry.
Figure 2.9  Consumer cyclical industry.
Figure 2.10 Utility industry.

Figure 3.1  The Wheel of Misfortune.
Figure 3.2  Overview of risk-management rationales in the neoinstitutional world.
Figure 3.3  Variations in firm value and default point.
Figure 3.4  Ownership concentration in European banks.
Figure 3.5  The underinvestment problem and risk management.
Figure 3.6  Over- and Underhedging.
Figure 3.7  Influence of bankruptcy costs on firm value.
Figure 3.8  Tax schedules.
Figure 3.9  Effects of convex tax schedules on tax liabilities.
Figure 3.10 Effects of convex tax schedules on after-tax income.

Figure 4.1  The interdependency of capital budgeting, capital structure, and risk management when risk management can create value.

Figure 5.1  Capital ratios in U.S. banks over time.
Figure 5.2  Stakeholder tranches and risk capital.
Figure 5.3  Economic capital.
Figure 5.4  Types of risk in banks.
Figure 5.5 Value at risk.
Figure 5.6 Deriving expected losses.
Figure 5.7 Economic capital for credit risk.
Figure 5.8 Typical distribution for market risk.
Figure 5.9 Distribution for deriving economic capital for event risk.
Figure 5.10 Distribution for deriving economic capital for business risk.
Figure 5.11 Distribution of asset values and default probability.
Figure 5.12 Input and output variables for suggested top-down approach.

Figure 6.1 Return on equity and changing capital structure.
Figure 6.2 Changes in RAROC for changes in riskiness and correlation.
Figure 6.3 RAROC and nonzero NPV projects.
Figure 6.4 Problem areas applying the RAROC decision rule—Zero NPV projects.
Figure 6.5 Problem areas applying the RAROC decision rule—Negative NPV projects.
Figure 6.6 Problem areas applying the RAROC decision rule—Positive NPV projects.
Figure 6.7 Fundamental problems with RAROC.
Figure 6.8 Economic balance sheet including economic capital.
Figure 6.9 Overview of the components of a normative theory for risk management.
Table 2.1 Industry Control Sample
Table 2.2 Bank Performance

Table 3.1 Overview of Corporate Risk-Management Scenarios
Table 3.2 Financial Risk Management by the Firm
Table 3.3 Sample of European Banks Selected for Testing Ownership Concentration

Table 4.1 Summary Table for Comparison

Table 5.1 Bank Book Capital Ratios
Table 5.2 Overview of Capital Concepts in Banks
Table 5.3 Split of Economic Capital
Table 5.4 Input Data from Publicly Available Sources
Table 5.5 Iterative Procedure
Table 5.6 Approximate S&P Default Probabilities
Table 5.7 Distance to Default
Table 5.8 Weighted Average Asset Return
Table 5.9 Final Results

Table 6.1 Effects of Keeping the Default Probability Constant
Table 6.2 Split of Economic Capital among Types of Risk
Table 6.3 CAPM Hurdle Rate and Economic Capital
Symbols

- ↑ Increase in the respective measure
- ↓ Decrease in the respective measure
- $\alpha$ Confidence level or $\alpha$-quantile of a cumulative probability distribution or constant
- $\beta_i$ Stock market beta of asset $i$ as derived in the market model version of the CAPM or constant
- $\Delta$ Change in value or option delta $N(d_1)$
- $\varepsilon$ Random change in return
- $\lambda$ Unit cost for volatility of the bank’s portfolio of nonhedgable cash flows
- $\mu_i$ Expected rate of return of transaction $i$
- $\mu$ Drift rate or expected return on a bank’s assets or expected value of a distribution
- $\Phi^{-1}$ Inverse standard normal cumulative density function
- $\rho_{ij}$ Correlation between the rate of return of transaction $i$ and $j$ or default correlation between loan $i$ and $j$
- $\sigma_A$ Constant asset volatility
- $\sigma_i$ Standard deviation (volatility) of the rate of return of transaction or index $i$
- $\sigma_{ij}$ Covariance between $i$ and $j$
- $\sigma_{E,W}^2$ Variance of weekly stock returns
- $\sigma_{specific}^2$ Specific risk
- $\Sigma$ Correlation matrix of value changes in the portfolio positions
- $\omega_i$ Portfolio weight of the $i$-th credit asset
- ' Indicator for a first proxy
- $A$ Asset(s)
- $a_j$ Number of years of data history in the event database in category $j$
Symbols

\( B \) Stock market index for the banking industry
\( BV_A \) Book value of total assets or asset \( A \)
\( BV_D \) Book value of debt \( D \)
\( BV_E \) Book value of equity \( E \)
\( BV_{OBS} \) Book value of off-balance sheet liabilities
\( c \) \((1 - \alpha)\)-quantile of the standard normal distribution or (convex) cost of external funds or call option or constant
\( CF_t \) Cash flow in period \( t \)
\( CM \) Capital multiplier
\( \text{cov}_{i,j} \) Covariance of losses
\( CR_r \) Concentration ratio for \( r \) largest shareholders
\( D \) Debt
\( DP \) Default point
\( DTD \) Distance to default
\( E \) Equity
\( e \) External funds
\( e(\cdot) \) Function of after-tax income
\( E(\cdot) \) Expected value of \( \cdot \)
\( E(R_{H}) \) Expected (or mean) return \( R \) of the portfolio over time horizon \( H \)
\( E(R_i) \) Expected rate of return of transaction \( i \)
\( EA_H \) Exposure amount at time \( H \)
\( EC_{i} \) Economic capital transaction \( i \)
\( E_{j} \) Total number of observed events in category \( j \)
\( EL_{ER,j} \) Expected losses due to event risk in category \( j \)
\( EL_{H} \) Expected loss (experienced at time \( H \))
\( EL_{P} \) Expected Loss of a portfolio of \( n \) credits
\( f(\cdot) \) Function of \( \cdot \), also convex tax function
\( f(R_{H}) \) Assumed distribution of the portfolio returns \( R \) over time horizon \( H \)
\( F \) Cumulative probability distribution or face value of debt \( D \)
\( F^{-1} \) Inverse function of \( F \)
\( F^{-1} \) Inverse of the cumulative probability function
\( FDC \) (Proportional) financial distress costs of the bank
\( g(\cdot) \) Function of \( \cdot \), also linear tax function
\( H \) End of the measurement period (horizon) or time in the end of the predetermined measurement period
\( I \) Initial cash investment or cost of an investment
SYMBOLS

ln  Natural logarithm
LPM_n(t)  Lower partial moment n with target return t
LR_H  Loss rate (experienced at time H)
M  Broad stock market index market or Market Portfolio
n  Moment of the distribution (see LPM)
n_j  Overall number of banks in the event database in category j
N(·)  Cumulative standard normal probability distribution function
Other%  Other (long-term) liabilities as percentage of total assets
p  Probability density function of the returns X (see LPM) or put option
p(·)  Probability
P  Portfolio P
△P  Change in the price of a risk factor P
PD_H  Probability of default (up to time H)
PE_j  Probability of an event occurring in category j
r  Risk-free rate
RD  Return on debt (also R_D)
RE  Return on equity (also R_E)
RE_h  Hurdle rate of return on equity capital
R_E;i  Required rate of return for transaction i on the invested shareholder capital E
R_f  Risk-free rate of return (also r)
R_{it}  Return of transaction or index i at time t
R_M  Return on the market portfolio M
R_M – r  Market risk premium
r_t  Discount rate for period t
s  Spread above the risk-free rate commensurate with the bank’s rating
S_i  Sharpe ratio for transaction i
S_{it}  Index value S for index i at time t
S_t  Stock price at time t
ST%  Customer and short-term liabilities as percent of total assets
t  Time or target (minimum) return (see LPM)
T  Time of maturity
τ  Transposed vector of
UL  Unexpected loss
ULC  Unexpected loss contribution
UL_{ER,P}  Unexpected loss due to event risk at the portfolio level P
Symbols

$UL_i$ Unexpected Loss of the $i$-th credit asset
$ULMC_i$ Marginal contribution of loan $i$ to the overall portfolio unexpected loss
$V$ Firm value or value of the portfolio
$\Delta V_H$ Change in the portfolio value $V$ over period $H$
$V_{A,t}$ Market value of the firm’s assets or of asset $A$ at time $t$
$VaR$ Vector of single transaction VaR
$VaR_{\alpha}$ Value at risk at the $(1 - \alpha)$ confidence level
$VaR_{H}$ Value at risk for period $H$
$\text{var}_i$ Variance of losses
$V_{D,t}$ Market value of debt $D$ at time $t$
$V_{E,i}$ Invested shareholder capital $E$ of transaction $i$
$V_{E,t}$ Market value of equity $E$ at time $t$
$w$ Internal sources stemming from the bank’s existing assets or internal wealth stemming from existing assets at the end of the investment horizon
$x$ Total firm (market) value (for calculation in concentration ratio CR)
$x_i$ Share of overall firm (market) value held by shareholder group $i$
$X$ Random variable or also pretax income or realized return (see LPM)
$X_{H}$ Return that accumulates until the end of the measurement period $H$
$z$ Wiener process
$Z_t$ Normally distributed random variable with zero mean and variance $t$
Abbreviations

APT  Arbitrage Pricing Theory
BIS  Bank for International Settlements
bn  Billion
bps  basis point(s)
CAPM  Capital Asset Pricing Model
CML  Capital Market Line
CSV  costly state verification
DCF  discounted cash flow(s)
e.g.  for example
EVA®  economic value added
EXIM  Export-Import Bank
FDIC  Federal Deposit Insurance Corporation
i.e.  that is
M&A  mergers and acquisitions
M&M  Modigliani and Miller
NPV  net present value
OPT  Option Pricing Theory
P&L  profit and loss statement
PV  present value
RAPM  risk-adjusted performance (or profitability) measures
RAROC  risk-adjusted return on capital
RARORAC  risk-adjusted return on risk-adjusted capital
ROA  return on assets
ROE  return on equity
RORAC  return on risk-adjusted capital
S&P  Standard and Poor’s
SML  Security Market Line
TQM  Total Quality Management
VaR  value at risk
WACC  weighted average cost of capital
Increased (global) competition among banks\(^1\) and the threat of (hostile) takeovers, as well as the increased pressure from shareholders for superior returns has forced banks—like many other companies—to focus on managing their value. It is now universally accepted that a bank’s ultimate objective function is value maximization. In general, banks can achieve this either by restructuring from the inside, by divesting genuinely value-destroying businesses,\(^2\) or by being forced into a restructuring from the outside.\(^3\)

The approach typically applied to decide whether a firm creates value is a variant of the traditional discounted cash flow (DCF) analysis of financial theory, with which the value of any asset can be determined.\(^4\) In principle, this multiperiod valuation framework estimates a firm’s (free) cash flows\(^5\) and discounts them at the appropriate rate of return\(^6\) to determine the overall firm value from a purely economic perspective. However, since a bank’s liability management does not only have a simple financing function—as in industrial corporations—but is rather a part of a bank’s business

---

\(^1\) Even though many other financial (and nonfinancial) institutions face the same fundamental problems described in this book, its focus will be exclusively on the banking industry.

\(^2\) These business units or transactions could be of more value to other firms or their shareholders.

\(^3\) Takeovers are a reflection of the market for corporate control, see, for example, Jensen (1986).


\(^5\) To both equity holders and debt holders.

\(^6\) The so-called weighted average costs of capital that reflect both the riskiness and timing of the cash flows and the firm’s leverage.
operations,\textsuperscript{7} it can create value by itself.\textsuperscript{8} Therefore,\textsuperscript{9} the common valuation framework is slightly adjusted for banks. It estimates the bank’s (free) cash flows to its shareholders and then discounts these at the cost of equity capital,\textsuperscript{10} to derive the present value (PV) of the bank’s equity—\textsuperscript{11}which should equal (ideally)\textsuperscript{12} the capitalization of its equity in the stock market.

This valuation approach is based on neoclassical finance theory and, therefore, on very restrictive assumptions.\textsuperscript{13} Taken to the extreme, in this world—since only the covariance (i.e., so-called systematic) risk with a broad market portfolio counts—\textsuperscript{14}the value of a (new) transaction or business line would be the same for all banks, and the capital-budgeting decision could be made independently from the capital-structure decision.\textsuperscript{15} Additionally, any risk-management action at the bank level would be irrelevant for value creation,\textsuperscript{16} because it could be replicated/reversed by the investors in efficient and perfect markets at the same terms and, therefore, would have no impact on the bank’s value.

However, in practice, broadly categorized, banks do two things:

\begin{itemize}
  \item They offer (financial) products and provide services to their clients.
  \item They engage in financial intermediation and the management of risk.
\end{itemize}

Therefore, a bank’s economic performance, and hence value, depends on the quality of the provided services and the “efficiency” of its risk management.\textsuperscript{17} However, even when offering products and services, banks deal

\textsuperscript{7}See Copeland et al. (1994), p. 479.
\textsuperscript{8}A spread can be earned by accepting deposits at lower rates than the market opportunity cost.
\textsuperscript{9}There are a number of other reasons described, for example, in Copeland et al. (1994), pp. 477–479, and discussed below.
\textsuperscript{10}As, for example, derived via the Capital Asset Pricing Model (CAPM).
\textsuperscript{11}So-called Equity Approach or Flows-to-Equity Approach as described by Copeland et al. (1994), Strutz (1993), Kümmel (1993), and many others.
\textsuperscript{12}When considering and pricing all real options, see e.g., Dixit and Pindyck (1994).
\textsuperscript{13}This theory assumes perfect and complete markets.
\textsuperscript{14}See, for example, the CAPM, which is one of the most famous representatives of the neoclassical finance theory.
\textsuperscript{15}Note that banks and all other companies would be able to recapitalize at no extra cost.
\textsuperscript{16}Risk management can be useful, even in the neoclassical world, for other purposes. For instance, risk management can ensure that a company stays within a certain risk class as defined in the Modigliani and Miller (M&M) world.
\textsuperscript{17}See Harker and Stavros (1998), pp. 7–8.
Introduction

In financial assets\(^{18}\) and are, therefore, by definition in the financial risk business.\(^{19}\)

Additionally, risk management is also perceived in practice to be necessary and critically important to ensure the long-term survival of banks. Not only is a regulatory minimum capital-structure and risk-management approach required,\(^{20}\) but also the customers,\(^{21}\) who are also liability holders, should and want to be protected against default risk, because they deposit substantial stakes of their personal wealth, for the most part with only one bank. The same argument is used from an economy-wide perspective to avoid bank runs and systemic repercussions of a globally intertwined and fragile banking system.

Therefore, we find plenty of evidence that banks do run sophisticated\(^{22}\) risk-management functions\(^{23}\) in practice (positive theory for risk management). They perceive risk management to be a critical (success) factor that is both used with the intention to create value and because of the bank’s concern with “lower tail outcomes”,\(^{24}\) that is, the concern with bankruptcy risk.

Moreover, banks evaluate (new) transactions and projects in the light of their existing portfolio\(^{25}\) rather than (only) in the light of the covariance risk with an overall market portfolio. In practice, banks care about the contribution of these transactions to the total risk of the bank when they make capital-budgeting decisions, because of their concern with lower tail outcomes. Additionally, we can also observe in practice that banks do care

\(^{18}\)In order to offer products that are tailored to their clients’ needs, banks need to transform their “resources” along the following dimensions: term, scale, location, liquidity, and/or risk itself by originating, trading, or servicing financial assets; see Allen and Santomero (1996), p. 19.

\(^{19}\)They enable most of the market participants to cope with economic uncertainty by hedging, pooling, sharing, transferring, and pricing risks. See Harker and Stavros (1998), p. 2.

\(^{20}\)See, for example, the Basle Accord from 1988 (Basle I), the European Capital Adequacy Directive (CAD), and the recent discussion on the newly proposed Basle Accord (Basle II).

\(^{21}\)And many other stakeholders.

\(^{22}\)Over the last ten years, we have seen dramatic improvements in risk measurement tools to make the risk management in banks more effective.

\(^{23}\)Managing risks has been one of the hottest topics in banking and finance over the last decade. For instance, Risk Magazine devoted a whole special issue, under the topic “The Decade of Risk,” to this phenomenon; see Risk Magazine (1997).


\(^{25}\)For instance, the concern with credit concentrations to one borrower, region, or industry is a well-established banking guideline and is also reflected in regulatory rules (e.g., the “Grosskredit-Richtlinie” in Germany).
about their capital structure\textsuperscript{26}—when making capital-budgeting and risk-management decisions\textsuperscript{27}—and that they perceive holding capital as both costly and a substitute for conducting risk management.

Therefore, banks do not (completely\textsuperscript{28}) separate risk-management, capital-budgeting, and capital-structure decisions, but rather determine the three components jointly and endogenously\textsuperscript{29} (as depicted in Figure 1.1).

However, this integrated decision-making process in banks is not reflected in the traditional valuation framework as determined by the restrictive assumptions of the neoclassical world. And therefore it appears that some fundamental links to and concerns about value creation in banks are neglected.

Apparently, banks have already recognized this deficiency. Because the traditional valuation framework is also often cumbersome to apply in a banking context\textsuperscript{30} many institutions employ a return on equity (ROE) measure\textsuperscript{31} (based on book or regulatory capital) instead. However, banks

\textsuperscript{26}They also have to do so due to regulatory requirements.
\textsuperscript{27}For instance, when banks have capital constraints, they decide either to not take additional risks on their books (which would increase the bankruptcy risk) or to hedge/sell other risks instead.
\textsuperscript{28}As is assumed in the neoclassical world.
\textsuperscript{29}See Froot and Stein (1998a), p. 58.
\textsuperscript{30}This is especially true for outsiders. Even though they are heavily regulated, banks are opaque institutions. Therefore, even bank analysts, who closely follow these organizations, have—according to anecdotal evidence—difficulties in estimating the necessary input parameters.
\textsuperscript{31}This already reflects the evolution of bank performance measures from a pure earnings focus in banks to a return on assets (ROA) focus. Realizing that capital is the limiting factor in banking, which is also related to risk, banks introduced ROE numbers.
have also realized that such ROE numbers do not have the economic focus of a valuation framework for judging whether a transaction or the bank as a whole contributes to value creation. They are too accounting-driven, the capital requirement is not closely enough linked to the actual riskiness of the institution, and, additionally, they do not adequately reflect the linkage between capital-budgeting, capital-structure, and risk-management decisions.

To fill this gap, some of the leading banks have developed a set of practical heuristics called Risk-Adjusted Performance Measures (RAPM) or also better known, named after their most famous representative, as RAROC (risk-adjusted return on capital). These measures can be viewed as modified return on equity ratios and take a purely economic perspective. Since banks are concerned about unexpected losses and how they will affect their own credit rating, they estimate the required amount of (economic or) risk capital that they optimally need to hold and that is commensurate with the (overall) riskiness of their (risk) positions. To do that, banks employ a risk measure called value at risk (VaR), which has evolved as the industry’s standard measure for lower tail outcomes (by choice or by regulation). VaR measures the (unexpected) risk contribution of a transaction to the total risk of a bank’s existing portfolio. The numerator of this modified ROE ratio is also based on economic rather than accounting numbers and is, therefore, adjusted, for example, for provisions made for credit losses (so-called expected losses). Consequently, “normal” credit losses do not affect a bank’s “performance,” whereas unexpected credit losses do.

In order to judge whether a transaction creates or destroys value for the bank, the current practice is to compare the (single-period) RAPM to a hurdle rate or benchmark return. Following the traditional valuation framework of neoclassical finance theory, this opportunity cost is usually determined by the covariance or systematic risk with a broad market portfolio.

However, the development and usage of RAROC, the practical evidence for the existence of risk management in banks (positive theory), and the fact that risk management is also used with the intention to enhance value are phenomena unexplained by and unconsidered in neoclassical finance theory.

33See, for example, Zaik et al. (1996). We will use the acronyms RAPM and RAROC interchangeably in this book.
34See, for example, Schröck (1997), pp. 93+.
35This is because (and as we have seen) they are concerned with the risk of default.
36This is done at a certain level of confidence that corresponds to their target credit rating.
37This fictional capital measure is proportional to the risk taken and is often called economic capital. It forms the denominator of the modified ROE ratio.
38See, for example, Schröck (1997), pp. 96+.
It is, therefore, not surprising that there has been little consensus in academia\textsuperscript{39} on whether there is also a normative theory for risk management and as to whether risk management is useful for banks, and why and how it can enhance value.\textsuperscript{40}

Therefore, the objective of this book is to diminish this discrepancy between theory and practice by:

- Deriving circumstances under which risk management at the corporate level can create value in banks
- Laying the theoretical foundations for a normative approach to risk management in banks
- Evaluating the practical heuristics RAROC and economic capital as they are currently applied in banks in the light of the results of the prior theoretical discussion
- Developing—based on the theoretical foundations and the implications from discussing the practical approaches—more detailed instructions on how to conduct risk management and how to measure value creation in banks in practice

In order to achieve these goals, we will proceed in the following way: We will first lay the foundations for the further investigation of the link between risk management and value creation by defining and discussing value maximization as well as risk and its management in a banking context, and establishing whether there is empirical evidence of a link between the two.

We will then explore both the neoclassical and the neoinstitutional finance theories\textsuperscript{41} on whether we can find rationales for risk management at the corporate level in order to create value. Based on the results of this discussion, we will try to deduce general implications for a framework that encompasses both risk management and value maximization in banks.

Using these results, we will outline the fundamentals for an appropriate (total) risk measure that consistently determines the adequate and economically driven capital amount a bank should hold as well as its implications for the real capital structure in banks. We will then discuss and evaluate the currently applied measure economic capital and how it can be consistently determined in the context of a valuation framework for the various types of risk a bank faces.

Subsequently, we will investigate whether RAROC is an adequate capital-budgeting tool to measure the economic performance of and to iden-

\textsuperscript{39}For an overview see Smithson (1998).
\textsuperscript{40}See Harker and Stavros (1998), p. 8.
\textsuperscript{41}This theory introduces agency and transaction costs and other market imperfections to explain real-life phenomena.
tify value creation in banks. We do so because, on the one hand, RAROC uses economic capital as the denominator and, on the other hand, it is similar to the traditional valuation framework in that it uses a comparison to a hurdle rate. When exploring RAROC, we take a purely economic view and neglect regulatory restrictions that undeniably have an impact on the economic performance of banks.\textsuperscript{42} Moreover, we will focus on the usage of RAPM in the context of value creation. We will not evaluate its appropriateness for other uses such as limit setting and capital allocation.\textsuperscript{43}

We close by evaluating the derived results with respect to their ability to provide more detailed answers on whether and where banks should restructure, concentrate on their competitive advantages or divest, and whether they provide more detailed instructions on why and when banks should conduct risk management from a value creation perspective (normative theory).

\textsuperscript{42}However, regulation more and more adopts the economic perspective outlined in this book (see, for example, the recently suggested Basle II Accord, which is not covered in detail in this book). Therefore, the discrepancy between the results of this book and the regulated reality should diminish over time.

\textsuperscript{43}RAPMs have been found extremely useful for these purposes, see, for example, Matten (1996) and Schröck (1997). For a differing opinion see Johanning (1998).