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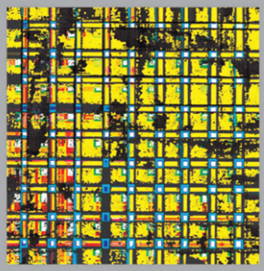

Financial Risk Management for Islamic Banking and Finance

Ioannis Akkizidis and
Sunil Kumar Khandelwal

FINANCIAL RISK MANAGEMENT FOR ISLAMIC BANKING AND FINANCE

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Financial Risk Management for Islamic Banking and Finance

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2. *Integrating Market, Credit and Operational Risk: A Complete Guide for Bankers & Risk Professionals*, 2006, Risk Books, London, ISBN: 1904339964.

Apart from its manuscript, the first book also includes a practical operational risk software tool for designing and evaluating an operational risk management framework based on advanced measurement approaches.

The second book is a best seller. Its Chapter 3 'Operational Risk' and Chapter 4 'Extreme Value Theory in Risk Management' are listed from the GARP Association as recommended material for 2007 FRM Study Guide Readings. For more information please visit:

https://www.garpdigitallibrary.org/display/booktitle.asp?btid=161

This book is dedicated to:

'My Father'
(Dr. Ioannis Akkizidis)
'My Larger Family'
(Dr. Sunil Kumar)

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Foreword by Agil Natt

I congratulate the authors Messrs Akkizidis and Khandelwal for writing this book, *Financial Risk Management for Islamic Banking and Finance*. There have been many books written on Islamic banking and finance, but few have been written on risk management aspects, especially within the context of financial products which are *Shariah*-compliant. I find the book comprehensive in its approach and detailed in information which will render it as a valuable reference material for practitioners and students alike. The book starts with an introduction of various products and services that are currently being marketed and then discusses the various risk management issues in Islamic financial contracts. It also discusses on the IFSB principles of risk management and Basel II. The authors have also provided various methodologies and logical steps involving mathematical models to identify and measure risks in Islamic finance.

The publication of this book will be greatly welcomed by industry players and students. Both authors are well versed in this subject and have done extensive research to write this book, which covers all practical and theoretical concepts of financial risk management pertinent to the Islamic financial services industry. The growth in the Islamic financial services industry has been phenomenal in the last two decades and has formed the basis of a viable alternative system which in some aspects has rivalled its conventional counterpart. Today, we see traditional financial capitals of the West joining the race with the new entrants of the East in laying and expanding the infrastructure for a robust Islamic financial system. Yet, the number of knowledgeable *Shariah* financial practitioners is still trailing behind. Against this background, institutions like INCEIF have mapped out their global agenda of developing competent financial practitioners to serve the global market. The challenge for the future will be to bridge the gap between the theories propounded by academia and the practical

activities of the industry and ultimately, to further enhance Islamic banking and finance into a prime mobiliser of resources for the betterment of mankind.

I believe this book will be able to spur further thoughts and research with the objective of adding to this new and exciting body of knowledge.

Agil Natt
President and Chief Executive
INCEIF – The Global University in Islamic Finance
Kuala Lumpur

Foreword by Amgad S. Younes

The financial industry today has evolved itself to be one of the most competitive, stringent, diverse, and aggressive environments to operate in. Successful financial institutions are acquiring, consolidating, and increasing market share, expanding product offerings and offering innovative structures and services across multi-diverse portfolios. However, the complexities of risk management threaten to limit growth. The Basel II accord aggravates the challenges by mandating that all risk-related decisions and processes be fully tracked and analysed to support enterprise risk management requirements.

Traditionally, risk management was based on risks to financial assets and people as a function, but risk management has evolved and become less about managing the present and more about being proactive in tackling scenarios and achieving business excellence.

With the Basel II accord, being transparent to all conventional financial institutions, Islamic banks thrive for compliancy in the era of modern and diversified financial management. With the majority of risks remaining the same (Credit Risk, Market Risk, Liquidity Risk, Rate of Return Risk, Operational Risk, etc.), it is crucial for Islamic banks to recognise and evaluate the overlapping nature and transformation of risks that exist between and amongst the categories of risks. Adverse changes in the Islamic banking market, counterparties, or products, as well as changes in the economic and political environments in which they operate and the effects of different *Shariah* rulings, are examples of Business Risks; in this regard, Islamic banks are expected to view the management of these risks from a holistic perspective.

This book is a welcome attempt to help Islamic banking and finance readers to broaden their horizons and enlighten their understanding towards Risk Management with a new perspective. The objective remains simple:

'Risk Management remains to be of crucial importance in today's modern conglomerates.' I do believe that this book will become an invaluable reference point to all those senior executives, risk managers and practitioners, researchers and students.

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Preface

Nowadays, in European, American and most Westernised markets, financial institutions such as Credit Swiss, Deutsche Bank, HSBC, the Islamic Bank of Britain, etc., are offering more products and services for Islamic finance (it is estimated that only Arab investors have more than US$800 billion on deposit in overseas banks, much of which is secured in Swiss and European banks). Moreover, a great number of financial institutions in GCC (Gulf Co-operation Council) countries and Asia are managing funds of over US$300 billion and are encouraged from their markets to provide Islamic financial products. The Asia-Pacific region houses the most populous Islamic nation on earth, approximately 800 million. As a result of the growth market of Islamic finance, the demand for risk management for Islamic financial products and services is becoming a very critical issue for both Westernised and Islamic financial markets.

In addition to what Westernised (non-Islamic) finance is providing, Islamic banks are providing specific financial products (contracts) which make them perform as investors, instead of only as creditors. These products are based on principles that are driven by Profit and Loss (P&L) sharing policies. Both the structure of all Islamic financial contracts and the P&L policies need to fully comply with *Shariah* (Islamic) laws. Additionally, Islamic financial institutions and also Westernised institutions that provide Islamic products (via Islamic windows) are on the road to complying with the Basel II accord. Thus, they are facing the challenge of developing internal models in order to quantify, supervise, and manage all three major types of their financial risks; that is, credit, market, and operational risks. Moreover, they need to provide adequate solutions and define the associated minimum requirements for the supervisory regime.

This book covers all risk management issues for all Islamic financial products and services, including *Mushãrakah*, *Mudãrabah*, *Murãbaha*,

Salam, *Ijãrah*, and *Istisnã*, considering all of their unique characteristics that are underlined by the *Shariah* principles and law.

Therefore, the book provides an overview of the systematic methodological steps for evaluating and managing all types of financial risks for the Islamic financial products. It describes all types of risks and addresses the issue of how to identify both qualitatively and quantitatively their significance levels. Moreover, the book shows how to define when the risks appear within the lifetime of the different types of contracts. Measurement techniques for quantitatively assessing all types of risks are also described in this book.

Additionally, the book demonstrates the methodologies to model and evaluate financially, using mathematical approaches, the risks in the contracts referring to Islamic finance. The overall effects of risks including their impact on the bank's profit-and-loss and asset and liability on the balance sheets are also discussed. Hence, all risks that are initiated from the fluctuations of the balance sheet and the sharing (PLS) and non-sharing (P&L) profit-and-loss financial products is fully explained in this book. Risk management for Islamic banking financial products and services is one of the greatest challenges that many Westernised as well as Islamic banks are facing and probably will continue to face in the future. Therefore, this book is a valuable guide for those that are working on both conventional (non-Islamic) and Islamic finance.

ORGANISATION OF THE BOOK

The book is divided into 7 chapters, consisting of different sections:

Chapter 1: Principles of Islamic Finance

Chapter 1 begins with an overview of Islamic financial principles. The reasons for the advent of Islamic finance can be traced to social and ethical dimensions of the financing. The role of *Shariah* and other classical Islamic schools of thought in Islamic finance is discussed in this chapter. Prohibition of *Riba*, avoidance of *Gharar* and *Haram* activities, and payment of *Zakat* are important cornerstones of Islamic finance and are introduced in chapter 1. Additionally, major differences between conventional and Islamic finance are also presented. The chapter further covers significant areas of Islamic finance, such as accounting standards, international risk management framework, and the growth of the industry. Accounting in Islamic finance is not the same as conventional finance and a glimpse at a typical Balance Sheet of an Islamic bank reveals some of the differences. Moreover, the chapter explains the treatment of assets and liabilities as

needed in Islamic accounting. One of the fundamental tenets of Islamic finance is the participation in the business activity and avoidance of a pure financial debt. Profit and Loss Sharing (PLS) contracts are a result of this. The relevance of PLS contracts in Islamic finance is explained in this chapter, along with the reasons for their limited use. Six most common types of Islamic financial contracts are identified as relevant in the current state of the progress of Islamic finance. *Mushãrakah*, *Mudãrabah*, *Murãbaha*, *Salam*, *Istisnã*, and *Ijãrah* are the most commonly used Islamic financial contracts and have been selected for further analysis in this chapter. The chapter deals with *Mushãrakah* and *Mudãrabah* as investment contracts and explains them in detail with the help of examples drawn from real-life activities of Islamic banks. *Permanent* and *Diminishing Mushãrakah*, along with differences between *Mushãrakah* and *Mudãrabah*, are analysed in this chapter. Furthermore, the chapter, with the help of supportive examples, deals with the most popular Islamic contract form, *Murãbaha*. Further, *Salam* and *Istisnã* as vehicles for forward sale are discussed and examples are presented to demonstrate their applicability. Being very similar but not the same, the two are differentiated on the basis of fundamental points. *Ijãrah*, the Islamic leasing, is also dealt with in this chapter. Bonds in Islamic finance, known as *Sukûk*, are a recent phenomenon. The market for *Sukûk* has been growing rapidly, with several large *Sukûk* being issued recently. This chapter also presents an analysis of *Sukûk*.

Chapter 2: Risk Management Issues in Islamic Financial Contracts

In chapter 2, a brief overview of financial risks is presented, along with a detailed risk profiling of Islamic financial contracts (*Mushãrakah*, *Mudãrabah*, *Murãbaha*, *Salam*, *Ijãrah*, *and Istisnã*), for the existence of the different types of financial risks; that is, credit, market, operational, liquidity. Examples, with detailed graphical timeline analyses of the contract life, are provided to support the reader's understanding of the risks inherent within the different financial contracts. An overview of risks in Islamic finance is explained, along with a comparison with conventional finance. It shows that all discussed Islamic financial contracts are exposed to operational risks. Likewise, credit risks appear in all contracts except in the *Salam* and *Istisnã* contracts. Moreover, it demonstrates that all contracts that are dealing with commodities − that is, *Murãbaha*, *Ijãrah*, *Salam*, and *Istisnã* − are exposing the financial institutions to commodity price risk; on the other hand, the *Mushãrakah*, *Mudãrabah* contracts, which are partnership agreements, are initiating equity risks. Some of the Islamic financial contracts are typical due to the changing relationship between the contracting parties over the time period of the contract. Chapter 2 further discusses

in detail, with the help of graphs, the several overlapping risks which can arise out of single events; for example, in the case of *Diminishing Mushãrakah*, an interruption of regular cash flows to the institution can cause credit and liquidity risks. Furthermore, the chapter also presents risk management strategies for the *Mushãrakah*, *Mudãrabah*, *Murãbaha*, *Salam*, *Istisnã*, and *Ijãrah* in relation to credit risk, market risk, operational risk, and the resulted liquidity risk. This chapter is a useful guide to identifying for all the existing as well as future types of Islamic financial contracts the different types of risks that may arise within their lifetime. This is mainly based on the evaluation of the associated financial events linked to the *expected inflow-cash* and *outflow-cash* flows.

Chapter 3: Basel II and IFSB for Islamic Financial Risk

Chapter 3 provides all necessary information needed for banks that provide Islamic financial products, to comply with the Basel II accord. Islamic financial contracts are typified by the changing relationship between the contracting parties during the lifetime of the contracts. This has a direct bearing on the risk exposures. This chapter highlights the detailed analysis of credit, market, and operational risks that has been given by the Basel II accord. The three mutually-enforcing Pillars are the foundation of Basel II and this chapter discusses the applicability of these pillars in Islamic financial industry. It highlights that Basel II is primarily for conventional banks and thus is not fully relevant to Islamic financial institutions. However, in line with any other industry guidelines, some of the principles of risk management as proposed in Basel II are applicable to Islamic financial industry as well. The basic role of capital cannot be changed and thus the role of risk management in any institution. Further, the chapter analyses the various approaches presented under Pillar 1 along with their relevance to the Islamic financial industry. Pillar 2 and Pillar 3 are supportive in nature and hence their role in risk management is more at a supervisory level, which has been presented in this chapter. The chapter also signifies the link between the role of social responsibility of Islamic finance and market disclosure. The chapter further identifies that the IFSB is playing a key role in the development of standards for risk management in the Islamic financial industry. The recent release of standards for risk management is the first systematic attempt at consolidating the efforts for bringing Islamic financial risk management under one umbrella, and this is discussed. The six major risks as identified by the IFSB for the Islamic financial industry − credit, market, operational, equity investment, liquidity, and rate of return − are explained in this chapter. Furthermore, the suggested treatment for these according to the IFSB is also analysed.

Chapter 4: Credit Risks in Islamic Finance

In chapter 4, the risks of credit defaults referring to counterparties, collaterals, and guarantees are fully covered for all Islamic types of financial contracts. As discussed in this chapter, financial institutions are exposed to credit risks that correspond to lending in the *Murãbaha*, leasing in the *Ijãrah*, promises to deliver or to buy in *Istisnã* and *Salam*, and investments failure in the *Mushãrakah* and *Mudãrabah* contracts. Furthermore, the chapter identifies different methods and techniques for developing models for credit risk that results from Islamic products. The chapter also highlights credit value-at-risk (VaR) based on expected and unexpected losses. The Credit VaR estimation is viewed as the economic capital to be held as a buffer against unexpected losses. The chapter also discusses how financial institutions are mitigating credit risks by employing collaterals or guarantees granted by tier counterparties.

Chapter 5: Market Risks in Islamic Finance

Chapter 5 discusses how Islamic financial institutions are exposed to market risk primarily through four types of risks, which are: rate of return (mark-up) or benchmark rate risks related to market inflations and 'interest rates', commodity price risks as they typically carry inventory items (predefined prices), FX rate risks in the same way as conventional banks and equity price risks mainly in regards to the equity financing through the profit and loss sharing contract modes. Islamic financial products carry more than one market risk factor; moreover, even a simple portfolio usually contains different types of contracts. This combination of risk factors and contracts increases the complexity of collecting and combining the information needed for market risk analysis. As discussed in this chapter, the sensitivity to market risk in Islamic contracts reflects the relationship between the cause from a financial risk factor and its adverse impact to the financial institution's earnings from these contracts. In financial analysis, the most prominent techniques to valuate market risks are the value-at-risk (VaR), and this analysis is outlined in this chapter.

Chapter 6: Operational Risks in Islamic Finance

In chapter 6, operational risk, one of the major topics in today's financial risk management, is discussed. The chapter presents all the key aspects of operational risk management by giving guidelines on how to identify and qualitatively map risks in operations within all the business lines as well as how to transfer their qualitative attributes to quantitative measurement indicators. It outlines some of the initial main elements of operational risk

analysis, which includes the identification, mapping, assessment, and measurement and evaluation. It particularly makes reference to Islamic financial products and especially the compliance with the *Shariah* principles and laws. Three different approaches for operational risk identification analysis are presented: the self-assessment analysis, the quantitative operational risk indicator approach, and the operational risk loss approach. The chapter further discusses the identification factors and operational risk mapping. It particularly goes deeper into the identification of operational risk causes, events, and consequences. It graphically illustrates the different sources of operational risks with regard to the different Islamic financial contracts. It talks about how the loss data collection is a primary approach for the assessment of operational risks. The issue of IT security is particularly highlighted. It also underlines that in some cases the operational risks related to IT systems/technologies have a significant impact and can even lead to credit and market risk.

Chapter 7: Concluding Remarks

Concluding remarks are provided in chapter 7. This chapter brings together all the issues and ideas discussed throughout the book. A brief summary of the important conclusions is also presented in this chapter. It discusses future directions of financial risk management in Islamic Banking and Finance.

References are given at the end of every chapter for those interested in strengthening their knowledge beyond the material and scope of this book. All referenced documents written by the Basel Committee on Banking Supervision are available free of charge from their website www.bis.org/bcbs/publ.htm and documents from the IFSB can be found on http://www.ifsb.org

A list of acronyms is finally given to ease understanding of the terms used throughout the book.

About the Authors

Dr Ioannis Akkizidis is a Risk Management Consultant & Analyst at IRIS Integrated Risk Management AG, Zürich, Switzerland. Ioannis is a main author of the bestselling book entitled *Integrating Market, Credit and Operational Risk: A Complete Guide for Bankers & Risk Professionals* (2006), where two of its chapters are part of the recommended material for the GARP's 2007 FRM Study Guide. He is also the main author of the book entitled *Guide to Optimal Operational Risk & Basel II* (2006). His first degree is in engineering (in Athens, Greece), whereas his postgraduate masters degree is in applied mathematical analysis and control systems from the University of Portsmouth, England, UK. He holds a PhD in applied mathematics and artificial intelligence obtained from the University of Wales, UK. He has published several scientific papers in international journals and presented at international conferences and events, giving talks on the subject of Financial Risk Management including Islamic Finance. He has work experience worldwide over many years in risk management and his main interests lie in designing and implementing models as well as bringing new ideas in the risk and financial management field for financial institutions and large corporations.

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on banking and finance. He has also chaired numerous sessions in round tables and meetings on finance. He has several articles to his credit in journals, newspapers, and magazines. He is an active member of GARP and ISACA in UAE. He has been actively involved in several co-operative activities of the financial industry in UAE.

Contacts

The authors will be pleased to have feedback and are open to any discussion referring to the subject and material presented in this book. Please contact them via e-mail and/or postal address on:

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Abbreviations

Abbreviation	Explanation
AAOIFI	Accounting and Auditing Organisation for Islamic Financial Institutions
ADB	Asian Development Bank
AMA	Advanced Measurement Approach
BIA	Basic Indicator Approach
BOT	Build Operate Transfer
CAH	Current Account Holders
CCR	Counterparty Credit Risk
DIB	Dubai Islamic Bank
EAD	Exposure at Default
IDB	Islamic Development Bank
IFSB	Islamic Financial Services Board
IIFS	Islamic Financial Services
IMA	Internal Model Approach
IRB	Internal Rating Base
IRR	Interest Rate Return
KSA	Kingdom of Saudi Arabia
LGD	Loss Given Default
LIBOR	London Interbank Offered Rate
OIC	Organisation of the Islamic Conference
P&L	Profit and Loss
PD	Probability of Default
PER	Profit Equalisation Reserve
PLS	Profit and Loss Sharing
RRR	Rate or Return Risk

SA	Standardised Approach
Shariah	Body of Islamic law
SPV	Special Purpose Vehicle
UAE	United Arab Emirates
UIAH	Unrestricted Investment Account Holder
VaR	Value at Risk

CHAPTER 1

Principles of Islamic Finance

INTRODUCTION

Efficient financial systems are one of the pre-requisites for a developing and growing economy. Resilient and responsive financial systems enable the government to implement monetary policies effectively, which is used to control and manage several macro-economic parameters. Banking is a major component of the financial system and hence has far-reaching impact on the overall financial health and stability of an economy. Any disruption in the banking system has serious implications for the economic conditions of a country. Banking and financial system in a country connects individual economic units, thereby creating a national network of financial claims, and helps in the creation of national financial market. Essentially, banking system routes the financial transactions, plays the role of financial intermediation and helps in the creation of wealth. The intermediation process in financial market creates a series of interconnected contractual obligations and relations which alters the values of the variables in the risk equation. Intermediation helps in rationalising the decision to save and invest by surplus units and to borrow and invest by deficit units. The intermediation is generally a very long chain involving several financial entities and processes, each of which is aimed at reducing cost, improving the match between the needs and availability of funds, creation of tailor-made financial products based on the market needs, and provision of timely funds.

The last two decades have seen integration of financial markets across the globe. Due to globalisation and the rapidly growing international trade, most of the financial entities and markets are connected to each other through telecommunication network, forming a complex web of global financial network. These linkages of participants on the global financial system create a network of interdependencies in terms of financial claims and settlements. Any disturbance in the settlement of financial claim at any

of the nodes of this web is capable of generating a ripple effect which can turn a local financial crisis into a global financial catastrophe. The risk of settlement, also sometimes referred to as Herstatt risk,[1] is just one of the possible damages which these interdependencies can cause. Other than these, due to the heavy reliance on interest rates, the financial markets are highly prone to changes in them. Any alteration in the interest rate, either state governed or market forced, causes impact on several dimensions of banking and financial sectors. Borrowing and lending, the prime function of financial intermediaries, is directly related to interest rates.

Conventional banks have been playing the role of financial intermediation for several decades. Interest differential was the original source of revenue in primitive models of banking which have been supported by charges, commissions and fees as new methods of income generation in modern banking system. Other than the role of intermediation, banks have been providing temporary cushions for short-term money requirements in the market as well as assisting in performing the function of price discovery in the money market. Conventional banking is largely based on interest rates, accounting, various products and services, risk management activities, as well as long-term strategies, which are based on interest rates. Islamic scholars have raised questions about the necessity and validity of the interest in the process of financial intermediation. In the desire to provide sustainable and justified distribution of wealth and income, Islamic finance has attempted to find alternates to the conventional form of financing. Interest has been considered as a form of exploitation since it is merely a charge on money. Hence, the prohibition of giving and taking interest among the Muslim population can be considered as a prime reason for the origin of Islamic banking.[2] Interest, as called *Riba* (literally meaning 'extra'), is considered to be *Haram* (literally meaning 'forbidden') and hence is prohibited. Added to this was the disenchantment of Muslims for investing in economic activities involving *Gharar* (literally meaning 'risk', 'uncertainty', and 'hazard'). Due to the strong emphasis in Islamic economics on equitable distribution of wealth in the society, there has been insistence on sharing the revenue with the less fortunate in the form of *Zakat*[3] (literally meaning 'purification'). Hence, the Islamic banking is mainly based on the absence of *Riba* in the transactions, avoidance of *Gharar* in contractual terms, payment of *Zakat* for the needy and poor, and avoidance of *Haram* activities. A common thread running across all these tenets is protection of the poor and weak from exploitation by the rich and powerful. Islamic finance has a strong root in sustainable society with focus on welfare, equality, and justice. Social implications of commercial activities cannot be neglected in Islamic finance since it has a strong emphasis on a socially responsible form of financing. The activities of Islamic finance are not purely materialist, although profit is a motive, but it is supported by strong social responsibilities and accountabilities. The social

objectives cannot be separated from commercial objectives in Islamic finance. Some of these differences between conventional financing and Islamic financing are summarised in Table 1.1.

The formal and structured Islamic banking is of recent origin, although it was present in unorganised and privately-held activities, the systematic efforts begun in the mid-seventies. With the opening of the Islamic Development Bank (IDB) in Saudi Arabia and Dubai Islamic Bank (DIB) in United Arab Emirates, the formalisation of Islamic financial services began. IDB is now an international financial institution consisting of members from 56 countries and DIB is one of the largest Islamic Banks in the world. This phase of development of Islamic financial sector was marked by setting up of Islamic banks which can offer *Riba*-free banking. During the late seventies and early eighties, Islamic banking spread to Egypt, Malaysia,

Table 1.1 Differences between conventional financing and Islamic financing

Conventional finance	*Islamic finance*
Primarily based on Interest rate	Interest is prohibited
Facilitate financial activities	Facilitate social, economic and financial activities
Structured and formalised	Unstructured and still informal in many ways
Stress on financial efficiency	Stress on social, ethical and financial efficiency
Restricted moral dimension	Strong moral dimension
Highly systematised in terms of risk management, accounting and other standards	Standards for risk management, accounting and other activities are still developing
Existing set of legislations to deal with legal issues	Legal support still in development with several legal areas under doubt
Highly developed banking and financial product market	Developing banking and financial product market
Existence of conventional money market	Non-existence of significant Islamic money market
Availability of inter-bank funds	Non-availability of inter-bank funds
Strong and developed secondary market for securities	Non-existing secondary market for securities
Existence of short-term money market	Non-existence of short-term money market

Jordan, Sudan, Pakistan, and Iran. Faisal Islamic Bank in Egypt, Jordan Islamic Bank for Finance and Investment in Jordan, Sudanese Islamic Bank in Sudan and several others in Middle East countries started their operations. Malaysia systematically adopted Islamic banking with the setting-up of the Bank Islam Malaysia Berhad. During this phase rapid expansion was seen, with some of the countries adopting completely Islamic models of banking, including Sudan and Iran. After the late eighties, the shift was on developing marketable, consumer-friendly, *Shariah*-compliant Islamic financial products. Several innovative products were introduced, with more and more banks coming up with unique solutions for Islamic financing. At the same time, the need was felt for standardisation and good governance. Efforts to develop International Accounting Standards for Islamic financial services gathered momentum. Organisations such as Islamic Financial Services Board (IFSB) and Accounting and Auditing Organisation for Islamic Financial Institutions (AAOIFI) had been working in the direction of providing standards for the Islamic financial industry. Central Banks in countries offering Islamic financial services started developing standards for the supervision of Islamic financial institutions. Islamic insurance (*Takaful*) developed as a separate branch of Islamic financial services. Hence, the framework of Islamic financial services include, among other things, Islamic banks, other Islamic financial institutions, AAOIFI, IFSB, Central Banks, and other interest groups (Figure 1.1). During 2007, more than 250 Islamic banking institutions were providing a wide range of financial products all over the world. The number is growing rapidly due to the entry of new institutions and conventional banks into Islamic banking by opening an Islamic window. The growth is one of the indicators of the success

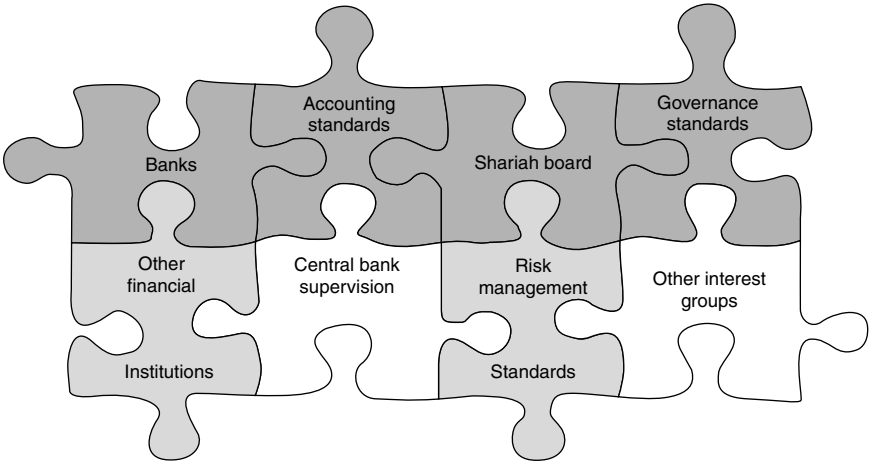

Figure 1.1 Structure of Islamic financial service industry

of the Islamic form of banking. Muslims all over the world have been keen on accepting the Islamic form of financing, largely due to religious reasons. Equal interest has been shown in Islamic banking by non-Muslims due to financial reasons.

The growth of sustainable development and the raising concern over wasteful consumption and exploitative production has also helped in the development of Islamic banking, which accepts an ethical approach to financing rather than a pure profit-based financial approach. Money should not be used to exploit the plight of others is the fundamental rule. Coupled with this, the other tenets of Islamic banking include avoiding *Gharar*, insistence on clear terms in contract, prevention of transactions for speculative activities and linking financing to productivity. Banks do not remain mute spectators in Islamic financing, but become an active partner and attempt to participate fully in the sharing of profit and losses with customers and thus Islamic banking is also known as Profit and Loss Sharing Banking. In true essence, Islamic banking cannot be conducted without a participation in profit and loss. The foundation of Islamic banking lies in the participation and not in simple financial intermediation. While conventional banks perform the function of transfer of funds from the surplus to the deficit units by using interest on the funds intermediated as the source of revenue, Islamic banks perform the same function by way of active participation between the two units, linking the risks and return in a more formal way. Thus, we can summarise that Islamic banking and finance wishes to achieve the objectives of a more equitable society with better distribution of wealth and income, promote ethical business activities, create a just and fair financial system where the rich do not benefit at the cost of the poor, and remove uncertainty in business dealings. Due to the emphasis on equity-based financing over debt-based financing, the risks in Islamic banking differ from conventional banking. The credit risk, market risk and operational risk, albeit present in Islamic banking, differ in their origin, impact and implications. These will be explored in detail in the next few chapters of the book.

Although theoretically Islamic banking seems to use the same tenets for financing as used by conventional banking, they differ greatly in terms of their application. The method of conducting Islamic banking differs from bank to bank, from country to country, and sometimes from product to product. These differences can be partly attributed to the presence of the *Shariah* board, which governs and guides the banks regarding the conduct of Islamic banking. The *Shariah* board interprets various products, services and situations based on Holy Quran and *fiqh* (Islamic jurisprudence). There are four classical schools of Islamic thoughts; namely, *Hanafi*, *Maliki*, *Shafi'i*, and *Hanbali*. These schools have specific presence in different parts of the world and hence the *Shariah* ruling differs which can also be found based on them. China and Turkey are more influenced by the *Hanafi*; in a large

part of Africa *Maliki* is followed; Indonesia and Malaysia have large followers of the *Shafi'i* school; and *Hanbali* appears to be followed in Arabia. These four schools represent most commonly accepted rulings of Islamic jurisprudence. The interpretation of *Shariah* scholars can be based on one or more schools of thought and hence can have impact on the conduct of the Islamic banking.[4] Multiple factors are considered before *Shariah* provides a ruling on a particular case. This multiplicity of methods of financing has been a prime reason for the lack of standardisation of products, processes, and policies. This did not hamper the growth and development of Islamic banking, but has resulted in some confusion among the followers of Islamic banking. Due to the multiplicity of interpretations of situations, the progress on the front of developing specific legislation for Islamic banking has been slow. Malaysia, Pakistan and Bahrain have developed specific legislations dealing with Islamic banking, whereas most of the other countries offering Islamic banking are using conventional banking legislations with some modifications for Islamic banking along with *Shariah* rulings.

The existing literature deals with Islamic banking in isolation and thus restricts the comprehensive view where Islamic banking is seen as an integral part of the global financial system. Risk management has been extensively dealt with, but with the focus on conventional banks. There is only a handful of literature on risk management in Islamic banking and finance.

This chapter begins the systematic attempt to bridge this gap and understand risk management in Islamic banking and finance holistically. The Balance Sheet of an Islamic Bank is presented as a starting point for understanding the grouping of assets and liabilities which are different from the conventional banks. A typical Balance Sheet of an Islamic Bank is also presented in order to offer an overview of how reporting is managed in Islamic financial institutions. *Zakat* as an obligation has a bearing on the financial statements and thus is also shown in the Balance Sheets. The role of AAOIFI has also been highlighted.

The nature of Islamic financial activities cannot be understood without clear understanding of Profit and Loss Sharing (PLS) principles. This chapter presents an overview of the PLS contracts and their role in Islamic financial activities. Various rules related to PLS contracts are explained and the present concerns are also analysed. The reasons for the limited popularity of the PLS contract are further explored in this chapter.

The chapter presents an analysis of some of the more common Islamic financial products, including *Mushãrakah*, *Mudãrabah*, *Murãbaha*, *Salam*, *Istisnã*, and *Ijãrah*. A brief overview of *Sukuk* is also presented. PLS contracts are the foundation of Islamic finance and *Mushãrakah* and *Mudãrabah* are the two common forms of contract using PLS in Islamic finance. The bank and customer join as partners and undertake business activities. Where the bank contributes only the capital, it is called a *Mudãrabah* contract. Under

a *Mushãrakah* contract, the bank can take part in the management of the joint business. Several Islamic scholars claim that these two forms of Islamic finance should preferably be used as compared to *Murãbaha*. Several rules related to *Mushãrakah* and *Mudãrabah* are enumerated in this chapter. The analysis is supported with examples from real life.

Murãbaha is the most popular type of Islamic financing contract. Popularly known as 'cost-plus' financing, it has been the instrument of choice for Islamic banks. Due to limited risk exposures, as compared to other contract types, *Murãbaha* has been in use for a long time and has contributed maximally to the total Islamic business (for a detailed analysis of risks related to *Murãbaha*, please refer to chapter 2). *Murãbaha* is most commonly used for financing consumer goods, real estate, machinery, and equipment. As per most common Shariah opinions, *Murãbaha* should not be used on a long-term basis and should be treated as a 'stop-gap' arrangement until other Islamic financial instruments are fully developed.

Islamic finance does not permit forward sale, with the two exceptions of *Salam* and *Istisnã*. These are discussed in detail in the present chapter. *Salam* can be used for agricultural commodities, whereas *Istisnã* can be used for manufactured (or constructed) goods. Different requirements for *Salam* and *Istisnã* are explained in this chapter. *Parallel Salam*, where two simultaneous agreements are used by the banks, is also explained with the help of examples. A quick comparison that brings out the main differences between these two types of contract is also presented in this chapter.

Leasing in Islamic finance is managed through *Ijãrah*, which is dealt with in this chapter. *Ijãrah* is subjected to certain rules as provided by Islamic *fiqh*, which are explained. Several dimensions of *Ijãrah* contracts relating to alternative methodologies for creating a contract are explained in detail in this chapter. The two main types of *Ijãrah* contracts – that is, *Ijãrah thumma al bai*, and *Ijãrah wa Iqtina* – are also presented. A risk analysis of these two is presented in subsequent chapters.

Sukûk is most commonly known as Islamic Bonds. A detailed analysis of highly dynamic *Sukûk* is presented in this chapter. Since the market for *Sukûk* is going through a rapid transformation, some of the information may be required to be updated from other sources while using it. There are large varieties of *Sukûk*, depending on the type of underlying contracts; but, based on essential qualifications, *Sukûk* can be debt-based or equity-based. Differences between conventional bonds and *Sukûk* are also presented in this chapter.

The Islamic banking balance sheet

The extent of liability of the owner provides two alternative models of the organisations. One can be based on the concept of unlimited liability,

which is popularly known as ownership form of business, and the other can be with owners having limited liability. Joint stock companies, which are based on the concept of limited liability, are a result of rapid industrialisation during the early twentieth century. Heavy investments and involvement of large-scale funds made it necessary to have organisation with pooled capital. There was also a need for specialised management which is separate. Joint stock companies with the distinctive features of limited liability, separation of ownership from management, and legal entity were a result of industrial revolution. Due to their typical nature and complicated financial structures, companies need special methods and standards for maintaining their accounts. Asset valuation and accurate measurement of income and liabilities is one of the difficulties faced by the accounting. Availability of alternative methods for doing this, along with choices of concepts and conventions, has added confusion to the existing chaotic situation. In the last few decades this problem has been solved to a large extent by adopting universal concepts, conventions, and principles. All throughout, the effort has been to monetarise everything. Focus has been on determining income and valuation. The concept has been further extended to growth and finally to the wealth maximisation. Islam has reservations over these issues and offers an alternative view which includes social, moral, and ethical dimensions to the valuation and measurement of assets. However, it should not be misunderstood that Islamic finance is against income and profit. *Zakat* (obligatory alms) is calculated on income and profit and thus both are relevant and not *Haram* (prohibited). Income in accounting is ex-post calculation and is a historical concept. The valuation of assets using discounted cash flows is generally not acceptable in Islamic finance, since, according to Islamic finance, there is no debt-related time value of money. The concept that 'a dollar today is worth more then a dollar tomorrow' does not find much support in Islamic finance. This is in line with the prohibition of *Riba*, as it mainly represents the time value of money. Islamic finance can use the method popularly known as 'current cash equivalent method'. Along with other reports, due to the calculation of the *Zakat*, the Income and Expenditure Account as well as Balance Sheet are also emphasised. Due to the close integration of all the beneficiaries of a business venture, reporting of true profits is essential in order to provide justice to them at the time of distribution of profits. Reporting in conventional accounting is limited to financial information, whereas in Islamic finance there is an emphasis on reporting non-financial facts, whilst keeping co-operative aspects of economic activity in mind rather than competitive aspect. Due to the social responsibility attached to the economic activity, it is expected that the reporting should be more elaborate and extensive, also keeping the non-financial aspects in it. The sustainability of Islamic banking depends on

the public trust, which is directly related to candid, sufficient, timely and true and fair information disclosure. Hence, sufficient reporting is of the utmost importance in Islamic banking.

Accounting aims at presenting the 'true and fair' financial view of the organisation. There has been a series of developments related to accounting standards. International standards have evolved and have helped in standardising the accounting practices in conventional banking. Islamic banking attempted to align with the success of International Accounting Standards by creating the AAOIFI standards for Islamic accounting. Before the introduction of AAOIFI standards, each Islamic bank had its own accounting standards, practices, and regulations. Differences in these standards, practices, and regulations have led to inconsistencies, rendered financial results non-comparable, and created confusion. This was added to the growing resentment among Islamic institutions towards a blind adoption of the Western accounting model, which was presumed to be materialistic and based on consumerism. There has also been concerns regarding the belief by Islamic and some Western scholars that conventional accounting models do not take into account the 'other costs', such as environment degradations, inequality of income distribution, social implications, and the degeneration of resources. Islamic accounting ideally wanted to move away from simple monetary measurements, various conventional accounting concepts and conventions and include non-pecuniary information so as to provide a better view of the use of resources as per Islamic jurisprudence. Islamic institutions wanted their own accounting standards, which are *Shariah* compliant, leading to the development of AAOIFI. The aim of any accounting standard is to record and present true and fair economic facts. The Islamic accounting differs from the conventional accounting standard in this respect as the former concentrates only on the pecuniary impact of the transactions, where the Islamic accounting attempts to focus on the pecuniary as well as the ethical and social impact of the transactions. Out of several controversies related to Islamic accounting, the most prominent is the treatment of *Zakat*. Some scholars believe that *Zakat* is a cost and hence should be included in the expenses; whereas some others feel that it is a part of profit distribution and hence should be treated as appropriation.

Islamic financial institutions will have to prepare similar sets of financial statements as prepared by conventional banks; statement of income, statement of cash flows, and a balance sheet. Other than these, they also have to prepare a statement consisting of transactions related to *Zakat* funds. Islamic economists ideally want to have only investment deposits on the liability side and on the asset side only profit-sharing contracts. But this is practically not possible due to the many complexities involved. For all practical purposes, Islamic banks have current account and investment

deposits on the liabilities side and on the asset side they have several profit-sharing variants of products such as *Mushãrakah*, *Mudãrabah*, *Murãbaha*, *Istisnã*, *Salam*, and *Ijãrah*, which are discussed further in this chapter. The fundamental difference between Islamic banking and conventional banking arises due to the prohibition of *Riba*. The non-interest-bearing current accounts are distinguished from the investment deposits. The asset side of the Islamic bank comprises of funds which are held with the Central Bank and other financial institutions, property and other assets, along with *Murãbaha*, *Mudãrabah*, *Ijãrah*, and other financing. The liability side largely consists of depositor funds. Islamic banks have to follow certain rules regarding the maintenance of the accounts. First, each project should be financed and recorded through a special project account which can specifically record and report the transactions related to the project. Hence, it is more transaction-based accounting. Second, the *Mudãrabah* account should be maintained separately and the settlement should be on the basis of realised cash and not recorded cash. Similarly, third, in the case of diminishing *Mushãrakah*, the net accrued profits should be considered at the end of the year. Fourth, the profits should be distributed each year and should not be accumulated. Finally, for *Murãbaha* contracts, the profits should be calculated after the termination of the contract. They generally cannot divide liabilities into different categories based on liquidity.

At the time of writing this book, not many banks followed the AAOIFI standards and hence the financial statements of Islamic banks are non-comparable and are not standardised, although most of them use a similar format for reporting. A typical balance sheet for an Islamic bank is presented in Table 1.2.

Table 1.2 Typical balance sheet of an Islamic bank

ASSETS
Cash and cash equivalent
Financing and receivables
– *Murãbaha*
– *Salam*
– *Istisnã*
Investments securities
Mudãrabah investments
Mushãrakah investments

Continued

Table 1.2 Continued

Investment in other entities
Inventories
Investment in real estate
Assets acquired for leasing
Other investments
Fixed assets
Other assets
Balances with and due from financial institutions
Diminishing *Mushãrakah*
LIABILITIES
Deposits and other accounts
– Current accounts
– Savings accounts
– Term deposits
– Others
Deposits of other banks
Salam payable
Istisnã payable
Declared but undistributed profits
Zakat and taxes payable
Other accounts payable
NET ASSETS
REPRESENTED BY
Islamic Banking Fund
Reserves
Inappropriate / Un-remitted profit
Surplus / (Deficit) on revaluation of assets
Remuneration to *Shariah* Advisor / Board
CHARITABLE FUND
Opening Balance
Add: Additional provisions
Less: Utilisation of funds
Closing Balance

Understanding profit and loss contracts

Conventional banking, largely based on interest, is characterised by non-participation of contracting parties in the profits and losses resulting out of the fulfilment of contracts. The contracts consist of pure lending with the onus of making profits solely lying on the borrower and the lender clearly demarking his liabilities. Further, in the case of profits, the borrower does not pay anything to the lender which is in proportion to his share and, in the case of bankruptcy, the shareholders have to suffer, according to which Islamic finance was the unjust distribution, leading to inequality. Islamic banking is dominated by Profit and Loss Sharing (PLS). It primarily promotes PLS between the lender and borrower by converting their relationship from borrower and lender to partners. Islamic financial institutions are facing credit, operational, market, and liquidity risks of a higher degree, mainly due to PLS.[5] It needs transparent contracts as a foundation to the transaction. The *Shariah* requires that the contract should be drawn in clear terms and nothing should be hidden or left unclear. Any uncertainty is not permitted and is treated as *Gharar*. Moreover, the contracts should be as per the *Shariah* rules and principles. Absence of a universally acceptable legal framework for Islamic contract has led to several problems. The progress on designing, developing, and propagating the legal structure has been unsatisfactory. In countries such as Sudan and Iran that completely follow an Islamic financing system, there has been a frugal legal system to support, and in several other countries which are following Islamic banking as a parallel system, there is a lack of prudent Islamic legal system in place. There have also been inconsistencies between the conventional and Islamic legal interpretations relating to financial transactions.

PLS is one of the fundamental principles of Islamic financing and can acquire several forms, depending upon the type of contract. The most common form of it is where a bank provides funds and an entrepreneur provides time and effort. At the end of a stipulated period, if there are profits, they are shared in the agreed proportion. If there are losses it is generally the bank that takes the entire responsibility, unless there is a mismanagement and negligence on the part of the entrepreneur. Hence, apparently there appears to be greater risks in profit and loss sharing contracts. Primarily, the rate of return on any investment is calculated ex-post and thus any pre-determined fixed rate of return is not permitted. The profit and loss sharing contract affects the bank balance sheet in several ways. The use of depositors' funds is shown as a liability since it represents an unrestricted use of depositors' funds for financing entrepreneur activity. The provision of funds to an entrepreneur is shown on the asset side.

Although PLS is the cornerstone of Islamic financing, its use has been limited and debatable. There are several reflections of PLS used by Islamic

finance, such as *Mushãrakah* and *Murãbaha*. Habib[6] observes that it was expected that Islamic banking would take the form of the two-tier *Mudãrabah* model, but was forced to use *Murãbaha*. Although there is a strong agreement among Islamic scholars that the most desirable form of Islamic financing is using *Mushãrakah* and *Mudãrabah*, there has been reluctance from both the parties, the banks and the borrowers, to use PLS. Institutions are reluctant due to the high degree of uncertainty attached to it, whereas businessmen have their own reasons for not using PLS. There are several reasons for the limited use of PLS by Islamic financial institutions. Desire for secretiveness and lack of transparency, complicated and expensive monitoring, and taxation issues are some of the reasons. Iqbal and Molyneux[7] cite some more reasons, such as the need to keep and reveal detailed records, limited opportunities to re-invest retained earnings and/or raise additional funds, and loss of exclusive control over the business. Some studies, however, hold the moral hazard problem responsible for this. Another issue is asymmetric information and the nature of banks as short-term financial institutions.[8] Probably the conventional model of information availability (strong, semi-strong, and weak) does not appear to exist in Islamic finance, and, due to lack of information, the bank can end up making an adverse selection. An entrepreneur having a financially sound project will shy away from an Islamic bank since it will involve sharing his profits and thus increasing his cost of funds. On the other hand, projects with limited financial soundness will come to Islamic banks due to the natural protection available for the failure in Islamic financing. Hence, Islamic banks can be left with a choice among weak projects. Similarly, an established organisation will approach conventional forms of financing since debt-financing will be a cheaper option. On the other hand, start-up firms will approach Islamic banks due to hedging against losses. Islamic banks thus will be left with financing infant firms. The moral hazard problem is at the core of PLS, and makes it difficult to use. The questionable honesty of the entrepreneur and his misdirected use of funds can lead banks into difficulty.

Summarising the discussion, for a bank to enter into a PLS agreement with an entrepreneur, it should have all the necessary information at all the stages of a contract. Before entering into the contract, the required information is generally made available by the entrepreneur as an incentive to obtain funds. During the life of the enterprise, the problem of under-reporting may arise, especially when there is no punishment/monitoring/incentive clause in the contract. It is at this stage where the entrepreneur can mismanage the funds. Moreover, there are no established models for Islamic banks to use during contracting which can accurately measure the risk involved. As discussed before, monitoring is expensive and hence cannot be used in all the cases by banks. On the other hand, there are incentives for the bank to use PLS since it provides equity-based funding as compared to debt funding,

which is expensive. Hence, if a bank can manage information asymmetry, the PLS model appears to be less expensive.

Islamic financial products and services

Islamic financial products have evolved over two decades. The journey has been need-based from simple *Murãbaha* financing to *Sukûk*. The Islamic financial products are mostly based on classical Islamic contracts and can be grouped into three broad types: equity financing, sales financing, and lease financing. Equity financing mostly takes the form of *Mushãrakah* and *Mudãrabah*. Many of the Islamic financial products are a variation of the following types of instruments:

Mushãrakah

Mushãrakah is also known as 'Partnership Financing' or 'Joint Venture Financing'. Islamic *Fiqh* does not refer to the word *Mushãrakah*; it is a derivation from the word *shirkah*, which means sharing. Unequal distribution of wealth is treated as a sin in Islam and hence any partnership with unjust distribution of profits or losses is not permitted. It is believed that the interest is the root cause of unequal distribution of wealth and hence moderation is used while distributing the profits and losses of the business, where, in the case of profit, the managing partner should not take a large share and, in the case of loss, the non-working partners should not be asked to bear all the burden of loss, which generally is the case in conventional partnerships. To overcome these issues of conventional partnership, *Mushãrakah* is used as an alternative. *Mushãrakah* is a form of equity financing which refers to a partnership agreement between the bank and the customer where equity is contributed jointly and profits and losses are shared on agreed terms; however, it is not just lending money. The capital can be contributed in cash or in the form of goods or assets. The profit-sharing ratio can be decided at the time of the agreement but, in the absence of a loss-sharing ratio, the losses will compulsorily be shared as per the proportion of the capital. Both the parties have the right to manage, although one of them may surrender their right in favour of the other. *Mushãrakah* is seldom used due to the high degree of uncertainty over the returns. It is used in cases involving huge investments and for joint-venture projects. In *Mushãrakah*, the finance comes from both the parties. In case only one party finances the whole project, *Mudãrabah* is used, which is explained in the next section. *Mushãrakah* can also take the shape of *Diminishing Mushãrakah*, where the entrepreneur keeps purchasing the share of the financier regularly and thus diminishes the contribution of the financier, which eventually is completely phased out. A possible use of *Diminishing*

Mushãrakah can be for real estate financing. However, *Diminishing Mushãrakah* cannot be used easily for financing regular trade transactions. The general law of partnership applies for the termination of *Mushãrakah*. The partners can terminate the *Mushãrakah* by giving a notice. Death or insanity of one of the partners also leads to the termination of *Mushãrakah*.

Example – *permanent Mushãrakah* A customer X of bank ABC plans to start a production plant for the manufacturing of ceramic tiles. The bank enters into a contract with customer X whereby the bank contributes 40% and customer X contributes 60% of the capital. The bank surrenders its right to manage in favour of customer X. They agree to share the profits in the ratio of 20% for the bank and 80% for the customer. In case they make a profit it will be shared in the ratio of 1:4; but if there is a loss, it will be shared in the ratio of 2:3 (capital ratio).

Example – *diminishing Mushãrakah* A customer X of the bank ABC plans to start a commercial transport service by purchasing a delivery van. The bank enters into a diminishing *Mushãrakah* with the customer where it contributes 90% of the cost of the van and the customer provides the remaining 10% (generally called down-payment in conventional form). Out of the profits, the customer keeps 25% and the remaining 75% goes to the bank. Let us assume the capital contribution to be divided in 20 equal units; thus, the bank owns 18 units and the customer owns 2. At regular agreed intervals, say, two months, the customer keeps purchasing one unit from the bank's contributed share in units, thus increasing his contribution and reducing the bank's. After 36 months, the customer will own all the units of the bank's contribution, thus owning the van all by himself. A detailed analysis of changing risk exposures due to the changing ownership ratio is shown in the next chapter (Figure 2.8).

Mudãrabah

Mudãrabah is also known as 'sleeping partnership'. *Mudãrabah* refers to a partnership where one of the partners contributes capital (*rabb-ul-mal*) and the other partner the management (*mudarib*). This is also a form of equity financing and is more popular than *Mushãrakah*. The investing partner cannot take part in the management of the firm. The investing partner can provide the funds with a restriction that they will be invested in a particular business; it is then called restricted *Mudãrabah*. On the other hand, if *rabb--ul-mal* allows *mudarib* to invest in any business, it is called unrestricted *Mudãrabah*. Many banks use *Mudãrabah* to mobilise funds through savings and investment accounts.

Example A customer X approaches the bank ABC to invest in the manufacturing of ceramic tiles, but insists that he cannot contribute any capital. The bank invests all the required funds for the business, whereas the customer takes care of the management. The customer and bank are partners in this joint venture. There are several risk exposures in this form of financing, which are illustrated in chapter 2.

Note *Mushãrakah* and *Mudãrabah* have some common features. Both should not be confused with simple financing of business. They require participation in business either in the form of contribution to the capital or management or both and prohibit one party benefiting at the cost of the other in sharing profits and losses. The partners are free to determine the ratio of profit and loss sharing, subject to the condition that, in the event of losses, they should be shared as per their capital contributions and profits for the financing partner (who is not taking part in management) cannot exceed his share in capital. Both can be securitised, particularly where the investments are vast. The investment can be divided equally in parts and *Mushãrakah / Mudãrabah* certificates can be issued to each contributor like debenture certificates. Under certain circumstances these certificates can be traded on the secondary market and hence can provide the much required liquidity for Islamic banks. Different *Shariah* experts have different opinions on the negotiability of these certificates. Some believe that if the investments are held in cash and assets, it can be traded at a value more than the asset value; while others believe that it cannot. For practical bankers, *Mushãrakah* and *Mudãrabah* can be used to finance import and export trade. They can also be used for financing transaction-based working capital needs. In cases where there are a few assets with business it is easy to use *Mushãrakah*, but when the business consists of large number of assets, the profit sharing can be done on the basis of gross profit rather than net profit and the entrepreneur can be compensated by increasing his share in the profit to account for the indirect costs. The provision of a daily overdraft is also theoretically possible using these instruments; however, practically they are difficult to use. However, there are some issues associated with these instruments which have resulted in making them less popular with bankers. The bank has a greater risk of loss when it uses these instruments and thus the shareholders will be reluctant to invest in them. Another problem can arise when the entrepreneur cheats the bank and does not disclose the true and fair financial status of the business. The differences between *Mushãrakah* and *Mudãrabah* are summarised in Table 1.3.

Murãbaha

Murãbaha is also referred to commonly as 'Cost-Plus Financing' or 'Mark-up'. According to Islamic jurisprudence, *Murãbaha* is a type of sale where

Table 1.3 Differences between *Mushãrakah* and *Mudãrabah*

Feature	*Mushãrakah*	*Mudãrabah*
Type of partners	All partners provide capital and contribute to the management; hence, there is only one type of partner.	Two types of partners, one who contributes the capital (*rabb-ul-mal*), the other who takes care of the management (*mudarib*).
Rights of management	All partners have the right of management. Partners have the right to surrender their right of management.	Financing partner (*rabb-ul-mal*) cannot take part in management. Management exclusively remains with non-financing partners (*mudarib*).
Sharing profits and losses	All partners share profits in agreed proportions and losses in the proportion of their capital contribution.	Partners share profits in agreed proportions and the financing partner (*rabb-ul-mal*) will share losses to the extent of his capital.
Liability	All partners have unlimited liability. They will have to bear the extra liability in the proportion of their capital.	The liability of financing partners (*rabb-ul-mal*) is limited to the extent of their capital contributions, whereas managing partners (*mudarib*) have unlimited liability.
Ownership of assets	All assets of the partnership business are jointly owned by all the partners.	The ownership of assets remains with financing partners (*rabb-ul-mal*) and the managing partners (*mudarib*) do not participate in the ownership of assets of the business.

the seller discloses the true cost of the products and then adds a mark-up to sell it at an agreed price. The profit can be based on a percentage or a certain fixed amount. It also allows spot and future payment; however, there is no apparent mention about the deferred payment in conventional Islamic jurisprudence. Since *Murãbaha* is a contract of sale and not a contract of loan, it should honour all the requirements of a valid contract of sale. First, the commodity should be an existing commodity and not one which is going

to be produced or cultivated or made in future and hence this is the ground for rejection of commodity futures in Islamic finance. Second, the seller must be the owner at the time of sale; that is, he must either have physical or constructive possession at the time of sale. Third, the sale cannot be conditional and the consideration must be certain at the time of entering into the contract. Fourth, the commodity must have value at the time of sale, and hence this is the ground for rejection of trading on 'index future'. *Bai'Mu'ajjal* is the deferred payment *Murãbaha*. Islamic jurisprudence allows certain protection to the seller in terms of delayed or unpaid instalments. In case the payment is delayed, the seller can charge some penalty; however, the amount recovered from the penalty should be used for charitable purposes. In the case of default in instalments, they may include a clause where remaining instalments can be claimed immediately. There can be clauses for having some security in the form of mortgage or lien. In banking, *Murãbaha* refers to a sale agreement whereby the bank purchases the goods and sells it to the customer at an agreed profit. The repayment can either be made in instalments or in a lump sum as decided at the time of the agreement. Due to the practical difficulties involved in using *Mushãrakah* and *Mudãrabah*, the *Shariah* experts permitted the use of *Murãbaha* under certain circumstances. *Shariah* experts are of the opinion that *Murãbaha* should not be treated as a mode of financing and should not be used on a long-term basis. Also, *Murãbaha* should be used where the customer needs the money for purchasing real commodities and not for any other purposes. This is the most common mode of financing used by Islamic banks. Almost all the Islamic banks use this to finance consumer goods, real estate, machinery, and equipment, and also sometimes for financing Letters of Credit. Legally, *Murãbaha* creates a series of relations depending on the stage of the contract (see chapter 2 for a detailed analysis). It begins with the relationship of promisor and promisee, which is then converted to buyer and seller. When the sale between the bank and the customer is finally affected, it creates a relationship of creditor and debtor.

Example A customer X of bank ABC wishes to purchase a car for $25,000 from a dealer. He approaches the bank with details regarding the make, model, and the details of the dealer. The bank enters into a preliminary contract, where customer X promises to buy the same car from the bank ABC for an agreed price of $32,000, payable in monthly instalments. The bank then purchases the car from the dealer at the agreed cost and adds its profit margin (cost-plus financing), depending on several parameters, including (but not limited to) total value, total time of financing, repayment terms, credit standing of the customer, and down payment made by the customer. Another contract is then made between the bank and the customer, where the bank sells the car to the customer and the customer agrees to

make the payment in the agreed number of instalments. At this stage, the relationship between the bank and the customer changes to creditor and debtor. Similar contracts can be made for furniture, electronics, personal computers, machinery, equipment, and ships. The effect of these changing relationships on risks in the contract is illustrated in chapter 2.

Salam

Salam is also known as 'forward sale'. *Salam* was originally allowed to meet the needs of small farmers who needed money during the harvesting period to meet expenses for harvesting as well as to maintain their family. Since borrowing on interest was not permitted, they were allowed to use forward sales. It was also used originally for the import and export trade in the Arab region. As discussed in the previous paragraphs, according to Islamic jurisprudence the essential conditions of a valid sale include that the commodity should be ready at the time of the sale. However, *Salam* and *Istisnã* (which is explained in the next section), are the two exceptions which are permitted according to Islamic *fiqh*. Hence, *Salam* is a contract of forward sale, whereby a commodity is sold on a future date, for which the complete price is paid on the spot. In this case, the price is paid in cash and the delivery is deferred. The buyer is called the *rabb-us-salam*, and the seller is called the *muslam ilaih*. *Salam* is permitted under certain conditions: 1) The price should be paid in full and on the spot. 2) It can be used for specific products and it can be used for commodities which can be clearly explained in quantity and quality. 3) The time and place of delivering the commodity should be specific. 4) *Salam* cannot be used for barter transactions. Regarding the time of delivery, opinions are divided. Some Islamic scholars feel that the time of delivery should not be less than one month, whereas other scholars feel there is no minimum period. Traditional Islamic jurists have maintained that the price of *Salam* should be lower than the spot price, whereas contemporary Islamic scholars believe that the price can be decided as per the free will of buyer and seller. The unique feature of *Salam* is the confirmed delivery. The seller should deliver the goods on the specified date. Salam does not include gold, silver, and currencies. Bankers can use *Salam* to finance the agricultural sector. It can also be used for financing commercial and industrial activities, operational costs, and capital goods. There can be several applications of *Salam*, depending on the circumstances. It should be noted that *Salam* exposes banks to market risk, especially fluctuations in the commodity prices (a detailed risk analysis of *Salam* can be found in chapter 2 and market risk in chapter 5). Banks are not very happy to take the delivery of the commodity which is a necessary condition in the *Salam*. To avoid this, modern bankers are using the *Parallel Salam*, where a bank enters into two simultaneous agreements for the same

future date, one as a buyer and the other as a seller. *Parallel Salam* will be discussed in the following paragraph with the help of an example. *Parallel Salam* takes care of commodity price fluctuations to a certain extent, but still requires managing the risks from the non-delivery of the commodity on the due date.

Example – *parallel Salam* A customer X of bank ABC wishes to arrange for a forward sale of his crops. The bank enters into a *Salam* contract (first contract) where it provides the required finance and in return agrees to purchase the crop from customer X after a specified time. The situation primarily benefits both parties. Customer X is relieved of the burden of repayment of the amount borrowed as he does not have to repay the same as cash, and secondly he has sold a certain part (or all) of the produce, thereby reducing the uncertainty of the sale in the future. The bank can benefit by simultaneously entering into another *Salam* contract (*Parallel Salam*) to sell the crop to a third party, thus minimising its risk. The possible price fluctuation in the market price of the crop (market risk) can be marginalised by entering into parallel *Salam*. The bank is thus left with facing the risk of not getting the right quality or of non-delivery of the crop on time. To shield itself against this, the bank can include necessary compensation clauses in the first contract. A detailed analysis of risks and their management for a *Salam* contract is presented in chapter 2.

Istisnã

Istisnã is also known as 'progressive financing'. It is also called purchase by order. As discussed in the previous paragraph, the two exceptions to the sale contracts in Islamic finance are *Salam* and *Istisnã*. *Istisnã* is the second method of sale where the commodities can be sold before they are ready. *Istisnã* is applied for goods made-to-order. It is an agreement aimed at forward contracts in manufactured goods. It allows for on-the-spot payment and deferred delivery or a deferred payment and a deferred delivery. There is a provision of deferred payment in instalments. This flexible combination makes it a popular tool for Islamic banks. In most of the cases the payment is made periodically as per the progress in manufacturing or construction. Banks use *Istisnã* to finance construction activities as well as manufacturing activities. Several banks have successfully integrated *Istisnã* for real-estate financing. Banks can use this to finance capital-intensive goods by entering into two contracts, one with the customer who wishes to have the goods and the other with the manufacturer to produce the goods. The government can use *Istisnã* for developing infrastructure by using the Build-Operate-Transfer (BOT) basis. For example, a highway can be constructed on BOT basis by entering into *Istisnã* with a construction company. In this case, the price of

Istisnã can be the right of the construction company to maintain the highway and collect tolls for a fixed period of time.

Example A customer X wants to purchase a ship. Bank ABC agrees to provide the financing using *Istisnã*, where is enters into a contract with the ship manufacturer to manufacture the specified ship and agrees to provide the finance in instalments, depending on the progress in manufacturing. The bank also enters into another contract simultaneously with customer Y to sell the specified ship at an agreed price. Inherent risks in this type of transaction are discussed in detail in chapter 2.

Note It might appear that *Salam* and *Istisnã* are both sales contracts where the commodity is not ready and hence are similar; however, it should be noted that there are some important differences between *Salam* and *Istisnã*. These differences are:

1. *Salam* can be used for almost all types of commodities, excluding gold, silver, and currencies; however, *Istisnã* can only be used for commodities which require manufacturing.

2. *Salam* price is always paid in advance; whereas the price of *Istisnã* can be paid either in advance or in the future.

3. *Salam* price is always paid in full; whereas the price for *Istisnã* can be paid in instalments.

4. *Salam* contracts cannot be cancelled unilaterally.

5. The delivery date is fixed in *Salam*; whereas in *Istisnã* the delivery date need not be fixed.

6. The material and manufacturer can be fixed by the buyer in *Istisnã*; whereas in *Salam* this cannot be fixed.

Ijãrah

Ijãrah is also commonly known as leasing. There are two connotations in Islamic jurisprudence for *Ijãrah*: one is for hiring services and another is for assets and properties. In the first case, the service can be hired and the reward can be paid for labour. In the second, *Ijãrah* refers to the sale of a definite usufruct in return for a definite reward. Since the first type of *Ijãrah* is not used in Islamic banking, the discussion will be restricted to the second connotation. For a bank, the second connotation is more important and applicable. Banks can use *Ijãrah* for leasing equipment, machinery, vehicles, and other assets. The lessor in this case is called '*mu'jir*', and the lessee is called

'*musta'jir*'. *Ijãrah* is subject to certain rules as provided by Islamic *fiqh*:

1. The subject of the lease must have a useful value.
2. The ownership of the asset should remain with the lessor and only the right to use the asset should be transferred to the lessee.
3. The liabilities pertaining to the ownership remain with the lessor; whereas the liabilities pertaining to the use are with the lessee.
4. The period of lease must be pre-defined.
5. A jointly-owned property can be leased and the lease rental must be shared in the proportion of their share in the property.
6. The consideration for the lease (rental) should be determined in the beginning.
7. The lease period will begin subject to delivery of the leased asset and not the date of commencement of use of the asset by the lessee.

Ijãrah can be used for a future date, subject to the condition that the payment of rent will begin only after the delivery of the leased asset. The number of contracts required in *Ijãrah* can be limited to one; unlike *Murãbaha*, where more than two contracts are needed. For long-term leases the bank can use a variable rental. This rental can be based on a fixed percentage increase after a specific period. Another alternative is to break down the lease period into smaller periods and, after the expiry of the first period, both the parties can mutually decide the rental for the next period. A third alternative, which has been proposed by several Islamic scholars, is tying up the rental with some benchmark rate, such as inflation rate, or tax rate, or bank rate. For example, the rental can be benchmarked to LIBOR and thus can be revised periodically. There are several criticisms to such benchmarking, especially to the interest rates, and thus it is highly debatable. Some scholars consider interest rate benchmarking as similar to lending on interest. To overcome this argument, moderators have suggested that a ceiling on the highest and lowest rental can be fixed, which removes the *Gharar* and thus ensures both the parties clear liabilities. In the case of delayed rental payments, the lessee can be charged some penalty which should be used by the lessor for charitable purposes. Insurance remains the responsibility of the lessor. Transfer of the leased asset after the leasing period can be handled in two ways – *Ijãrah* '*thumma al-bai*' (leasing and subsequently purchase) where the hirer uses the goods on payment of lease fees and purchases the goods from the lessor at an agreed price; and *Ijãrah* '*wa Iqtina*' (lease to purchase), where the lessee is committed to purchase the

goods at the end of the lease period and the rentals are considered to be a part of the purchase price. Islamic scholars are divided on this issue. According to *Shariah* experts, having two contracts – one for lease and the other for buying, where one is dependent on the fulfilment of the other – is tantamount to violation of Islamic principle and hence cannot be permitted. *Ijãrah* contracts can be securitised and hence can have secondary markets. This is primarily because the lessor remains the owner throughout the period of the lease. In the case of very high value *Ijãrah*, the bank can issue *Ijãrah* certificates, where each certificate can represent a fixed part of ownership and the rental can thus be proportionately divided among the certificate holders. Since these certificates would represent definite ownership, they can be traded and made negotiable. Hence, *Ijãrah* certificates can be used as a tool to manage the liquidity problem, which is a critical issue for Islamic banks.

Example An airline approaches ABC bank to finance the purchase of an Airbus aircraft costing approximately $80 billion US. The bank arranges to lease the aircraft to the airline using *Ijãrah* and securitises it as *Ijãrah* certificates. The risks in this transaction are discussed in detail in chapter 2.

Sukûk

Sukûk is also commonly known as Islamic Bonds. *Sukûk* are asset-backed, stable-income (fixed and floating), *Shariah*-compliant trust certificates. A primary requirement for *Sukûk* is the existence of the asset on the balance sheet. Scholars point out that the assets should not represent other Islamic debt contracts. The AAOIFI §17 describes the *Sukûk* as, 'certificates of equal value representing, after closing subscription, receipt of the value of the certificates and putting it to use as planned, common title to shares and rights in tangible assets, usufructs and services, or equity of a given project or equity of a special investment activity'. *Sukûk* claims are not on the returns but are on the ownership. The holder of *Sukûk* holds ownership rights and responsibilities in relation to the underlying asset. Before undertaking any further discussions on *Sukûk*, it is important to note basic differences between conventional bonds and *Sukûk*. A bond is essentially a contractual debt obligation, whereas *Sukûk* is not. *Sukûk* holders are entitled to share the profits generated from underlying assets as well as share sale proceeds of these assets on liquidation. Bond holders do not share the losses, whereas *Sukûk* holders are under obligation to also share the losses. When the *Sukûk* represents a debt, it is not negotiable; unlike bonds, which are generally negotiable. A strong secondary market exists for bonds, but, at the time of writing this book, there is no visible organised secondary market for *Sukûk*.

Globally, *Sukûk* is used more for sovereign issues rather than corporate issues; however, this trend is now changing, with more and

more corporates opting for *Sukûk*. The *Sukûk* can be medium- to long-term and can have fixed or variable rates of return. They are also rated by international rating agencies like their counterpart bonds. And like bonds they provide regular income streams and can enjoy capital appreciation. The model of *Sukûk* is similar to the conventional bond issue, where a Special Purpose Vehicle (SPV) is set up to acquire assets and issue financial claims. There are several types of *Sukûk* issued according to the preferences of the issuer and investor. AAOIFI has issued a standard for fourteen types of *Sukûk*, grouped as tradeable and non-tradeable. The most common *Sukûk* at the time of writing this book are: *Mushãrakah Sukûk*, *Ijãrah Sukûk*, *Istisnã Sukûk*, *Murãbaha Sukûk*, and *Mudãrabah Sukûk*. Nearly half of the *Sukûk* issued globally during 2004–2006 belonged to the category *Mushãrakah Sukûk*. In terms of value, the largest *Sukûk* until April 2007 was by the Ports, Customs & Free Zone Corporation, Dubai, for $2.8 billion in January 2006. A large number of *Sukûk* have been concentrated in the Middle East, with UAE and Bahrain accounting for the largest shares. As for maturity, the longest tenure *Sukûk* of 14 years has been issued by KSA MBS 1 International *Sukûk* for $18 million in July 2006. But most of the *Sukûk* have less than a 5-year maturity. A handful of them have been rated by international rating agencies. The market for *Sukûk* has been expanding rapidly and is now becoming popular with corporates. Table 1.4 presents a summary of the top 10 of recent *Sukûk* issues based on size.

Other than the instruments discussed above, there are several variants of different products/features available in the market used by banks and financial institutions as per circumstances. Some of the popular ones are briefly described below:

Hibah: It is a form of gift used to repay account holders in an Islamic bank. Current accounts and savings account holders in an Islamic bank do not get any interest; however, at the end of the year the bank can give some *hibah* as a part of its compensation to the account holders.

Musawamah: It is very similar to *Murãbaha*, except that the seller need not disclose his cost of goods. All other terms are similar to the *Murãbaha*.

Qard Hassan: It is a loan on a goodwill basis which is totally free of any extra cost. The debtor is required to return only the principal borrowed amount, although he may return anything extra, whatever he feels appropriate. Thus, this is a true *Riba*-free loan.

Takaful: It is an Islamic insurance. It is one of the oldest concepts in Islamic finance. It is based on pooling the risks together in order to enjoy what is called the law of large numbers.

Table 1.4 Top 10 *Sukûk* until February 2007 based on size

Issuer	*Issue date*	*Country*	*Issue size (US$ Mill)*	*Tenure*
PCFC Sukûk (Corporate)	6 Jan	United Arab Emirates	3,500	2 Years
Dubai Global Sukûk FZCO	4 Nov	United Arab Emirates	1,000	5 Years
ADIB Sukûk Company	6 Dec	United Arab Emirates	800	5 Years
SABIC Sukûk	6 Jul	Kingdom of Saudi Arabia	800	
DIB Sukûk Company	7 Feb	United Arab Emirates	750	5 Years
Government of Qatar (Govt)	3 Sep	Qatar	700	7 Years
DAAR International Sukûk Company	7 Jan	Kingdom of Saudi Arabia	600	3 Years
Pakistan International Sukûk Co. Ltd. (Govt)	5 Jan	Pakistan	600	
Malaysia Global Sukûk (Govt)	2 Jul	Malaysia	600	5 Years
Wings FZCO (Corporate)	5 Jun	United Arab Emirates	550	

Source: Data sourced from Liquidity Management Centre BSC (c), Bahrain. Latest data can be accessed at http://www.lmcbahrain.com/

Wadiah: In this case the bank works as the trustee for funds of customers. The bank does not guarantee any interest but can give some *hibah*, which can compensate the customers.

Wakalah: It is a relationship between principal and agent. When a person appoints someone else as his agent, he uses *wakalah*.

SUMMARY

The network of financial obligations running through the chain of financial intermediaries creates numerous risk exposures. The focus of conventional

financial institutions has been on the monetarisation of activities of finance with the aim of improving global standards and having better stability. Islamic financial scholars have tended to disagree with the conventional finance due to the inherent social role of finance in Islam. The four main reasons for the evolution of Islamic finance are: prohibition of *Riba*, avoidance of *Gharar*, prohibition of *Haram* activities in business, and payment of the *Zakat*. The focus of Islamic finance has been on welfare, equality, and justice. Several alternative methods of financing have been developed, keeping in mind these objectives. Islamic Development Bank (IDB) and Dubai Islamic Bank (DIB) are among the first few Islamic financial institutions which were set up during the seventies. Several countries have adopted Islamic finance as the core financial activity, including Sudan, Iran, and Pakistan. In other countries there have been a parallel run of conventional and Islamic financial activities, either in the form of full Islamic institutions or through an Islamic window operated by conventional banks.

Although the basic concepts of accounting remain the same for conventional as well as Islamic banking, there are differences in terms of grouping of the assets and liabilities. The inclusion of *Zakat* in the accounting and the treatment of it has been a debatable issue and they are looked at from various view-points. Non-recognition of interest (*Riba*) in Islamic banking makes the difference in accounting, since the interest income and expenses are not accounted for. Due to the recent origin of structured and systematic Islamic financial activities, the international standards for accounting have been developed recently by AAOIFI. These standards are under development and are not mandatory and hence not widely used.

Profit without participating in the actual business activities is not considered to be ethical and hence Islamic finance has a strong reliance on the PLS as a mode of financing. The relationship between lender and borrower should be of partners and not just creditor and debtor. There has always been strong insistence from Islamic financial experts on PLS to provide finance. The use of PLS has been rather limited and debatable. High disclosure requirements, difficulties in monitoring the performance of the financed projects, as well as limited opportunities for re-investment of retained earnings, are some of the reasons for the non-popularity of the PLS. PLS contracts appear to be riskier for banks and thus have been avoided.

There are a large variety of Islamic financial products. A large number of them have been created by banks in order to meet the local and situational needs. The more common ones are: *Mushãrakah*, *Mudãrabah*, *Murãbaha*, *Salam*, *Istisnã*, and *Ijãrah*. *Sukûk*, the Islamic bond, is gaining popularity with the corporates as well as governments. *Mushãrakah* and *Mudãrabah* are the two common forms of PLS contracts in Islamic banking. Both involve partnership of financing institution and client. In both types of contract, the bank needs to provide the capital. In *Mushãrakah*, the bank may

not participate in the management; whereas in *Mudãrabah* it does not have the right to participate in the management of the business. This basic difference between the two has implications on the risk exposures of the bank. *Salam* and *Istisnã* are the two exceptions to the forward sale, which is not permitted in Islamic finance. *Salam* was originally used for financing the needs of the farmers. In the case of *Salam*, the price for the commodity is paid fully on the spot, but the delivery is scheduled for a future date. There is no provision for deferred payment in *Salam*. For manufactured goods and projects under construction, *Istisnã* is used, where the payment can be made in trenches to the contracting party. Under both contracts, the delivery is scheduled for a future date. *Istisnã* can be used by the government to build infrastructure on a BOT basis. *Ijãrah* is leasing in Islamic finance. There are two types of *Ijãrah*, one where the lessee commits to purchase the asset at the end of the leasing period (known as *Ijãrah wa Iqtina*) and the other where he has an option to purchase (known as *Ijãrah thumma al bai*). *Ijãrah* contracts can be securitised and have a secondary market. In the case of high-value *Ijãrah*, the bank can issue *Ijãrah* certificates which can be traded on the secondary market since they represent claims over an asset. *Sukûk* is a very important tool for liquidity management in Islamic finance. It can either be issued based on debts, in which case they are non-negotiable and must be held until maturity, or on equity, in which case they are negotiable and need not be held until maturity. The global *Sukûk* market is expanding rapidly, with several large *Sukûk* issues in the recent past.

NOTES

1. Bankhaus Herstatt in 1974, closed for the business after its banking licencse was withdrawn before settling its claims to counterparties. This type of settlement risk, in which one party in a foreign exchange trade pays out the currency it sold, but does not receive the currency it bought, is sometimes called Herstatt risk (Source: Herstatt Risk reference http://riskinstitute.ch/134710.htm).
2. Islamic finance is constantly evolving and has several dimensions and interpretations. We have attempted to represent the most widely accepted views for all the discussion, with all due respect to alternativee views presented by different schools of thoughts and different Islamic scholars.
3. Every Muslim must pay a portion of their wealth to weaker sections of the society if his annual wealth exceeds a minimum level. *Zakat* is one of the five Pillars of Islam and is obligatory.
4. Almost every ruling of Shariah can be linked to one or more schools of thought, but discussing them is beyond the scope of this book, and hence the references have been generic and not specific.
5. I. Akkizidis and K. Sunil, 'Risky Business', *Islamic Business and Finance*, (2007), pp. 32–34.
6. A. Habib, 'Incentive-compatible profit-sharing contracts: a theoretical treatment', *Islamic Banking and Finance*, (Ed) by Munawar Iqbal and David T. Llewellyn, Edward Elgar, UK (2002).
7. M. Iqbal and P. Molyneux, *Thirty Years of Islamic Banking: History, Performance, and Prospects* (Basingstoke: Palgrave Macmillan, 2005).
8. M. Abalkhail and J. R. Presley, 'How informal risk capital investors manage asymmetric information in profit/loss-sharing contracts', *Islamic Banking and Finance*, (Ed) by Munawar Iqbal and David T. Llewellyn, Edward Elgar, UK.

CHAPTER 2

Risk Management Issues in Islamic Financial Contracts

INTRODUCTION

Risks are part and parcel of financial intermediation. The survival and success of a financial organisation depends on the efficiency with which it can manage its risks. Risk management is one of the critical factors in providing better returns to the shareholders. It is also a necessity for stability of the overall financial system. This chapter is an attempt to understand various risks associated with Islamic finance in general and Islamic banking products in particular. Increasing complexity and convergence of financial activities has resulted in multiplicity of risks. The three most common forms of risks – credit, market and operational, which occupy the maximum attention of the financial community – are explained in brief in this chapter. The Islamic financial industry has a different orientation towards risks. The risks are more aligned on the basis of contract types as a result of the special structuring of the contracts in Islamic banking. Profit and loss sharing is the nature of some of the Islamic financial contracts, along with the changing relationships of parties during the lifetime of the contract. These expose them to specific types of risks. These risks are specific to the contract types. This chapter thus presents and explains the different types of risks arising from the *Mushãrakah*, *Mudãrabah*, *Murãbaha, Salam, Istisnã, and Ijãrah* Islamic financial products, elaborated with the help of graphs and examples. Furthermore, it highlights how financial institutions that provide such Islamic financial contracts are exposed to these corresponding underlying risks, as well as how they can manage them.

The risks that are initiated by the *Mushãrakah* partnership, which are based on capital and business management contribution between the financial institution and an agent, are discussed in this chapter. Such joint-venture contracts that combine two forms of contracts – the *Permanent Mushãrakah* and the *Diminishing Mushãrakah*, according to the participation in the equity, i.e. permanent or limited – are dealt with extensively. The different exposures of the financial institutions to credit, operational, market, and liquidity risks, whether the financial institution is employing the *Permanent* or *Diminishing Mushãrakah* contracts, is also presented in this part of the chapter. Due to some differences in the structuring of the *Mushãrakah* and *Mudãrabah* contracts, an analysis of a *Mudãrabah* agreement along with the differences between the two in terms of risk exposures is also presented in this chapter.

The main structure of the *Murãbaha* agreement is explained which is based on the interrelations between the three parties: the financial institution, the buyer (client), and the seller. Consequently, the financial institution is exposed to operational risk in the *Murãbaha* contract because of the inability of the buyer to keep its promise to purchase the commodity. Furthermore, credit risk initiated from the buyer defaulting to pay the fixed repayments together with the consequences of liquidity risk is also presented and discussed. Finally, the exposure to market risks due to commodity price fluctuation before and after the financial institution is reselling the commodity as well as due to benchmark or mark-up risks are also highlighted.

This chapter also illustrates various aspects referring to *Salam* contracts, where the financial institution makes advance payment, but the delivery from the seller is set at a future date. The different types of risks, including credit, operational, market – with regards to commodity price fluctuation and mark-up risk – and liquidity that financial institutions face by providing *Salam* contracts are shown. Different approaches on how to manage the above-mentioned risks are also featured.

The structure and risk issues of the *Istisnã* financial contract that involves the financial institution, the producer (manufacturer), and the buyer/user of a commodity are also presented in this chapter. The main differences between the *Istisnã* and *Salam* contracts are introduced. Furthermore, this part of the chapter discusses the main risks initiated by the *Istisnã* contracts. These risks, which include operational, liquidity, and reputational, are explained accordingly, together with their resulting losses on financial and business institutions. Mark-up risk is particularly discussed, as it can be the main factor for additional losses due to market price fluctuations of the commodities and constructed assets that are exchanged in the *Istisnã* contracts. Strategies and techniques on how to minimise the risks arising from the *Istisnã* financial contracts are proposed.

The leasing financial contract called *Ijãrah* is also presented in this chapter. The different types of risks involved in *Ijãrah* contracts are featured. Thus, the exposure of financial institutions to credit risk due to the lessee's defaults is presented. Operational risks due to catastrophic events as well as any damages to the assets on the return (maturity) date are related to the fact that the financial institution continues to own the assets in *Ijãrah* contracts. Furthermore, the exposure of the financial institutions to market risk, which is initiated from the price fluctuation of the commodities in *Ijãrah* contracts, is illustrated. Finally, there is a discussion concerning additional credit and market risks that arise when the payment is set to the maturity date.

Sukûk, the financial vehicle for Islamic institutions to raise funds, will be discussed in this chapter. Due to the availability of a large variety of *Sukûk* in the market, the discussion on risk management is beyond the scope of this book and hence has not been dealt with.

In addition, graphical representations showing all cash flows in and cash flows out of the Islamic financial contracts together with their associated risks and losses during their lifetime are illustrated. Note that, in the figures showing the different Islamic contracts, the directions of the arrows (up and down) represent the cash-out and cash-in or delivery-in, respectively. Meanwhile, the triple line arrows facing up represent the associated losses that are covered by the institution. Note, finally, that the analysis is always performed from the point of view of the financial institution.

As nowadays, the structure of the Islamic contracts is updated and enhanced with more elements and conditions; institutions that are providing Islamic financial contracts should be able to identity the types of risks that they face by employing such contracts. The aim of this chapter is to show generic means to break down the Islamic financial products in a way that can be analysed in terms of the risks that may arise during their lifetime. Institutions may provide more advanced or updated contracts, based on those that are presented in this chapter (*Mushãrakah*, *Mudãrabah, Murãbaha, Salam, Ijãrah*, and *Istisnã*), and thus they must be able to identify the corresponding financial risks. Guides to these identifications are presented in this chapter.

AN OVERVIEW OF FINANCIAL RISKS

Financial intermediation creates a series of financial inter-linkages, which results in financial obligations. Individual economic units are interconnected to each other through the money market intermediaries. There can be disruptions at this level which can create uncertainty and hence the risk. These individual entities are linked to each other via local money market. Local money market contributes its own share of fluctuations and disturbances. Due to the

global nature of trade, local money markets are connected to each other. The micro- and macro-economic factors on the global level further add to the uncertainty. Since all the financial entities are directly or indirectly interwoven, interlinked, and interrelated, they create a complicated maze of uncertainties which makes up the mass of the financial risk. Something which can be predicted accurately generally does not involve risk; it is unpredictability which is the risk creator. The higher the degree of uncertainty, the higher is the risk. Risks should not really exist in a market where there is perfect information symmetry. But this is wishful thinking. Information asymmetry is an integral and unavoidable part of the market. Asymmetry leads to uncertainty, which is one of the causes of risk. Events which are certain are generally out of the purview of risk. Multiplicity of outcomes with an uncertain chance of occurring results in risks. If a coin has both the sides marked as 'heads' it poses no risk as the result is certain. The choice of two alternatives, 'heads' and 'tails', with no certainty of the happening or non-happening of a specific event, result in a risk element. The risks cannot be eliminated, they can be managed. The element of risk also brings opportunities, and, to gain from these opportunities, the risks are required to be managed efficiently. Banks, due to their typical nature, carry special risks. For a bank, some of the risks can turn into losses and may even cause liquidation problems. A risk is in many cases hidden before it is visible as a loss. Risk and return are usually correlated. A bank with a conservative approach may not utilise the funds fully and thus have a higher cost of capital, whereas a bank with huge risk appetite can over-lend, thereby increasing the chances of a failure. At the same time, pricing the loans is also largely based on risk. A risky loan which is under-priced may prove to be a drag on the profitability, whereas a sound loan which is over-priced may shy away good customers, leading to loss of business.

At the level of the enterprise, the risks can be grouped into financial, business, and operational risks. Financial risks will generally include credit, market, and liquidity risk. Business risk is a combination of management risk and strategic risk. The operational risk can arise due to people, processes, systems, as well as several other factors. Some of the other relevant risks for the financial industry can be commodity risk relating to the changes in the prices of concerned commodities, country risk relating to the changes in the country rating, equity market risk relating to changes in the value of equity investments, reputational risk relating to the adverse events which can affect the organisational reputation, legal risk relating to issues related to legislations, political risk relating to adverse changes in political situations, concentration risk relating to grouping of several unfavourable risks together, regulatory risk relating to non-compliance to regulatory requirements, and systemic risk related to interconnected unfavourable events across the industry. For the purpose of this book, the three major

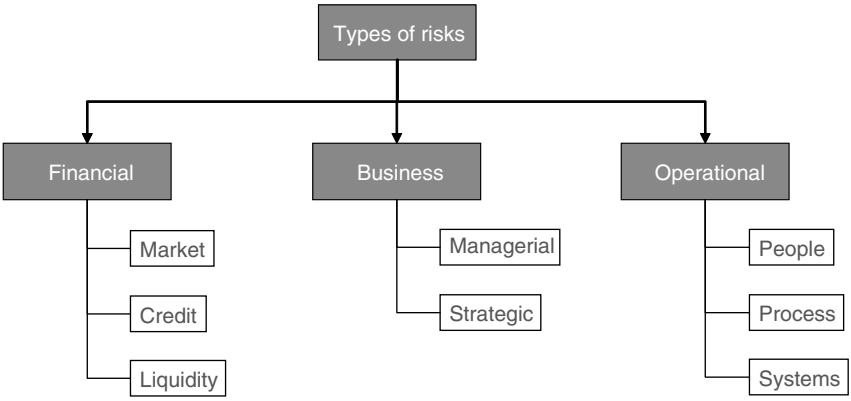

Figure 2.1 Major types of risks in the financial industry

risks – credit risk, market risk, and operational risk – will be considered in the discussion with reference to other risks, e.g. liquidity risk, wherever necessary. Figure 2.1 presents the more common categories of risks.

With the fast-changing landscape of financial services in banking and financial sectors in the last three decades, there is a shift of focus on the development of Islamic banking. The original issue in the seventies of developing an interest-free financial system is no more of prime importance for Islamic bankers. The core issue is currently to develop an Islamic financial system which does not suffer from the weaknesses of the conventional system. Thus, the focus has suddenly shifted to liquidity management, risk management, and common standards in Islamic finance.

Credit risk

Credit risk is simply defined as the potential that a borrower or counterparty will fail to meet its obligation in accordance with agreed terms.[1] It is the risk of failure of the counterparty to honour their commitment, and is also referred to as default risk. This arises from the inability of the counterparty to service the debt on agreed terms. It can also arise when the solvency or the credit rating of the counterparty changes adversely. In Islamic banking there is a limited availability of credit ratings defined from external agencies. This book therefore is more emphasizing in the direct credit risk from the counterparty rather on the risk of changing in the credit ratings. Credit risk is one of the earliest recognised risks in the financial industry. During the early eighties, a large part of a bank's profit came from lending businesses; hence, the focus was primarily on credit risk. Credit risk exists for complete portfolio as well as individual accounts. It is important for banks to recognise such risks since a few large counterparty failures can lead to

serious consequences. Credit risk cannot be accurately calculated before the event since the likelihood of default is highly uncertain and thus is difficult to predict accurately. Although there are developments in the calculation of credit risks, the major difficulty remains with the availability of the data. Several standard measures have been developed over the years to calculate the credit-worthiness of the project and the client. Rating agencies have played a significant role in standardising the understanding of credit risk, although they have failed to predict major failures. Rating agencies such as Moody's, Standard & Poor's, and Fitch have developed elaborate techniques to rate projects and parties. Ratings are based on several factors and rating by one or more of these rating agencies is generally available to large issues or issuers. Due to the absence of rating facilities for small customers and projects, banks have their own in-house-developed rating standards, which are used to rate their customers and the projects. Ratings are a relative measure of risk and hence not largely useful for accurately measuring the probability of default. The first challenge is modelling the probability of default directly with credit risk models and the second is capturing portfolio effect in credit risk measurement.[2] In the case of credit risk, controls are required at credit portfolio levels. The risk categories for credit risk include different levels and segments of credit such that the maximum total loss in case of credit risks is limited to the total exposure of the credit volume. In some cases credit risk can be related to other risks, such as market risk and operational risk. In transactions involving cross-border trade, credit risks cover country risks as well as political risks. Credit risk can also acquire the dimension of concentration risk when counterparties having similar risk profiles group together.

Market risk

Market risk is the risk of losses in on- and off-balance-sheet positions arising from movements in market prices, interest rates, FX rates, and equity values[3] where these are the main four market risk factors. Market risk was recognised in the late eighties after the increasing importance of stock markets when banks started investing heavily into securities. The exposures grew and thus the discomfort of possible losses from changes in underlying prices. Since banks deal in several currencies across different markets in the world, they are exposed to the fluctuations in national and international interest rates. Banks are also exposed to changes in foreign exchange positions, which can apply to transactions as well as assets which are denominated in foreign currencies. Foreign exchange rate risk can also arise from the unfavourable revaluation of the trading currencies. Investment in equities by banks is exposed to changes in the equity prices. Finally, commodity price changes, where the bank has some interests, can affect the position adversely. Market risk is difficult to measure due to diversified portfolios, since it will

consist of several markets, currencies, indexes, and instruments. The larger the diversification of the portfolio, the more difficult it is to accurately estimate market risks due to the correlation between different risks. There are several ways to measure and manage market risk. Most of the banks have limits and triggers for foreign exchange transactions. Factor sensitivities and VaR can be used for marked-to-market trading. The market is full of complex derivative products for hedging the positions to manage the risk. Stress testing and other financial models are used for better understanding of market risk. The maximum loss method has been developed to estimate risk for non-linear portfolios. In the case of market risk, the controls are required at the trading desk and portfolio level. The risk categories for market risk include different interest rate categories, various foreign exchange markets, and different market commodities. The maximum total loss in case of market risk is limited to the market value of the security.

Operational risk

Operational risk is defined as the risk of loss resulting from inadequate or failed internal processes, people, and systems or from external events. This definition includes legal risk, but excludes strategic and reputational risk.[4] Operational risk has been recently recognised and has been gaining prominence among risk-related research. The three major components of operational risk are people, processes, technology, or some other external events (usually catastrophic). People's risks include human errors, lack of expertise, compliance, and fraud. Process risks include risks related to different aspects of running a business, which may include regular business processes, risks related to new products and services, inadequate/insufficient control, etc. Failures related to systems are included in technology risks. Operational risk is rather difficult to measure and manage. Often, these risks only become apparent once a problem arises.[5] The recent focus of risk experts has been operational risk. The wide range of activities included in operational risk makes it difficult to apply a standard model to all organisations and hence there is a lack of universally accepted standard models. While the industry is far from converging on a set of standard models, the banks have developed or are developing models relying on a similar set of risk factors. Those factors include internal audit ratings or internal control self-assessments, operational risk indicators such as volume, turnover, or rate of errors, loss experience, and income volatility.[6] The quantification of various loss events related to a wide range of activities is a difficult task, which is currently under exploration by the risk community. A daunting task is to classify the loss events in operational risk and several such classifications are available. Basel II guidelines (see chapter 3 for details) has published a scheme which can be taken as a foundation to develop it further based on the

individual needs of the organisation. The most ideal and simplified ways of controlling operational risk can be internal audits and internal controls. In the case of operational risk, the controls are required at business process levels. The risk categories for operational risk include different business lines and loss event types (for more details on loss event types see chapters 3 and 6). Operational risk is becoming a critical factor in risk management since the maximum total loss in case of operational risk can extend to the bank's liquidation value.

The role of information in risk management

It would be impossible to monitor, measure, manage, and mitigate the risk without sufficient, timely, and accurate information. The monitoring of the cash flows and the calculation of credit risk, market risk, and operational risk heavily depends on the appropriate information systems and availability of information. Information collection, processing, and preserving plays an important role in all stages of risk management (Figure 2.2). Information is generated at all stages of activities in a financial institution and collecting it at the point of origin will ensure accuracy and reliability. Credit risk is heavily dependent on information since the assessment of credit-worthiness of project or client depends on the information available for processing. In market risk, liquidation analysis, and ALM (Asset Liability Management) the information referring to financial contracts is playing a key role in the estimation of the current and future cash flows. Operational risk also relies

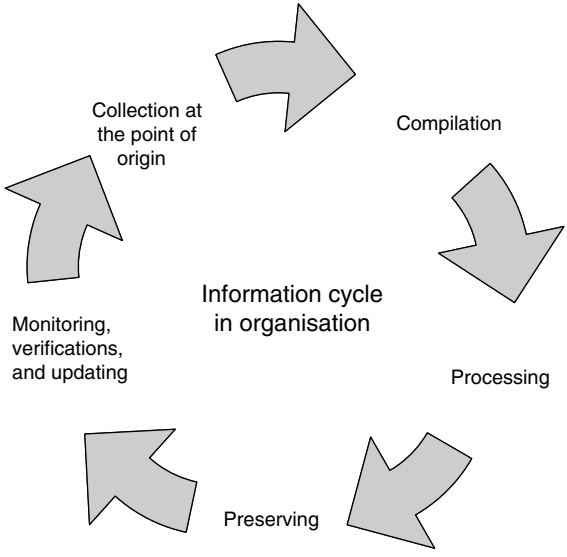

Figure 2.2 Information management in organisations

heavily on collection of information in regards to the performance of process, systems, and people within the institution. Loss data bases are used in evaluating all types of risks. Stress and back-testing are fully dependent on information data and systems. Capital allocation required by an institution is related to its risk exposures, and since assessing risk exposures is related to information availability, efficient allocation of capital depends on information management. Proper information will help the bank in unpacking risk components and allocating capital efficiently.

Another dimension of risks can be the interaction and mutation of risks. Some of the risks can work as an initiator for other risks. Sometimes the risks combine with each other, thus a new risk emerges. For example, the risk on investments consists of credit risk as well as market risk. A change in the value of the investment is a market risk, whereas downgrading of the investment by rating agency will involve credit risk. Similarly, the inability to manage market risk can be considered as an operational risk rather than a pure market risk. To what extent this needs to be allocated using market risk methodology and operational risk methodology is complicated to determine. The inability to monitor and manage the different types of risks can be considered as a failure of people and hence in some form can contribute to operational risks. This is a grey area of risk management and additional research is required. While allocating capital to manage risks, this merging of risks can cause duplicate allocations and thus finally increase the capital allocation. The management of overlapping of capital allocations across different risks is an area requiring further probing.

IDENTIFYING RISKS IN ISLAMIC FINANCE

A common perception about Islamic banking is that it is safer since it is not based on interest rates. Also, there is an argument that several of its products are using a mark-up arrangement, and hence they carry less risk. Both these points of view are not entirely correct and are understatements. Although Islamic banks are not directly affected by fluctuations in interest rates, they are indirectly affected through lease, mark-up, and deferred sale. As discussed in the previous chapter (chapter 1), Islamic financing relies more on equity financing rather than debt financing and hence inherently is riskier. There are several reasons why Islamic banking can be riskier than conventional banking. Sundararajan and Errico[7] point out several of them, including the specific nature of risk faced by Islamic banks and the virtually unlimited number of ways to finance a project using either PLS or non-PLS contracts. Along with this, the *Shariah* rulings can create a large variety of contracts. PLS contracts fundamentally increase the risk as they are difficult to monitor. The lack of standardisation due to the availability of a large number of ways to finance is

another factor that renders Islamic banking riskier. There is no legal caveat to control the relationship with the entrepreneur, especially when financed through *Mudãrabah*, although the bank can exercise some control over the working of the enterprise if financed through *Mushãrakah*. Added to this, scarcity of hedging instruments, underdeveloped inter-bank money markets, and a market for government securities which are *Shariah*-compliant, make the Islamic banking more vulnerable to unfavourable events. Finally, liquidity management in the absence of a short-term money market for Islamic finance adds to the difficulty. Although the liquidity risk faced by banks at present seems to be low, there are several reasons which may lead to liquidity problems in the future.[8] First, they rely largely on a current account for liquidity. Second, there is a restriction on the sale of debts. Third, the market for short-term Islamic instruments is not developed. Fourth, the lender of last-resort facilities is not available. Another dimension to the high risk is due to the nature of PLS contracts, since they are based on the profitability of the project rather than the credit-worthiness of the borrower.[9]

The three major risk categories as discussed above – credit risk, market risk, and operational risk – are all present in Islamic financing in differing degrees, as compared to conventional financing (Figure 2.3). A quick comparison of different risks in Islamic finance with conventional finance reveals that credit risk, commodity risk, liquidity risk, market risk, legal risk, and regulatory risks are higher in Islamic financing. These risks in Islamic finance exist with different intensities and have several dimensions (Table 2.1). Since the bulk of Islamic financing goes to trade finance and mark-up arrangements, it is susceptible to the adverse fluctuations of the commodity prices. Also, Islamic banks do not have access to cheap credit and hence have to manage their own liquidity. In its efforts to manage the liquidity, banks may adopt an over-cautious approach by following a conservative route to investments and funds management which will undermine the efficient allocation of available funds to the profitable channels. On the other hand, in the case of ill-managing the liquidity, there can be a banking crisis, which may even result in sudden cash flight and liquidation. There are no universally accepted standards for reporting for Islamic finance, except AAOIFI (the Accounting & Auditing Organisation for Islamic Financial Institutions), which is still under refinement and is not mandatory and hence still not used by several institutions. This renders the reports by Islamic financial institutions non-comparable. An entrepreneur having a financially sound project will generally not come to an Islamic bank due to a PLS contract; his preference in this case will be a conventional bank. Thus, entrepreneurs having projects which are less profitable will approach Islamic banks to finance. Some of the unique risk factors relating to the Islamic mode of financing are liquidity-originated market risk, transformation of credit risk to market risk and market risk to credit risk during different stages of the contract, bundling of credit risk and market

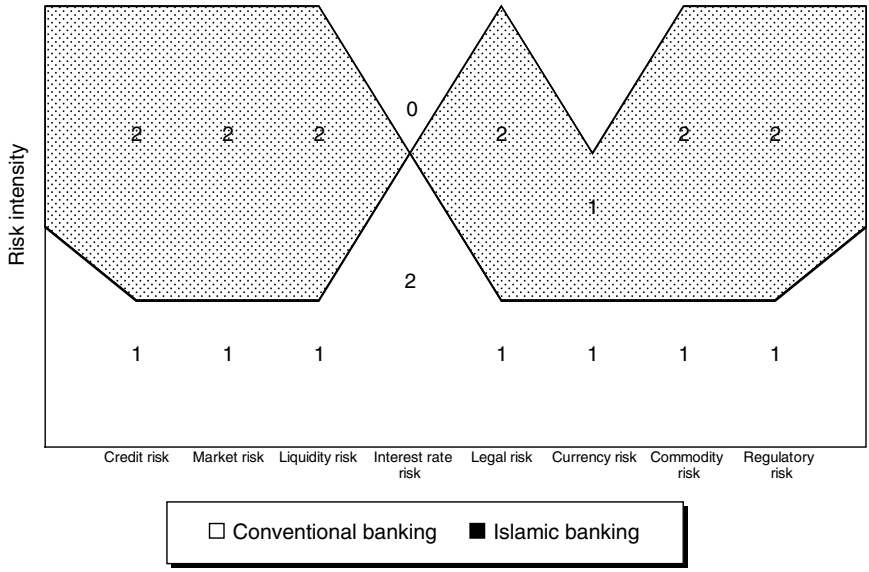

Figure 2.3 Risk profiling – conventional vs Islamic banks

risk, market risk arising from ownership of non-financial assets, and treatment of defaults.[10]

Some of the factors affecting credit risk in Islamic banks are:[11]

- Less sophistication in risk management practices
- Incentive to unscrupulous clients to default due to leniency towards default
- Lower risk due to short-term financing
- No (except in Malaysia) trading book exposure
- No access to credit derivatives
- According to OIC Fiqh Academy, *Murãbaha* is binding only to the seller
- The usual counterparty risks, such as failure to supply/deliver on time, failures regarding the quality and quantity
- That *Istisnã* poses dual risk
- The default of clients and non-performance of sub-contractors, and some *Fiqh* does not allow *Ijãrah* ending in ownership.

Table 2.1 Risks in Islamic financial services

Type of risk	*Coverage*
Credit risk	Attributed to delayed, deferred, and default in payments by counterparties. Covers profit-sharing contract (*Mudãrabah* and *Mushãrakah*), receivables and lease (*Murãbaha*, *Diminishing Mushãrakah*, and *Ijãrah*), and working capital financing (*Salam*, *Istisnã*, and *Mudãrabah*). Covers different stages of a contract.
Market risk	Attributed to adverse movements in interest rates, commodity prices, and foreign exchange rates. Covers commodity risks existing in *Murãbaha* and *Ijãrah* contracts.
Equity risk	Attributed to adverse changes in market value (and liquidity) of equity held for investment purposes. Covers all equity instruments (*Mudãrabah* and *Mushãrakah*).
Liquidity Risk	Attributed to adverse cash flow in situations arising mainly out of changing market risk exposures, credit risk exposures, and operational risk exposures.
Rate of return risk	Attributed to changes in account holders' expectations of the return on investments. Also related to fluctuations in returns due to changes in underlying factors of the contract.
Operational risk	Attributed to the inadequacy of failed processes, people, and systems. Also includes risks arising from *Shariah* non-compliance.
Legal risk	Attributed to the inadequate legal framework, conflict of conventional and Islamic laws, and conflict between *Shariah* rulings and legal decisions.

The role of information in the risk management of Islamic financial institutions can be more critical compared to conventional financial institutions. The nature of contracts in Islamic finance involves more integration with the activities of the entrepreneur. The PLS contracts are heavily biased towards availability of information for managing the risks. In the case of *Mushãrakah* and *Mudãrabah* contracts, there is a heavy bias towards availability of information for risk management. Whilst using *Istisnã*, a bank needs to maintain a steady flow of information about the contractors. Similarly, the sustainability of the activities of the Islamic financial institution depends on the sharing of information with the shareholders and their approval of these activities through *Shariah*. Sharing of *Shariah* rulings with the shareholders is an integral part of activities. Islamic finance has a special emphasis on transparency in the conduct of activities, calculation of

Table 2.2 Comparative information requirements – conventional vs Islamic banks

User/source of information	*Nature of information required to be shared*	
	Conventional banks	*Islamic banks*
Shareholder	Accounting, significant management policies, critical decisions.	Accounting, significant management policies, critical decisions, business activities, details of major sources of income and investment, *Zakat* details.
Clients/customers	Credit-worthiness, ratings, financial.	Credit-worthiness, ratings, financial, entrepreneurship abilities, selected personal information.
Financed projects	Feasibility reports before the agreement for financing.	Feasibility reports before the agreement for financing. During the financing period, regular cash flows, income statements, overall conduct of business. At the time of termination of financing (or partnership) contract, balance sheet, income statements.
Central bank	Statutory reports	Statutory reports, Special reports needed for Islamic banking.
Shariah	Not applicable	Project details, client details, business lines details, method of financing, treatment of defaults.
Other banks/institutions	Industry-supportive information, a few details about line of businesses.	Industry-supportive information, details of ethical and *Shariah* approved conduct of business.

profits and losses, as well as the nature of activities. Transparency depends on information. Due to the focus on social responsibilities, information management acquires a special dimension in Islamic financial institutions, more than a mere statutory compliance. Hence, special efforts are required for efficient information management.

RISK OF NON-COMPLIANCE WITH *SHARIAH* RULES

Shariah is the body of Islamic law. The term means 'way' or 'path'; it is the legal framework within which the public and some private aspects of life are regulated for those living in a legal system based on Muslim principles of jurisprudence. *Shariah* deals with all aspects of day-to-day life, including politics, economics, banking, business law, contract law, family, hygiene, and social issues.

The risk of non-compliance with *Shariah* rules is referred to as *Shariah* risk. This can be included in operational risk, as non-compliance can lead to reputational damage, which can trigger an exodus of funds from Islamic investors, causing failures and systemic risks. There are several variations possible in *Shariah* rulings, which give rise to a high degree of uncertainty. The conventional financial market is reasonably matured in terms of availability of products for financing. A large number of highly matured products are available for retail and corporate financing. A constraint of Islamic finance has been the non-availability of parallel products as compared to conventional finance. With the growing market for Islamic finance, innovative products are being launched, which have created some unique solutions for Islamic financing. Some of these products may not fully comply with *Shariah* rules and are subject to *Shariah* scrutiny and thus can be considered to be an adaptation based on current market needs. These products pose a special risk in terms of being rejected under the scrutiny of *Shariah* rules. As interpretations can differ, utmost precaution needs to be taken before entering into any contract. An approval from the *Shariah* council should be obtained. There should not be any deviations in the contract once the *Shariah* council has approved a particular contract.

MAIN ELEMENTS USED IN FINANCIAL RISK ANALYSIS

There are four main elements (as illustrated in Figure 2.4) that should be well defined and considered in financial risk analysis for both conventional

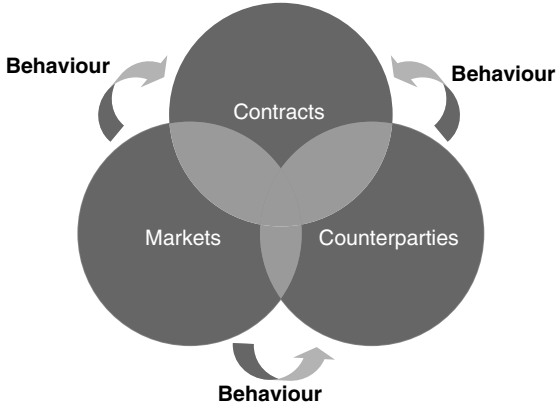

Figure 2.4 Main elements considered in financial risk analysis

and Islamic financial products; these are:

- The construction of the financial contracts
- The identification of the markets
- The identification of the counterparties
- The behaviour and interaction of the above two within a time period (past-current-future), mapped into the financial contracts.

The construction of the financial contracts is mainly based on the cash flows (ins and outs). The ins and outs cash flows are illustrated in the representation of the lifecycle of the contracts, (presented in the following paragraphs), as arrows with down and up directions respectively. The identification of the markets and the counterparties is a complex process that is based on many tangible and non-tangible factors that affect their associated behaviours. This chapter is mainly focused on the Islamic financial contracts, where their construction is based on the characteristics of markets, counterparties and operations. The aim of this chapter is to show to the reader how to identify and analyse the different types of risks that arise within the lifetime or type of the Islamic financial contracts. Therefore, the guides illustrated in the following paragraphs can be applicable to any new or integrated types of Islamic products by focusing on the financial events and the *inflows* and *outflows expected cash*.

MUSHÃRAKAH CONTRACTS OF PARTNERSHIP AND FINANCIAL RISKS

The *Mushãrakah* contract combines the acts of investment and management. The *Mushãrakah* is a partnership (joint venture) contract where two

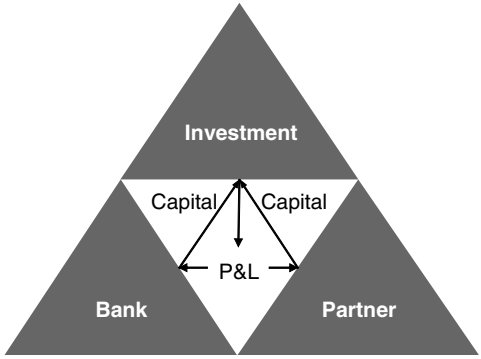

Figure 2.5 Structure of *Mushãrakah* partnership joint venture contract agreements

parties, the financial institution and the business partner, are combining their capital in an investment to share the profits and losses whereby they have similar rights and liabilities. The structure of the *Mushãrakah* contract is illustrated in Figure 2.5.

Note that in general the term *Mushãrakah* is used to define partnerships in respect to the levels of the partners' authority and obligations and the types of their contributions, which could be management, practical skills, goodwill, etc. However, in this book, for the financial *Mushãrakah* contract, the partnership that is based on the capital contribution is considered and discussed. *Mushãrakah* is a contract arrangement that works as follows: The financial institution together with other partners provides the necessary capital for a particular project. The contributions of the partners under this mode may be equal or unequal percentages of capital for the purpose of establishing a new income-generating project or to participate in an existing one. All partners, including the institution, have the right to participate in the project, i.e. on the management and decision-making level. They could also waive this right according to the agreement. The profits are to be distributed according to an agreed ratio, which needs to be decided at the time of signing the agreement and can be different to the capital ratio. Moreover, losses are shared in the proportion in which the different partners have provided the finance for the project.

Types of *Mushãrakah* contracts

The *Mushãrakah* contracts may take two forms:

- *Permanent Mushãrakah* contracts

In the case where the *Permanent Mushãrakah* contract is applied, the financial institution participates in the equity of the company that is investing and

receives an annual share of the profits and losses on a pre-rated basis. During the period where the financial institution will participate in this investment, profit and loss sharing is intended to continue until the company is dissolved.

Financial institutions provide *Permanent Mushãrakah* contracts for income-generating projects. As aforementioned, financial institutions provide capital for a project in exchange for ownership and profit sharing in the proportion agreed upon between the two partners. Moreover, the financial institution may leave the responsibility of management to the partner and retain the right of supervision and follow-ups.

- *Diminishing Mushãrakah* contracts

When the financial institution agrees on *Diminishing Mushãrakah* contracts:

– Its intention is to stay in the partnership for a limited time
– Its share of the equity is progressively reduced and the partner eventually becomes the full owner
– The partner generally buys the shares by payments on an instalment basis

Note, however, that until the financial institution participates in the equity of a company, it receives a share of the profits on a pre-rated basis.

Risks identification in Mushãrakah *contracts*

- Credit, operational, market, and liquidity are the main risks that financial institutions are exposed to by participating in both *Permanent* and *Diminishing Mushãrakah* contracts.

- Risk exposures when dealing with *Permanent Mushãrakah* contracts involve: In *Permanent Mushãrakah* contracts, the financial institution has a partnership in the business; thus, any external event or in general any inadequate activities or failures due to business risks that cause losses will initiate an exposure to operational risks as illustrated in Figure 2.6, points 1 & 2. Note that the financial institution that engages itself in *Mushãrakah* contracts has to participate in sharing both the losses and the profits. The agreed ratio of profit sharing can be different to the capital ratio, whereas the loss-sharing ratio must be the same as the capital ratio, as explained in *Permanent Mushãrakah* in chapter 1 (profit sharing ratio 1:4, loss sharing ratio – capital ratio – 2:3). In this situation, a financial institution has an unfavourable spread of profits and losses.

In the business partnership concerning *Permanent Mushãrakah* contracts, the financial institution is also sharing the business profits; however, the

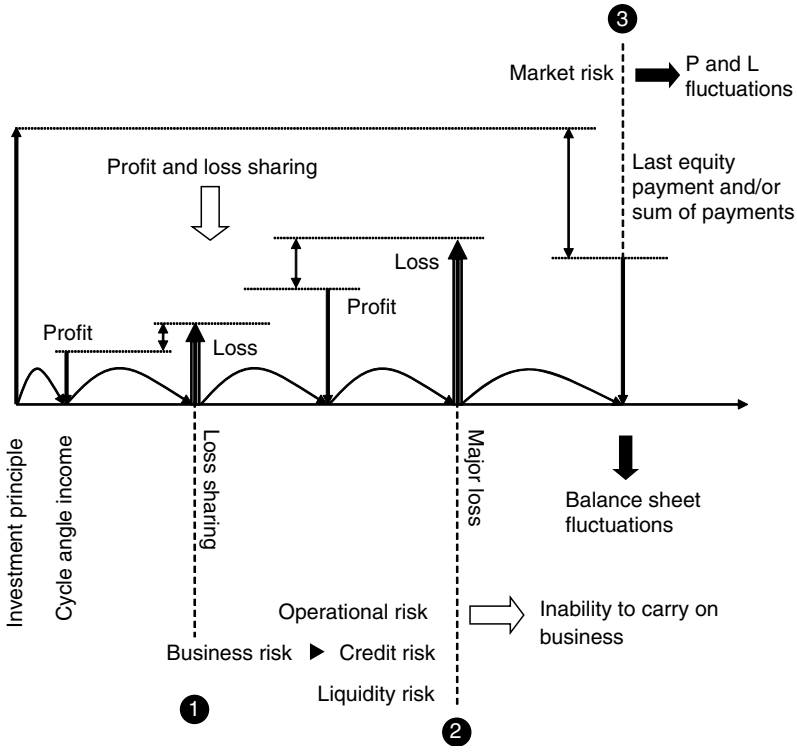

Figure 2.6 Credit, operational, market, and liquidity risks during the lifetime of Permanent *Mushãrakah* contracts

business may default to provide the expected cash due to the above-mentioned risks and losses. Such cases give birth to credit risk exposure as shown in Figure 2.6, points 1 & 2.

As a result to the above-mentioned credit inability concerning *Permanent Mushãrakah* contracts, the financial institution may face an exposure to liquidity risks as it may not be able to provide enough cash for its other investments and activities.

Finally, any major losses on *Permanent Mushãrakah* contracts may cause inability for further continuation of the business as illustrated in Figure 2.6, point 2. Such an event may result in a 'last equity' payment that will most probably have a market price lower than the initial nominal one. In this case, the financial institution is exposed to market risk as shown in Figure 2.6, point 3.

■ Risk exposures when dealing with *Diminishing Mushãrakah* contracts

In *Diminishing Mushãrakah* contracts, the financial institution is selling its

equities to the partners by payments on an instalment basis, as illustrated in Figure 2.7. In the event that the partner is unable to buy the equities on the pre-fixed price, due to business failures, the financial institution is eventually exposed to operational risks (see Figure 2.7, point 1).

The above-mentioned default on the expected payments from the partner(s), illustrated in Figure 2.7, point 1, results in a credit risk exposure in financial institutions that participate in *Diminishing Mushãrakah* contracts.

Credit and operational risks in *Diminishing Mushãrakah* contracts result in losses and variations to the financial institution's cash expectations. When this is the case, there is an additional exposure to liquidity risks (see Figure 2.7, point 1) due to the bank's inability to provide the associated cash for any further investments and planned activities.

In *Diminishing Mushãrakah* contracts, the price of the equity is fixed and thus any mismatch between the actual market price and the fixed one initiates loss of potential profit. In this case, the financial institution is exposed to market risk, as illustrated in Figure 2.7, point 3.

■ Both *Permanent* and *Diminishing Mushãrakah* contracts consist of partnership type of contracts and therefore the danger of transparency risks should be considered by the financial institution.

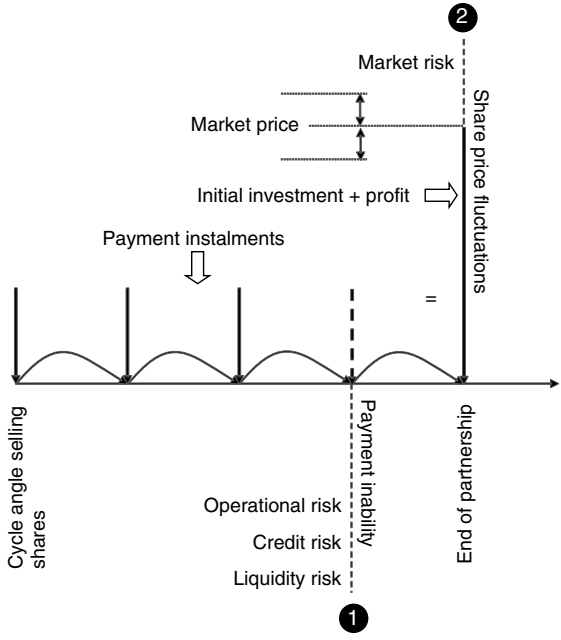

Figure 2.7 Credit, operational, market, and liquidity risks during the lifetime of Diminishing *Mushãrakah* contracts

Operational risk management in Mushãrakah *contracts*

In both *Permanent* and *Diminishing Mushãrakah* contracts, operational risks are mainly initiated due to business risks. Financial institutions that have rights in management of such business partnerships may participate in and/or monitor the process of the business and thus minimise the associated risks. Moreover, insurance policies could be applied for covering major losses that can be initiated due to external events.

Credit risk management in Mushãrakah *contracts*

Similarly to operational risk management, financial institutions can minimise credit risks in *Permanent Mushãrakah* contracts by being involved in business management activities and/or monitoring the balance of the business profits and losses. Moreover, the sale of last equities is a type of guarantee for minimising the losses from such credit risk exposures. Finally, financial institutions may minimise credit risks in the *Diminishing Mushãrakah* contracts by having the rights to sell their equities to a third party with the approval of the *Shariah* committee.

Market risk management in Mushãrakah *contracts*

Financial institutions should define a worthy strategy in case of market risk in *Permanent Mushãrakah* contracts where the stop loss should be clearly defined for selling the last equity price. On the other hand, for the market risk in *Diminishing Mushãrakah* contracts caused by market fluctuation, static and dynamic analysis can be applied to estimate the current and future Value at Risk (VaR) and evaluate the significance of the market risk exposure.

For minimising both credit and market risks, financial institutions that are participating in *Diminishing Mushãrakah* contracts should set the payment for the equity sale to the partner on several preset instalments.

Liquidity risk management in Mushãrakah *contracts*

In *Mushãrakah* contracts, the liquidity risk is a result of the other risks. Financial institutions may avoid facing such risks by either managing the source of the risk or by reserving additional capital.

Example – *Permanent Mushãrakah* By continuing with the example from chapter 1 and as illustrated in Figure 2.6, points 1 and 2, a bank is exposed to operational risk through business risk arising out of any external

events, inadequate activities, or failures. In case there is a sudden fall in the market for the ceramic tiles, the bank is exposed to operational risk. If the partner (customer) fails to provide the required profit it may give rise to credit risks as illustrated in Figure 2.6, points 1 and 2. In the case of major losses, the continuity of the business may be affected and may expose the bank to market risk as shown in Figure 2.6, point 3. The bank is already in an adverse position due to unequal sharing in profits (1:4) and losses (2:3).

Example – *Diminishing Mushãrakah* *Diminishing Mushãrakah* has a different set of risks. By continuing the example from the previous chapter, a bank enters into a *Diminishing Mushãrakah* with the customer where it contributed 80% of the cost of the delivery van and the customer provided the remaining 20% (4:1) and, as discussed, the capital contribution is divided in equal units of 20; thus, the bank owns 16 units and the customer owns 4 (4:1). Every two months the customer keeps purchasing one unit of ownership from the bank, thus increasing his contribution and reducing the bank's ownership. After 33 months, the customer will own all the units of the bank's contribution, thus owning the delivery van all by himself. If the partner fails to acquire the units from the bank, the bank is exposed to operational risk as shown in Figure 2.7, point 1, which in turn may also expose the bank to credit risk. The change of ownership pattern poses different risks during different phases of the contract. Figure 2.8 shows the way in which changing relationships affect the risk pattern.

	Before financing the asset	*During financing period of the asset*			*After 32 months (financing period over)*
Ownership percentage	*Bank*	*Financing period*	*Bank*	*Customer*	*Customer*
		1st month	80%	20%	
		3rd month	75%	25%	
		5th month	70%	30%	
	100%	…	…	…	100%
		29th month	10%	90%	
		31th month	5%	95%	
		33rd month	0%	100%	

Figure 2.8 Ownership pattern and risk in *Mushãrakah* contracts

Before the *Mushãrakah* contract is entered into, the risk is related to the asset price, i.e. the price of the delivery van. During the financing (contract) period, the three main risks faced by banks are credit risk, fluctuations in the value of delivery van (market risk), and operational risks, which includes *Shariah* risk. Interruptions in the future cash flows from the project resulting from sharing profits and sales of the partnership share may result in liquidity risk. As the ownership pattern is dynamic during the period of financing, the risk exposure also becomes dynamic.

MUDÃRABAH CONTRACTS OF PARTNERSHIP

The *Mudãrabah* contract is a type of business venture agreement. In Islamic finance, *Mudãrabah* is a special kind of partnership of capital and entrepreneur, and is therefore considered as the cornerstone of the Islamic financial intermediation.

The principal structure of the *Mudãrabah* financial contract is based on the following two key points:

- The contract is an agreement between two parties in which the first party provides capital (the financial institution) and the other party (agent) provides the expertise with the purpose of earning profit which will be shared at a percentage mutually agreed upon.
- Any losses from the implementation and lifetime of the *Mudãrabah* contract are fully covered by the provider of the capital (the financial institution).

Figure 2.9 illustrates the flow of the structure for the *Mudãrabah* contracts.

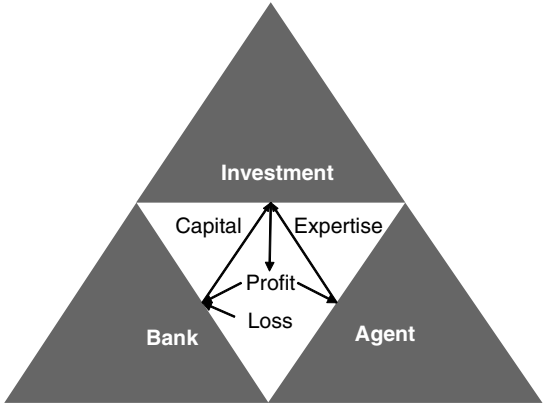

Figure 2.9 Structure of *Mudãrabah* contract agreements

Financial institutions that agree on *Mudãrabah* contracts count on the abilities and expertise of the agent to run a profitable business. On the other hand, the agent commits that he will provide the best of his know-how and experience in balancing the capital that has been invested by the financial institution for the particular business or project. As a result, by entering into a *Mudãrabah* contract, the two parties complement each other, allowing a business venture to be financed. *Mudãrabah* is also used to mobilise funds through savings and investment accounts.

Risks identification in *Mudãrabah* contract of partnerships

Financial institutions that are dealing with *Mudãrabah* contracts are exposed to operational, market, and liquidity risks. The analysis of risk identification in a *Mudãrabah* contract is split into two periods: a) during the investment lifetime of the agreement, and b) during the time of Profit Sharing and Covering Losses, if any, of the contract.

Risk issues during the investment period of the Mudãrabah *contract consist of*:

- As illustrated in Figure 2.10 (points 1 and 2), during the investment period of the *Mudãrabah* contract of partnership, the financial institution is exposed to operational risk. Operational risk may arise due to external events, including catastrophic ones as well as internal business failures. Such events cause high disruptions for business development and result in losses (minor to major) which the financial institution is compelled to cover fully.
- As a result of covering the above-mentioned losses, the financial institution is exposed to liquidity risk. This is due to the fact that the financial institution has to cash out a capital above its expected lines and plans and thus it may be unable to fulfil the other financial obligations (i.e. providing cash for other *Mudãrabah* financial contracts).
- Major losses may result from the inability of the business partner (or agent) to carry on the business development and/or the project's implementation. In this case, the financial institution is facing an additional future liquidity as well as credit risk due to the defaults from the partner (agent) for providing the expected (future) cash flows.

Risk issues during the profit and loss period of the Mudãrabah contract consist of: After the initial investment period, the *Mudãrabah* contract is expected to give back financial returns (profits). However, the *Mudãrabah* contract further exposes the financial institutions, who are the financial

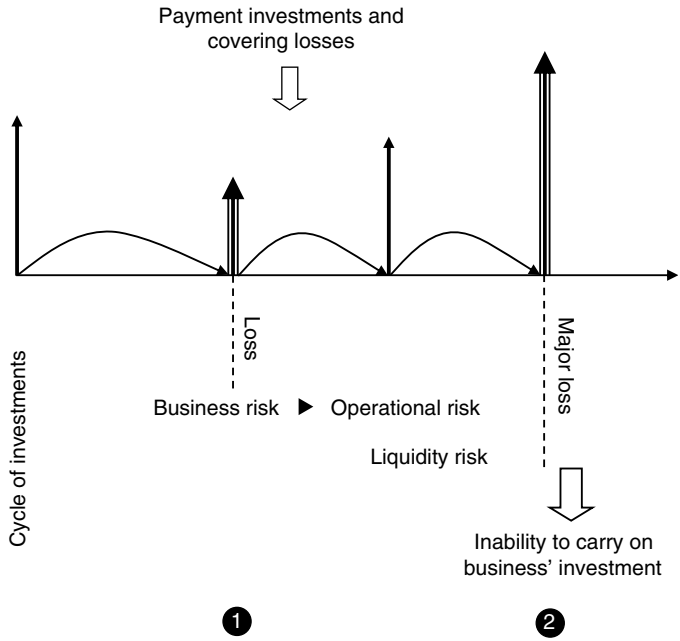

Figure 2.10 Risks in *Mudãrabah* contract agreements during the investment period

partners to operational, credit, market, and liquidity risks as follows:

- As the financial institution in a *Mudãrabah* contract has a partnership in the actual business that it is investing in, it is inherently exposed to business and operational risks as illustrated in Figure 2.11, points 1 and 2. This is due to any external or internal events that may arise and are causing losses to the actual business. Thus, any inadequate activities or failures which are beyond the scope of due diligence by the agent during the business operational processes and activities that cause losses are expected to be covered fully by the financial institution.
- Major losses in *Mudãrabah* contracts (Figure 2.11, point 2) may cause the inability of the financial institution to provide additional funds for the *Mudãrabah* investment and, thus, the business may be unable to operate further. This event will result in a last equity payment to the investment's equity shares. In this case, the equity price will most probably have a market price lower than the initial nominal that reflects a financial exposure to market equity risk as shown in Figure 2.11, point 3.
- Financial institutions are expecting profits resulting from the *Mudãrabah* contract. As a consequence of the above-mentioned losses, the investors of the *Mudãrabah* business are unable to provide the expected

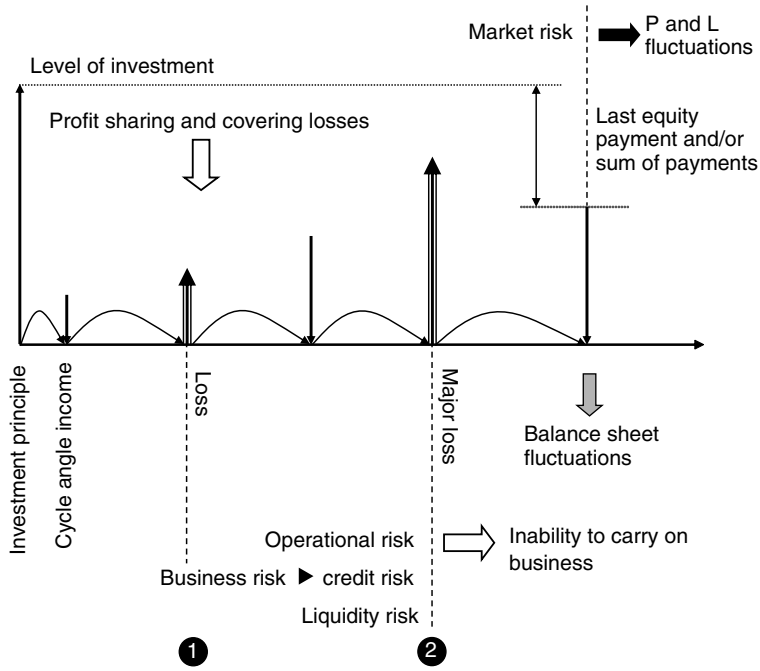

Figure 2.11 Risks in *Mudãrabah* contract agreements during the business profitability and loss period

profit. Thus, as shown in Figure 2.11, points 1 and 2, the financial institution is exposed to credit risk due to this default on the expected cash-in from the business profits.

- The above-mentioned inabilities to repay expose the financial institutions to liquidity risk as it is likely that the institution may be unable to provide enough cash for its other investments and activities.
- In *Mudãrabah* financial contracts, financial institutions have negligible management rights on the partnership business. As mentioned above, these limitations may cause a transparency risk that would result in losses to the financial institution. Therefore, transparency risk should be highly considered and controlled by the financial institutions that are providing *Mudãrabah* contracts.

Operational risk management in *Mudãrabah* contracts

Similar to *Mushãrakah*, the operational risk in *Mudãrabah* contracts is mainly initiated due to business risks. Since the agent (business partner) has

full management responsibilities, the events that initiate losses related to the operational risks can barely be managed by the financial institution. Financial institutions must ensure that the business deals using the *Mudãrabah* contracts are driven by experienced and knowledgeable agents where the projects are managed in such ways as to minimise business risks.

Credit risk management in Mudãrabah *contracts*

The credit risk exposure in *Mudãrabah* contracts can be minimised by monitoring the business performance, if possible, and the balance sheet of the business profits and losses.

Market risk management in Mudãrabah *contracts*

By applying equivalent principles as in the *Mushãrakah* contracts, for managing market risk, financial institutions should define strategies that will be implemented for the case of market risk in *Mudãrabah* contracts where, for instance, the stop loss for selling the last equity price is defined.

Liquidity risk management in Mudãrabah *contracts*

In *Mudãrabah* contracts, the liquidity risk is initiated by the other types of risks. Thus, financial institutions may need to provide capital adequacy that needs to be defined, based either on the regulators' directives or on internal estimations (see chapter 3).

Example Customer X approaches the bank ABC to invest in the manufacturing of ceramic tiles but insists that he cannot contribute any capital *Mudãrabah*. The bank invests all the required funds for the business, whereas the customer takes care of management. During the investment period, the bank is exposed to operational risk arising due to external and internal events, as illustrated in Figure 2.10, points 1 and 2. In case the customer (partner) is unable to generate the profits, the bank may be exposed to liquidity risk. In case there are major losses, the bank may not be able to provide additional funds, thus threatening the closure of the business. The market for the ceramic tiles will be an important factor affecting the risk position of the bank, which can affect the bank via operational and market risks.

Note *Mushãrakah* and *Mudãrabah* instruments have some common features and hence share some common risks. When these instruments are used for financing import and export trade, they carry foreign exchange risk. The

transparency poses risk for the bank. If the partner does not disclose true and fair profits, the bank practically does not have ways and means to control it.

MURÃBAHA CONTRACT AGREEMENTS AND FINANCIAL RISK

The *Murãbaha* contract is one of the most popular contracts of sale used for purchasing commodities and other products on credit. Most of the financial institutions that are providing Islamic products are extensively using *Murãbaha* as an Islamic mode of financing, and most of their financing operations are based on *Murãbaha*. This type of contract is suitable for financing the different investment activities of customers with regard to the manufacturing of finished goods, procurement of raw materials, machinery, and other required plant and equipment purchases.

Murãbaha is a contract arrangement where there are three parties involved: the 'financial institution' the 'buyer' (client), and the 'seller'. The financial institution acts as an intermediary trader between the buyer (client) who is the end-user and the seller (Figure 2.12). In other words, upon receipt of an order and agreement to purchase a certain product from the buyer, the financial institution will purchase the product from the seller to fulfil the order. This type of financial contract is based on the sale for an agreed-upon profit. This means that, in addition to the cost of a commodity, there is an agreed-upon profit payable at the present time or on a date in the future in a lump sum (at the maturity day) or by instalments (cycle repayments), as defined in equation (2.1).

$$R = \sum_{i=1}^{n}(r_i + p_i) \tag{2.1}$$

where: n is the number of payment instalments,
r is the commodity's price of the repayments,
p is the profit earned by the financial institution.

Under this sale transaction, the financial institution is calculating the profit margin over the initial cost defined by the seller. The profit margin that is based on a benchmark or mark-up rates may be defined either as a fixed sum or based on a percentage of the price of the goods. If a percentage is used, the percentage shall never be expressed in terms of time, in order to avoid confusion that the price is a form of interest (*Riba*), which is not allowed. The institution must disclose clearly the cost of acquiring the asset and hence should be transparent about the cost and profit.

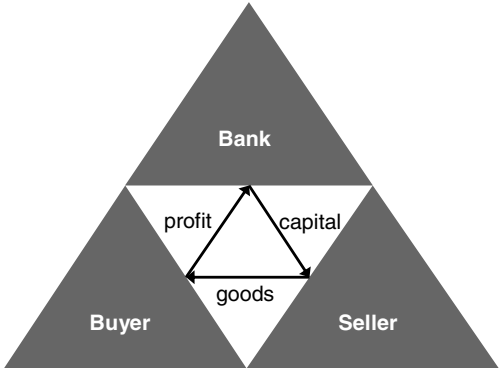

Figure 2.12 *Murãbaha* structure and its main interrelations

Risks identification in *Murãbaha* contracts

By applying *Murãbaha* financial transactions, financial institutions are exposed to credit, operational, market, and liquidity risk in an integrated way, as illustrated in Figure 2.13. There are three main areas during the *Murãbaha* contract where these risks may arise:

- In *Murãbaha* contracts, a client can make a promise to purchase from the financial institution. This is to either satisfy the promise or to identify any losses incurred from breaking the promise without excuse. In this step, the financial institution is exposed to operational risk, as shown in Figure 2.13 at point 1.
- Stock and availability of the commodity/goods is a basic condition for signing a *Murãbaha* agreement. However, the financial institution must purchase the goods in accordance with the specifications of the client, thereby taking ownership of the goods before signing the *Murãbaha* agreement with the client. Therefore, the financial institution assumes the operational and market risk of the commodity's ownership. In other words, the institution is responsible for damages, defects, and/or spoilage to the merchandise until such time that it is actually delivered to the buyer. Moreover, within this time period the financial institution is exposed to any risk from the commodity's price fluctuation. Point 1 in Figure 2.13 illustrates where these risks may appear before the commodity is even re-sold to the client/buyer.
- In the case of non-binding *Murãbaha* contracts where the client has the right to refuse the delivery of the product purchased by the financial institution, the institution is further exposed to market risk due to commodity (price) fluctuation illustrated at point 1 in Figure 2.13.

- The financial institution delivers to the client the commodity at an agreed initial date, but may not receive the payment from the client at the agreed cycle repayment instalments or at the maturity date. Thus, such default of the client's inability to repay is exposing the financial institution to credit risk as shown in point 2 of Figure 2.13. Moreover, at this point, the financial institution is also exposed to liquidity risk as on the repayment days it is expecting to receive a cash-in that it may use to cover its other financial obligations. Note also that in case the client agrees to pay at a later date, or even after the maturity date, issues of additional liquidity risk may arise due to unexpected cash-in at the later dates.
- The financial institution purchases the commodity on a current date and has to deliver the capital of the price plus the profit at a future date based on a benchmark or mark-up rates; however, if the profit does not cover the actual market rate, the financial institution is exposed to the mark-up or, in other words, market risk (see point 3 in Figure 2.13).

Different types of risks arise at the same points during the lifetime of *Murãbaha* contracts, also related to each other to a certain degree. Thus, financial institutions that are utilising *Murãbaha* contracts should consider their financial risks as integrated ones. For instance, financial institutions may increase the margin of the profit for covering any commodity price risk; however, such practice may cause inability of repayments, i.e. default

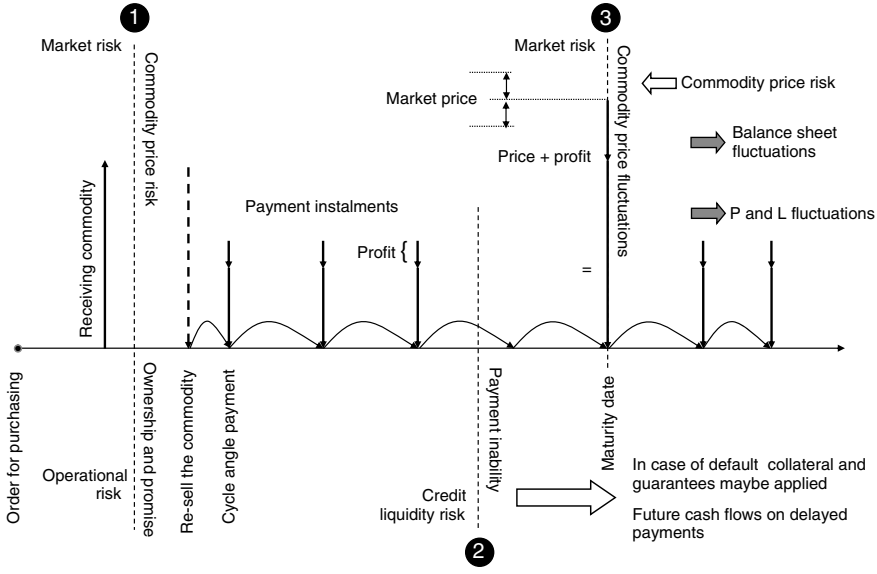

Figure 2.13 Credit, operational, and market risks during the lifetime of a *Murãbaha* contract

of payments, that will consequently result in credit and liquidity risk. In *Murãbaha* financial contracts, the defined profit should cover the actual profit, the market influence rate as well as the additional services, costs, and risk components.

Operational risk management in *Murãbaha* contracts

In regards to the operational risk exposure – this is whether the client will keep his promise of buying the product – the financial institution is permitted to take a collateral security to guarantee the implementation of the promise or to indemnify any losses that may result.

Credit risk management in *Murãbaha* contracts

The financial institution accepts from the client that agrees on *Murãbaha* contracts, goods or other assets as collaterals against the credit risk; that is, the risk of default in repayments. Thus, appropriate documentation of the debt resulting from *Murãbaha* contracts should be made by a guarantor, or a mortgage, or both, like any other debt. Mortgage, guarantee, or cash security may be obtained prior to signing the agreement or at the time of signing the agreement. The analysis of credit risk is provided in chapter 4.

Commodity and mark-up risk management in *Murãbaha* contracts

By providing *Murãbaha* contracts, financial institutions are exposed also to mark-up risk due to the changes in mark-up rate that are used as a price trading benchmark. In *Murãbaha* contracts, the mark-up price is fixed for the duration of the contract, while the benchmark rate may change. In cases where the prevailing mark-up rate increases beyond the benchmark rate, in the *Murãbaha* contract, the financial institution is unable to benefit from the increased rates. In *Murãbaha* contracts, the total repayment must be greater than the sum of the repayments considering the fluctuation μ as defined in equation (2.2).

$$R \geq \mu \cdot \sum_{i=1}^{n} r_i \tag{2.2}$$

Financial institutions must apply benchmarks and mark-up prices that refer to the commodities that are trading in *Murãbaha* contracts. Moreover, different scenarios that are driven by dynamic simulations of the market behaviours can be used to estimate the future commodity prices.

Liquidity risk management in *Murãbaha* contracts

The liquidity risk in *Murãbaha* contracts is a result of the other risks and may cause a significant impact and additional losses. Financial institutions, therefore, should invest in efforts to manage the other types of risks and thus minimise their exposure to liquidity risk.

Example As discussed in the example in the previous chapter, bank ABC purchases a car for $25,000 from a dealer to sell it to customer X. As shown in Figure 2.13, point 1, if the customer does not honour its promise to buy the car from the bank, it is exposed to operational risk. At the same time, in the case of non-binding *Murãbaha* contracts, the customer may refuse the delivery of the car and thus expose the bank to market risk due to fluctuations in the price of the car. A default from the customer as illustrated in Figure 2.13, point 2, may expose the bank to credit risk. In case the bank's mark-up is not sufficient, it is exposed to market risk as shown in Figure 2.13, point 3.

SALAM CONTRACT AGREEMENTS AND FINANCIAL RISK

Salam is a term used to define a sale in which the buyer makes advanced payment, but the delivery is delayed until some time in the future. Forward sale is prohibited in Islamic finance, with two exceptions: *Salam* and *Istisnã*. Usually, the seller is an individual or business and the buyer is the financial institution. The *Salam* contract serves the interests of three parties: the financial institution (bank), the seller, and the buyer, as illustrated in Figure 2.14. The seller receives advanced payment in exchange for the obligation to deliver the commodity at some later date. Firstly, the seller benefits from the *Salam* sale by locking the price of the sold commodity. It also allows covering its financial needs and business expenses. As a consequence, the financial institution (purchaser) benefits from the *Salam* contract by receiving the delivery of the commodity when needed to fulfil some other agreement, without incurring storage costs. Secondly, a *Salam* sale is usually less expensive than a cash sale. Finally, a *Salam* agreement allows the purchaser to lock in a price, thus protecting both parties from price fluctuation. In a *Salam* agreement there are several options for delivery available to the financial institution on the due date:

- The financial institution (bank) may receive the commodity and resell it to another party for cash or credit;
- The financial institution (bank) may authorise the seller to find another buyer for the commodity;

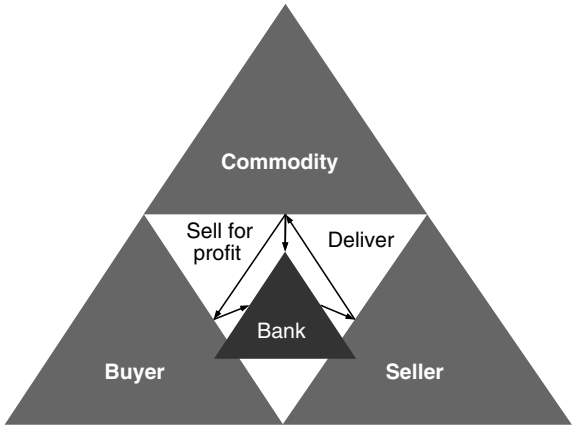

Figure 2.14 Relation structure in *Salam* contract agreements

- The financial institution (bank) may direct the seller to deliver the commodity directly to a third party with whom the financial institution has entered into another agreement.

In all the different options, the financial institution plays an intermediate role between the seller and the buyer, as illustrated in Figure 2.14. The financial institution gets a profit out of the trading between the seller and the buyer.

In terms of functionality, the *Salam* contract is structured in the same way as the conventional forward contracts; however, it defers in terms of the payment arrangements. In the *Salam* contract, the payment is set at the deal date on an agreed price where the seller promises to deliver at the specified future date. On the other hand, in the conventional forward contract, the full negotiated price is payable at the contract deal date, as opposed to the *Salam*, where the full payment is normally set on the delivery date.

Risks identification in *Salam* contracts

By undertaking *Salam* contracts, financial institutions are mainly exposed to operational, credit, market, and liquidity risks:

- Due to external events, the seller may default on delivering the commodity at the delivery date agreed in the *Salam* contract. In such cases, the financial institution may have some losses due to its exposure to the above-mentioned operational and credit type of risks (see Figure 2.15 at points 1 and 4). Note that, according to the IFSB,[12] such default is considered as credit (counterparty) risk.

- In addition to this operational risk, there could also be a mismatch on the agreed specifications referring to the received commodity. Such failures could cause further delays to the delivery of the actual commodity after the selling date (agreed between the bank and the buyer), as illustrated in Figure 2.15 at point 4, or even termination of the contract. Delayed deliveries for receiving the commodities may result in some reputational and business risks as well as cause additional expenses and opportunity losses.
- Even though the price of the commodity is locked in the *Salam* contract in order to be protected from commodity risks, both the bank that receives the commodity as well as the seller that sells it, at the delivery date the financial institution may face a market risk due to commodity price fluctuation and mark-up risk (see Figure 2.15 at point 2).

The *Salam* financial Islamic product exposes the financial institution to commodity price volatility during the period between the delivery of the commodity and the sale of the commodity at prevailing market price. The higher forward price accommodates the cost of commodity from the trade date to the delivery date, including financing, insurance, and storage costs. According to the definitions given by the Islamic Financial Services Board, institutions that are providing *Salam* financial products are exposed to commodity price fluctuations on a long position after entering into such a contract and while holding the subject matter until it is disposed of or even beyond the maturity date of the contract, as long as the commodity remains on the balance sheet of the institution.

- Note that any inability to forecast and thus estimate the future price of the commodity based on benchmarks and mark-ups (at the delivery date) could expose the financial institution to reinvestment risk that makes it unable to re-sell the commodity at a profitable price.
- On the selling date (see Figure 2.15 at point 4) any default from the buyer to pay the commodity at the agreed price exposes the financial institution to the credit risk.
- Since the price and time for the end-buyer are defined before the date of delivery of the commodity in the *Salam* contract, the financial institution may face additional market risk due to mark-up risk (see Figure 2.15 at point 3). Moreover, in cases of delivery defaults (operational risks and market risks), there is an additional exposure to liquidity risk, as it expects cash-flow that may not be received at the future selling time, as illustrated in Figure 2.15, points 3 and 5.

Operational risk management in *Salam* contracts

Financial institutions that are providing *Salam* financial Islamic contracts might be exposed to operational risks due to a seller's default of the

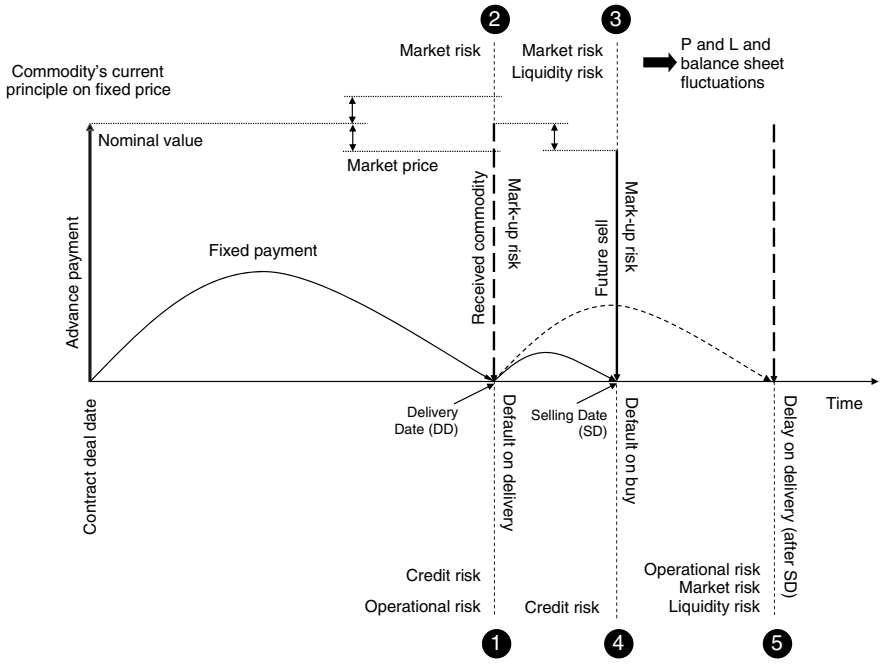

Figure 2.15 Operational, credit, market, and liquidity risks during the lifetime of *Salam* contracts

commodity's delivery or due to the commodity's specification mismatching. Financial institutions may minimise such types of operational risks by asking from the seller guarantees that they are following a quality management system or following any 'standard system', and/or by asking for references on past promises on *Salam* contracts and/or by collateralising their losses via insurance policies.

Credit risk management in *Salam* contracts

By providing *Salam* financial Islamic contracts, the financial institutions might also be exposed to credit risk due to a default from the buyer's side to purchase the commodity at the agreed price. Financial institutions should apply approaches for estimating the probability of such defaults and the result from such credit risks and expected losses. Such approaches are mainly based on quantitative information from past references that are combined with qualitative criteria related to promises on *Salam* contracts, as will be discussed in chapter 4, referring to credit risk management in Islamic finance.

Market risk management in *Salam* contracts

By evaluating the future market price, set for the *Salam* contracts, based on different market scenarios and strategies, financial institutions can minimise their exposure to market risk and mark-up risk related to commodity price fluctuations. Moreover, based on static and dynamic analysis, the VaR analysis can be applied in evaluating and managing the market risk in *Salam* contracts.

Hedging the *Salam* contracts

Financial institutions that provide *Salam* financial contracts are hedging their position by entering into *Parallel Salam* off-setting contracts. Financial institutions have several options for delivering the commodity and thus to hedge the corresponding risks:

- They may receive the commodity and re-sell it to counterparties for cash or credit.
- They may authorise the seller to find a third counterparty buyer for the commodity.
- Or they may advise the seller to deliver the commodity directly to a third counterparty with whom the financial institution has entered into another agreement.

A financial institution that is using parallel *Salam* contracts expects from the first contract a commodity to be delivered from the first counterparty at the agreed delivery date. With the second contract it is obligated to deliver the commodity to a second counterparty on a future date, after the delivery date. The financial institution is therefore exposed to commodity risk from the first contract; thus, when there is a default of delivery from the first counterparty, the loss is offset by the future contracts that mature on a future delivery date.

Example – *Parallel Salam* A customer X of bank ABC wishes to arrange for a forward sale of its crop. The bank enters into a *Salam* contract (first contract) where it provides the required finance and in return agrees to purchase the crop from customer X after a specified time. At the same time, the bank enters into another *Parallel Salam* contract (second contract) with a buyer (or customer Y) to ensure the sale of the crop. If, due to external events, the customer defaults on the delivery of the crop, the bank is exposed to operational and credit risk as shown in Figure 2.15, point 1. If

the market price of the crop increases substantially during the first phase, there is an incentive for the seller to default. After the bank accepts the delivery, in case the price of the crop has increased substantially, the buyer (in a *Parallel Salam* contract) may default, thus leaving the bank with storage costs and further credit risk and commodity price risk (see Figure 2.15, point 4).

ISTISNÃ CONTRACTS AND FINANCIAL RISKS

Istisnã financial contracts are used to define a production of a commodity or construction of an asset in which the buyer makes advance payment, but the delivery of the commodity or the asset is set at the future time. In other words, *Istisnã* is a contract that 'a manufacturer makes something' and 'it is a commodity on liability with the provision of work'. The *Istisnã* contract is very appropriate for the construction industry and for building infrastructure such as roads, dams, real estates, hospitals, etc.

The contract serves the interests of three parties: the financial institution (bank), the producer (manufacturer), and the buyer/user of the commodity, as illustrated in Figure 2.16. Financial institutions that provide *Istisnã* contracts are buying the commodity or the constructed asset and then are selling them after receipt for cash on deferred payment.

The *Istisnã* contract comes into existence when the manufacturer undertakes the production of the commodity or the construction of the asset for

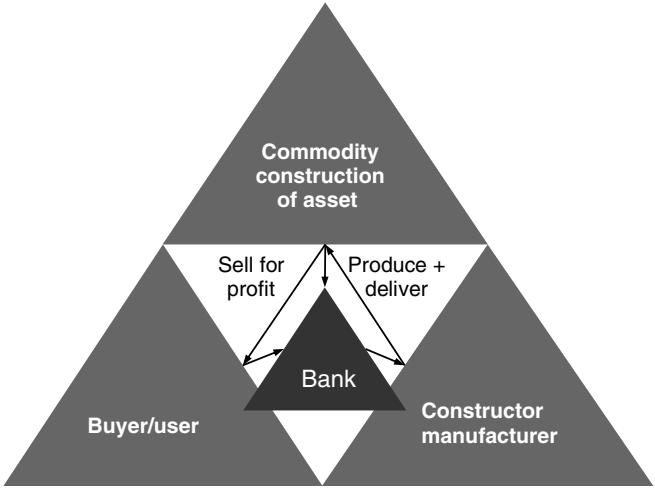

Figure 2.16 Relation structure in *Istisnã* contract agreements

the financial institution/buyer. Apart from the fixed price, the parties in the *Istisnã* financial contract agree on the specifications of the asset intended to be manufactured. Note, therefore, that, if there is a deficiency in fulfilling the agreed specifications, the party that had placed the order has a right to withdraw the order.

In *Istisnã* contracts, the feature related to the mode and timing of the payment is very flexible as it can be fixed at any specific time, from the beginning of the contract to the delivery time, or it can even be set at different payment instalment times. There is also flexibility on the delivery time. The amount of instalments could also be agreed and scheduled by the parties in the contract.

Differences between the *Istisnã* and *Salam* contracts

The *Istisnã* and *Salam* are similar contracts in terms of the creditability of time. However, the main differences between these contracts are:

- *Salam* can be used for almost all types of commodities, excluding gold, silver, and currencies; however, in the *Istisnã* contract, the underlying asset is required to be manufactured or constructed.

- *Salam* price is paid in full and in advance, whereas the payment instalments for the commodity in *Istisnã* contracts are flexible and can be made at any time if the parties agree.

- The *Istisnã* contract can be cancelled before the manufacturer or constructor undertakes the associated project, whereas in a *Salam* contract the unilateral cancellation of the contract is forbidden.

- Unlike the *Salam* contract, in the *Istisnã* contract there is flexibility on the delivery time.

Risks identification in *Istisnã* contracts

Financial institutions that are providing *Istisnã* contracts are exposed to operational, market, credit, and liquidity risks:

- Due to external events during the manufacturing or construction process, there may be a default from the supplier's side to provide the goods at all, or supply the goods on time, and the manufacturer or

constructor may default on:

- carrying out the process of producing the commodity/asset, as illustrated in Figure 2.17 at point 1.

- delivering the agreed commodity/asset on time by delaying the production process and shifting the delivery date after the selling time agreed between the financial institution and the buyer, as illustrated in Figure 2.17, point 6.

In both cases, the financial institution is exposed to operational risk where the associated losses are initiated due to the influence on the bank's reputation and future liquidation problems (liquidity risk) that the financial institution may face due to its inability to sell and cash in the commodity or the asset to the buyer at the selling date (see Figure 2.17, at points 4 and 6).

- Given the structure of the *Istisnã* contracts, as illustrated in Figure 2.17 at point 2, on the delivery date, the manufacturer or constructor may default in reaching the agreed quality of the goods as contractually specified. Assuming that the manufacturers and/or constructors are counterparties in relation to the bank, such defaults result in a credit risk exposure.

Moreover, the aforementioned defaults arise mainly due to operational risks and that implies further delays on the delivery of the commodity/asset (see Figure 2.17, at point 6) or even termination of the contract. Note, however, that by shifting the delivery date to a future time which is after the agreed selling date (between the financial institution and the buyer), it may cause losses to the financial institution due to liquidity risk as well as business risk (including reputation, administration, legal fees, etc). The failures mentioned above could result in financial losses due to additional expenses and opportunity losses.

- Credit exposures in the *Istisnã* contracts are arising at the selling time where the commodity or the constructed asset is billed to the customer (see Figure 2.17, at point 5). According to the IFSB§126, there is credit (counterparty) risk when the financial institution is not receiving the selling price of the asset from the customer or project sponsor either in pre-agreed stages of completion and/or upon full completion of the manufacturing or construction process.

- The Istisnã contracts may also expose the financial institution to market risks. This is due to the fact that the price of a commodity or a construction is fixed on the deal date. However, at the delivery date, due to market price, fluctuations of the commodity may result in a differentiation from the actual market price (see Figure 2.17, points 3

and 4). This price differentiation is initiated due to the mark-up risk where any underestimation of the future price that is based on benchmarks and mark-ups could result in the financial institution being unable to sell the commodity at a profitable price.

Similarly to the case discussed in *Salam* contracts, the *Istisnã* financial Islamic contracts expose the financial institutions to the volatility of the commodity and asset price during the period between the delivery of the commodity or the constructed asset and the sale of the commodity at prevailing market prices.

- In the *Istisnã* contract, any default on delivery, mainly due to operational risks after the selling date (Figure 2.17, at points 4 and 6), exposes the financial institution to liquidity risk as the institution is expecting a cash flow that it will not receive at the future selling date. Moreover, the financial institution is exposed to market risk as the price of the commodity or the asset at a later date may fluctuate and thus differentiate the nominal set price with the market one.

Operational risk management in *Istisnã* contracts

When selling *Istisnã* financial Islamic contracts, financial institutions may be exposed to operational risks due to the default of manufacturing and

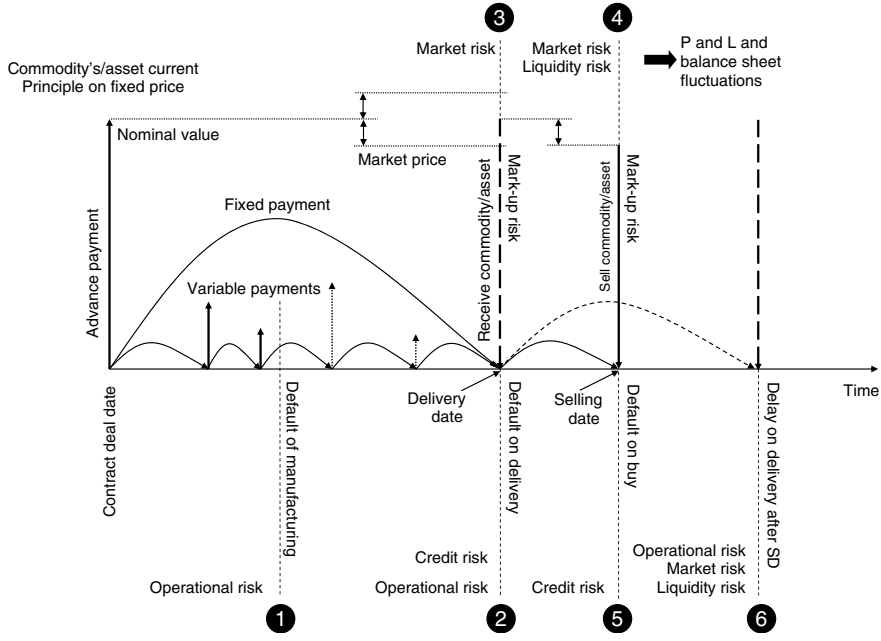

Figure 2.17 Operational, credit, market, and liquidity risks during the lifetime of *Istisnã* contracts

construction companies to deliver or due to the mismatching of the commodity's or asset's specification. Similarly to the risk management practices that should be applied in the *Salam* contracts, financial institutions can minimise such types of operational risks by monitoring the process of the commodity's manufacturing or the construction of the asset. Moreover, financial institutions should receive guarantees from the manufacturers on whether they are following an appropriate quality management system or that they are following any 'standard system'. Financial institutions should also ask for references concerning past manufacturing or construction projects. Losses that are initiated from the *Istisnã* contracts can also be collateralised via insurance policies.

Credit risk management in *Istisnã* contracts

Financial institutions might also be exposed to credit risk due to a default from the buyer's side to purchase the commodity or the constructed asset agreed in the *Istisnã* financial Islamic contract. Banks must be able to estimate the probability of default and the expected losses resulting from the *Istisnã* credit risk based on qualitative criteria as well as quantitative information data, as discussed in chapter 4.

Market risk management in *Istisnã* contracts

For commodity and construction assets, a good strategy for minimising market risks in an *Istisnã* contract is to sell the commodity and the properties resulting from the asset's construction before the delivery date. Moreover, financial institutions can minimise their exposure to market risk and mark-up risk by evaluating the future market prices of the manufactured commodity and constructed assets. By applying static and dynamic analysis, the VaR analysis can evaluate the significance of the market risk exposure that the financial institution is undertaking on *Istisnã* sales.

For minimising both operational and market risks, financial institutions that provide *Istisnã* contracts should set the payment instalments to the manufacturer or constructor of the asset on a variable basis instead of on the contract deal date.

Liquidity risk management in *Istisnã* contracts

One characteristic of the *Istisnã* contract is that the delivery and the selling date of the manufactured commodity or constructed asset may change. As aforementioned, this shifting of time may have a great impact on liquidity risk. Financial institutions that sell *Istisnã* contracts should be aware of this risk and reserve adequate capital for covering such liquidation issues.

Example A customer X wants to purchase a ship. Bank ABC agrees to provide the financing using *Istisnã*, where it enters into a contract with the ship manufacturer to manufacture the specified ship and agrees to provide the finance in instalments, depending on the progress in manufacturing. The bank also enters into another contract simultaneously with customer X to sell the specified ship at an agreed price. In case the manufacturer fails to deliver the ship on time as agreed, the bank is exposed to operational risk as illustrated in Figure 2.17, points 1 and 6. Failure of the customer to pay the selling price exposes the bank to credit risk at the time of delivery of the ship (see Figure 2.17, point 5).

IJÃRAH CONTRACT AGREEMENT AND FINANCIAL RISK

Ijãrah is a leasing financial contract that gives the right to use a commodity or service for a specific period of time. *Ijãrah* or leasing is a contract whereby the owner of something transfers its usufruct to another person or body for an agreed period. In general, *Ijãrah* contracts refer to the lease/rent of tangible assets such as property and merchandise, but it is also designed to denote the hiring of professional services for a fee.

Ijãrah is a contract between two parties:

1. the individual or organisation who leases out/rents out the property or service and is called the lessor (*mu jir*)

2. the lessees (financial institution – *musta jir*) who have the right to enjoy/reap a specific benefit from a specified consideration, rent, wages, from the lessor.

In *Ijãrah* contracts, the buyer usually makes advance payment and rents, leases, hires the goods and/or services from the lessor. The delivery time is set to a fixed date in the future. The payments can be either fixed or variable; however, in the former case they are based on benchmarking analysis.

Nowadays, extensions of *Ijãrah* contracts are implemented with the most commonly used options for purchasing the asset. One of these is the *Ijãrah wa Iqtina (hire-purchase agreement)*, which is similar to conventional lease-purchase agreements. Based on this type of agreement in *Ijãrah* contracts, an additional contract is applied, which includes a promise by the financial institution (owner of the asset) to sell the leased asset to the lessee at the maturity date of the original lease of the *Ijãrah* contract. The price of the residual value of the asset is pre-determined. The second type of *Ijãrah* contract, known as *Ijãrah thumma al-bai*, provides an option to the lessee to

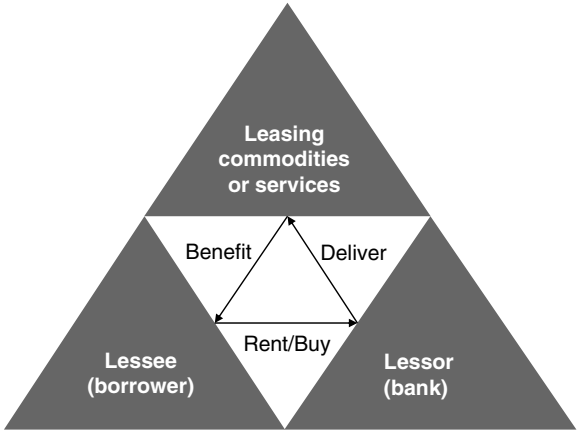

Figure 2.18 *Ijãrah* contract agreements

purchase the asset at the maturity date of the contract or to return it as originally agreed in the *Ijãrah* contract.

Risks identification in *Ijãrah* contracts

A financial institution as the owner of an asset that leases to the lessor based on *Ijãrah* contracts is exposed to credit, operational, market, and liquidity risks:

- Any default of payment due to business risks, market (price variation) risks, or even due to unscrupulous defaults by the lessee, may generate additional losses. Thus, such cases of inability to re-pay by the lessee is exposing the financial institution to credit risks, as illustrated in Figure 2.19, point 1.
- In the case that the renter/lessee exits earlier (before the maturity date), the financial institution will lose the expected payments on the predefined instalments or at the maturity date. Thus, any early leave exposes the financial institution to credit risks (Figure 2.19, point 2). Moreover, as a result of the above-mentioned risk, there is an additional exposure to liquidity risk at the times where cash flows were expected from the instalment payments or the fixed payments (last payment).
- Catastrophic events could also cause damage to the assets (such as properties) that may initiate major losses. The financial institution (owner) is therefore exposed to operational risk, as shown in Figure 2.19, point 3.
- The title of the ownership of the asset remains with the lessor, thus damages due to misconduct by the lessee propagate operational losses. The financial institution, who is the owner of the assets, is exposed to operational risk.

- The value of the payments of rent in *Ijãrah* contracts is defined on cycle payment instalments and is based on benchmark analysis. However, when such an estimation is unable to fulfil the actual market price, the financial institution is exposed to market risk (see Figure 2.19, point 4).
- In the case where the *Ijãrah* contract is set for payment at the maturity date, the financial institution may be exposed to market as well as to credit risks. Losses from the latter risk may appear when and if the renter/lessee defaults on the obligation for payment (full or partial amount), as shown in Figure 2.19, point 5. The former risk may arise due to the market risk fluctuation that could differ from the actual agreed price (on the *Ijãrah* contract), as illustrated in Figure 2.19, point 6.
- In general, at the maturity date, when the asset will be returned to the financial institution, any damages to the assets may cause an associated loss. In such cases there is an exposure to operational risk once more (Figure 2.19, point 6).
- Delayed repayments due to the above-mentioned defaults may cause liquidity risk (see Figure 2.19, point 7).
- In the *Ijãrah wa Iqtina*, the financial institution might be exposed to market (commodity) price risk as the price of selling the asset to the renter at the maturity date is pre-determined. Due to market fluctuations, the price at the maturity date may differ from the actual market price.
- In the *Ijãrah thumma al-bai*, the financial institution might be exposed to market (commodity) price risk as the lessee may refuse to purchase the asset on the termination of the lease; thus, at the maturity date, due to market fluctuations, the market risk may arise.
- When in the *Ijãrah* contract there is an option for the renter/lessee to buy at a pre-determined price the asset at the maturity date, the financial institution is exposed to the market (commodity) price risk in the same way as discussed in the previous point.

The risks encountered by the *Ijãrah* contracts are, to a high degree, similar to the ones that exist in conventional leasing contracts.

Credit risk management in *Ijãrah* contracts

Guarantees (capital or personal) and collaterals may be applied for minimising the financial institution's exposure to credit risk by revoking the contract's agreement or inability of payment from the renter in the cycle instalments or at the maturity date.

Operational risk management in *Ijãrah* contracts

For minimising their exposure to operational risks, adequate insurance against any losses and damages to the asset should be defined.

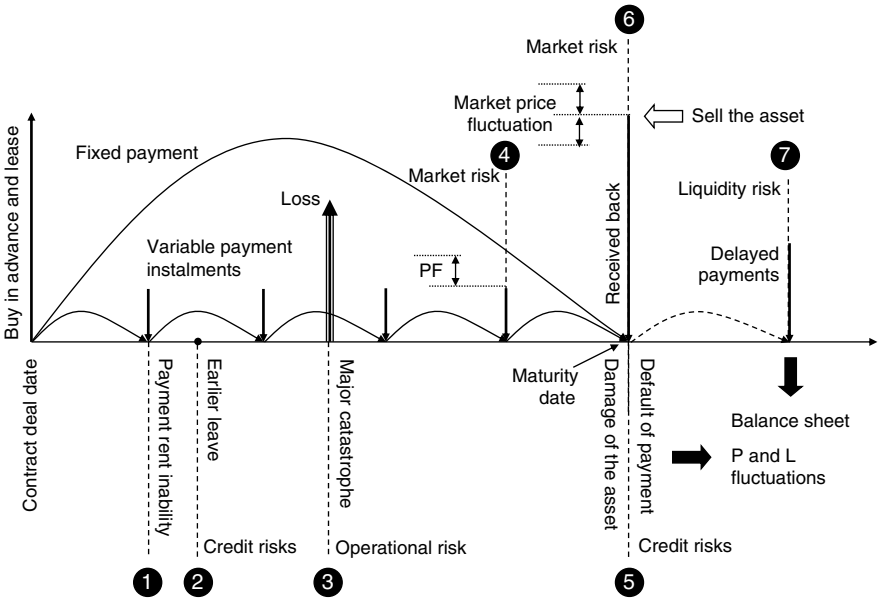

Figure 2.19 Credit, operational, and market risks during the lifetime of *Ijãrah* contracts

Market risk management in *Ijãrah* contracts

In undertaking *Ijãrah* contracts, the exposure to market risks can be minimised by simulating and evaluating the future market price based on different market scenarios and strategies that are mainly driven by potential yield curves. VaR analysis could also be applied to assess and evaluate the current and potential degree of market risks.

In general, there is less exposure to the above-mentioned risks when the *Ijãrah* contract is set for repaying the instalments at different time periods (cycle payments) than when the repayment is fixed to the maturity date.

Liquidity risk management in *Ijãrah* contracts

The exposure to credit, operational, and market risk by applying *Ijãrah* contracts results in a liquidity risk to different degrees. A good practice to minimise the liquidity risk is to monitor and manage its causes from the other risks.

Example An airline approaches ABC bank to finance the purchase of an Airbus aircraft costing approximately $80 billion US. The bank arranges to lease the aircraft to the airline using an *Ijãrah* contract. If the airline defaults on the payment of rent, it exposes the bank to credit risk (see Figure 2.19,

point 1). In case the airline decides to leave the lease early, the bank is exposed to credit risk, as shown in Figure 2.19, point 2. In the case of a catastrophic event affecting the aircraft, the bank is exposed to operational risks, as illustrated in Figure 2.19, point 3. On the maturity date when the aircraft is returned, the bank is exposed to operational risk from damages to the assets (see Figure 2.19, point 6).

Sukûk

Sukûk, as used in recent Islamic finance, refers to a certificate issued by a beneficiary as evidence of the collected funds entitling rights in certain assets. *Shariah* approval is needed for the underlying assets and for *Sukûk* contracts. These assets are driven by Islamic contracts and accordingly there are various types of *Sukûk*, named *Murãbaha Sukûk*, *Ijãrah Sukûk*, *Salam Sukûk*, *Istisnã Sukûk*, *Mushãrakah Sukûk*, *and Mudãrabah Sukûk*. Thus, in the *Sukûk* contract, the risk and the return associated with cash flows generated by underlining assets belong to the pool and are passed to the *Sukûk* holders (investors). As a result, all risks that may appear in a *Sukûk* contract are related to the associated risks that arise in its underlining Islamic contracts, as described in the above paragraphs of this chapter. Note that when a *Sukûk* is underlined by a pool of assets there is a distribution of different types of risks; however, a high degree of these risks are resulting in a high complexity in collecting the associated information and in analysing/evaluating their actual effect on the performance of the actual *Sukûk* returns.

The *Sukûk* structure depends on the creation of a Special Purpose Vehicle (SPV) and the underlying assets. *Sukûk*s representing debts are not traceable on a secondary market, although there are some alternative viewpoints from some of the *Shariah* scholars. For example, a *Sukûk* structured on *Murãbaha*, *Salam*, and *Istisnã* should be held until maturity. On the other hand, a *Sukûk* structured on equity basis can be traded on the secondary market (*Mushãrakah* and *Mudãrabah*). On similar lines, *Sukûk* can be classified either as having pre-determined returns or profit and loss sharing. It should be noted that *Sukûk* is always an asset-backed security. *Sukûk* is issued with varying maturity, such as from a few months to a few years. *Salam Sukûk* has been mostly issued for managing short-term liquidity since its structure resembled that of conventional treasury bills. The *Ijãrah Sukûk* has been most popular and can be issued for varying maturity, generally at least five years. Other than these, *Mushãrakah Sukûk* and *Istisnã Sukûk* are also being tried. Due to the availability of a large variety of *Sukûk* and their differing risk structures, it is beyond the scope of this book to discuss them. Fundamentally, the risks in *Sukûk* can be traced back to the underlying contract type, which has been discussed in the above paragraphs in this chapter.

SUMMARY

Risks and returns are strongly related in Islamic financial products. The unique structure of Islamic financial products exposes them to different types of risks at different stages of the contract. Financial institutions that are providing Islamic financial products or formulate deals based on Islamic financial contracts are exposed to financial risks, including credit, operational, business, market, and liquidity risks. Such risks may result in major financial losses and excessive disruptions in the financial institutions' performances. Islamic finance is riskier as compared to conventional finance. The information management plays a crucial role in risk management in Islamic finance. The specific nature of Islamic financial contracts exposes the Islamic financial institutions to risks which are shifting and changing over the time of the contract.

Table 2.3 illustrates an area of risks that financial institutions are exposed to by applying *Mushãrakah*, *Mudãrabah*, *Murãbaha*, *Salam*, *Ijãrah*, and *Istisnã* Islamic financial contracts. As illustrated in this Table, all of the Islamic financial contracts are exposed to operational risks. Likewise, credit risks appear in all contracts, except in the *Salam* and *Istisnã* contracts, where the main drivers of these agreements is a commodity or an asset delivered to the financial institution some time in the future. Moreover, all contracts that are dealing with commodities, i.e. *Murãbaha*, *Ijãrah*, *Salam*, and *Istisnã*, are exposing the financial institutions to commodity price risk; on the other hand, the *Mushãrakah* and

Table 2.3 Pattern of risks where financial institutions are exposed by applying Islamic financial contracts

	Types of risks				
			Market risk		
Types of contracts	*Operational risk*	*Credit risk*	*Commodity risk*	*Equity risk*	*Liquidity risk*
Mushãrakah	☑	☑		☑	☑
Mudãrabah	☑	☑		☑	☑
Murãbaha	☑	☑	☑		☑
Salam	☑	☑	☑		☑
Ijãrah	☑	☑	☑		☑
Istisnã	☑	☑	☑		☑

Mudãrabah contracts, which are partnership agreements, result in equity risks.

In the usual course of events, most of the above-mentioned risks additionally expose the institution to liquidity risks, as any default or delays regarding payments or deliveries from the buyers', sellers', or manufacturers' side, may initiate an elevated interruption on the financial institutions' expected cash flow. Such interruptions may result in the financial institution facing difficulties or even the inability to fulfil its financial obligations, especially the ones that are related to other financial products and services. Additionally, in the case that Islamic financial products are trading in foreign countries and currencies, they may also be exposed to foreign exchange risk. Note finally that the losses resulting from the different types of risks arising from *Murãbaha* contracts may cause fluctuations on the balance sheet and P&L of the financial institution.

In terms of managing the above-mentioned risks, financial institutions should define a risk-management framework of measuring, monitoring, assessing, evaluating, controlling, and managing their associated risks. For instance, guarantees or cash securities can be applied to collateralise the market and operational risks' exposures. Scenarios that are driven by dynamic simulations of the market behaviours can also be employed to define and evaluate the benchmarks and the mark-up prices.

In the following paragraphs, a short summary and concluding remark are presented and discussed for each of the examined Islamic financial products and business agreements.

Mushãrakah

The *Mushãrakah* contract, a partnership contract between a financial institution and a partner, involves both sides in management and decision making where the profits and losses are shared according to the proportion in which the two parties have provided the finance for the project. According to the financial institution's participation towards the equity of the investment company, the *Mushãrakah* partnership is distinguished in two types of contracts: the *Permanent Mushãrakah* and the *Diminishing Mushãrakah*. In the first type, the financial institution is sharing the profit and loss and therefore all the associated investment risks until the termination of the business. In the latter type, the institution is sharing the business investment and responsibilities for a limited pre-defined period. In both cases, however, the *Mushãrakah* contract that combines the capital investment and business management initiates credit, operational, market, and liquidity risks.

When the financial institution is dealing with the *Permanent Mushãrakah* contract, it is exposed to operational risks due to any inadequacies or

failures concerning business activities or even due to external events that cause major losses. Any resulting defaults from the business side for providing the expected cash exposes the financial institution to credit as well as to liquidity risks. Finally, the last equity payment that results from any inability of undertaking the business activities is exposing the financial institution to market equity risks.

The *Diminishing Mushãrakah* contract exposes the financial institution to operational, credit, and liquidity risk when it does not receive the equities due to a failure of the partner's business. Moreover, the fixed price of the equity, at the start-up of the *Mushãrakah* contract, may also cause some market risks to the institution. This is due to certain mismatching between the actual market price and the fixed prices, which results in loss of potential profit.

The operational and credit risks in both *Permanent* and *Diminishing Mushãrakah* contracts may be minimised by the financial institution's management rights, decision making, as well as by monitoring the balance of the business profits and losses. Additionally, insurance policies may be applied to cover any major losses that are initiated due to external events. Finally, for assessing and evaluating the market equity risk a VaR approach should be applied.

Mudãrabah

The *Mudãrabah* contract is a partnership where the financial institution is investing in a project and agrees with a partner that runs the business to share only the profit. However, in this partnership, the financial institution (who is the capital investor) is the only one that takes the whole responsibility concerning business losses. The *Mudãrabah* contract is a partnership that does not entitle the capital investor to take business responsibilities; however, it is exposing the financial institution to operational, market, and liquidity risks.

During the investment period of the *Mudãrabah* agreement, the financial institution is exposed to operational risk due to internal business failures or even to external events, including catastrophic ones. As a result of its obligation to fully cover the business losses, the financial institution is additionally exposed to liquidity risk. Moreover, any defaults to provide the expected cash due to the above-mentioned risks and losses initiates credit risk. During the profit and loss period of the *Mudãrabah* contract, the business partner has full responsibility for management. Any external or internal unexpected events may initiate business and operational risk losses. Moreover, in case the businesses that are based on *Mudãrabah* contracts return only minor profits, the financial institution may also face credit as well as liquidity risks.

As mentioned above, in the *Mudãrabah* partnership the financial institution is fully responsible for covering all losses (minor to major) and thus its exposure to risk has more financial impact. Financial institutions that are dealing with both *Mushãrakah* and *Mudãrabah* contracts are exposed to similar types of risks, but in the *Mudãrabah* contracts the financial institution is exposed to a higher degree due its obligation to exclusively cover any financial losses. Moreover, in *Mudãrabah* contracts there is a higher level of transparency risk due to the fact that, in this business venture, the financial institution has very limited management rights. In general, however, most of the Islamic financial products and deals are based on goodwill and must be transparent, so that the financial institution knows its real exposure to potential losses.

Murãbaha

The *Murãbaha* contract involves three parties: the financial institution, the buyer (client), and the seller; which is exposing the financial institution to all types of risks. Therefore, *Murãbaha* contracts may initiate an exposure to operational risks due to a reasonable or unreasonable default of the buyer to keep its promise for buying the commodity that the financial institution has purchased on his/her behalf. In the *Murãbaha* contract, exposure also arises from credit risks since defaults by the client when they come to repay the commodity on the maturity day or at agreed periodical times. In addition, the institution is also exposed to market risk due to commodity price fluctuation even before it actually re-sells the commodity to the client/buyer. Note, however, that market risks are mainly initiated from failures to estimate the actual margin on profit set in *Murãbaha* contracts than those based on benchmark or mark-up rates.

Ijãrah

The Islamic financial contract that refers to leasing of commodities or services is called an *Ijãrah* contract. This involves two parties: the lessor, an individual or organisation which leases out/rents out the property or service; and the lessee, the financial institution that rents from the lessor. By being involved in *Ijãrah* contracts, financial institutions are exposed to credit, operational, market, and liquidity risks. Thus, any defaults on payments due to business risk, market risk, or even due to the lessee's unconsciousness, is exposing the financial institution to credit risks. Any early exit of the renter/lessee from the contract results in a discontinuation of payments and thus exposes the financial institution to credit risk. This also results in liquidity risks. The institution is also exposed to operational risk if

catastrophic events arise or should catastrophic events arise during the of *Ijãrah* contracts. Moreover, as the financial institution is the owner of the assets, it is exposed to operational risks, e.g. due to any damages to these assets. Any mismatch between the rent price and the actual market price of the commodity or service exposes the financial institution to market risk. Note that the prices in *Ijãrah* contracts are pre-determined. Finally, financial institutions are also subjected to additional credit and market risks when an *Ijãrah* contract is set for payment at the maturity day.

Salam

The *Salam* contract is a sale in which the buyer, who is the financial institution, makes advance payments; however, the delivery from the seller on the *Salam* contract is defined some time in the future. The *Salam* is a type of forward contract where the three parties – the financial institution, the seller, and the buyer – receive several benefits, i.e. by fixing the price of the commodity, storage costs, etc. On the other hand, financial institutions that are providing *Salam* contracts are exposed to all main types of risks, including operational, credit, market, and liquidity risks. Any failures on delivering or delays on the commodity at the agreed date or on the agreed specifications may initiate expenses as well as losses for the current business and future opportunities. As a result, *Salam* contracts may expose the financial institutions to operational risks in addition to reputational and business risks. In addition to collateralisation policies, such as insurance, determined for the *Salam* contracts, financial institutions may minimise such types of risks by using references as well as guarantees in regards to the commodities' quality standardisation. By providing *Salam* contracts, the financial institutions are also exposed to credit risk due to any default from the buyer to pay the commodity at the agreed price. Moreover, as a result of commodity price fluctuation and mark-up risks, the financial institution may also be exposed to market risks. Furthermore, any failure in forecasting the future price of the commodity at which the institution is planning to resell and is based on mark-ups and benchmarks may expose the institution to reinvestment risks. As already mentioned, different market scenarios and strategies as well as mathematical techniques such as VaR can be applied to evaluate and minimise these market and mark-up risks. Finally, a parallel *Salam* may be employed as a hedge strategy to financial risks.

Istisnã

Financial deals that are structured for forming a relationship between the financial institution and a manufacturer of commodities or construction industry for building infrastructure are driven by the *Istisnã* financial

contracts. In *Istisnã* financial contracts, the institution makes advance payment, but the delivery of the commodity or the asset is set in the future. After receiving the commodity or the constructed asset, financial institutions are selling them for cash on deferred prices. One of the most intriguing characteristics of the *Istisnã* contract is that it is one of the most flexible financial Islamic contracts in terms of the volume and the time of payment instalments. There are two types of defaults that may arise during the lifetime of the manufacturer or constructor supported by the *Istisnã* contracts; these are any inabilities and/or any delays for carrying on with the process of producing the commodities or constructing the assets. Such risks are linked mostly to business operations and may result in significant losses as well as liquidation problems and negative reputational records for the financial institution. Similar to the *Salam* contracts, in the *Istisnã* contracts any failures to arrive at the agreed quality of the goods may result in losses due to delays or even termination of the delivery of the commodity or assets. Such failures could also result in opportunity losses as well as reputational, administrative, and legal costs. Monitoring the manufacturing and construction processes may minimise such types of risks. Moreover, an efficient production quality management system could also act as a guarantee for avoiding failures and delays. Financial institutions should also look for any references on previous manufacturing or construction projects by the manufacturer or construction industry. Finally, a collateralisation via insurance policies may also be applied. The credit (counterparty) risk arises when the buyer or user of the commodity or asset is unable to follow the agreed payment obligations set in the *Istisnã* contract. In addition to the above risks, financial institutions that are dealing with *Istisnã* contracts may also be exposed to market risks as the price of the manufactured commodities and constructed assets which are driven from the mark-ups may fluctuate to a value that highly defers from the actual market price. As common practice to most of the financial products, VaR analysis is an important method to evaluate the significance of the above-mentioned market risks.

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CHAPTER 3

Basel II and IFSB for Islamic Financial Risk

INTRODUCTION

Financial liberalisation, which was a part of globalisation, was keenly followed by developing countries in the 1990s. Several restrictions were eased, paving the way for easy entry of financial institutions. Multinational financial institutions from developed countries entered developing economies. Relaxing governance was considered as an essential part of this liberalisation. Self-regulation was considered to be the motivating factor. But everything did not work well. There were several instances of malpractice, financial frauds and, finally, some failures. A study by Demirgüç-Kunt and Detragiache found that there was strong correlation between financial liberalisation and banking crisis.[1] Governing bodies started looking at the existing set of standards and ways to overcome the issue of balancing control and freedom. It was realised that the existing standards were not sufficient and hence revision and additions were needed for bringing in sound financial risk-management practices. From simple capital provisions for risky assets to a comprehensive framework for risk management, practice of risk management has undergone wholesale transformation over the past several years. To protect financial systems from failure, special regulatory provisions are created on a regular basis. Each country has its own set of regulations based on several parameters. The most common among them is the requirement to hold some minimum capital indexed to the activities of the bank.

The major cushion of safety and soundness arrives from the capital held by the bank; thus, capital adequacy regulations are an important part of the regulatory provisions. The larger the capital, the better the protection against insolvency can be. But holding large capital leads to increased cost, since capital is a costly option. A bank which is over-capitalised will have low return on its capital and will not be able to pay decent dividends on

investment to its shareholders. At the same time, under-capitalised banks are highly prone to the risk of insolvency and can also suffer from retarded growth. Thus, arriving at an optimal level of capital is in the best interest of banks and the shareholders. Regulators attempts to monitor the level of capital maintained by the banks by defining the mandatory levels of capital known as regulatory capital. Capital adequacy is at the core of the supervisory activities of the Central Bank all over the world. It is an important benchmark for the soundness of the financial institution. Capital adequacy is considered to be a better tool compared to deposit-reserve requirement to control lending. During the eighties, there were several Central Banks who accepted a minimum limit of 8 percent of risk-weighted capital as being safe, which was proposed by the Basel I accord.

The previous two chapters have dealt with the evolution of Islamic finance and the major types of risks involved in conventional and Islamic finance. The present chapter provides a brief review of the Basel II accord (2006) and hence is largely based on the document issued by the Basel Committee on Banking Supervision. A brief summary of the original accord (1988) is presented, bringing out the major limitations of the original accord. An analysis of the three Pillars of Basel II and their applicability for Islamic financial institutions are also presented. The minimum capital requirement under Pillar 1 is examined and its relevance for Islamic financial institutions is discussed. Credit risk as perceived and presented by Basel II is similar in Islamic financial institutions, but varies in origin and intensity. The Standardised Approach and Internal Rating Based Approach are also discussed and their applicability to Islamic finance is analysed. The three alternative approaches as proposed under Basel II for operational risk, Basic Indicator Approach, Standardised Approach, and Advanced Measurement Approach, are also presented in brief in order to understand their applicability to Islamic finance. A review of different risk weights as allocated under Basel II for the Standardised Approach in the light of risk exposures for Islamic financial contracts is also presented in this chapter. The risk exposures of Islamic financial institutions in the case of market risk are spread to cover all major types of financial contracts, as discussed in chapter 2. The Basel II approach to market risk is discussed in the light of these exposures. The Second Pillar of Basel II, the supervisory review, is equally important for the Islamic financial institutions and is discussed in this chapter. Market disclosure requirements as proposed by Basel II are presented and analysed in the light of Islamic financial disclosure needs. The Islamic Financial Services Board (IFSB) has issued risk management standards for Islamic financial industry, which are discussed in detail in the last section of the chapter.

THE BASEL ACCORD

The Bank for International Settlements (BIS) was established on 17th May 1930 and is the oldest international financial organisation. It serves as the bank for the central banks. It provides a platform for consultative co-operation among the central banks. The role of BIS has undergone change as per the needs of the international financial sector. BIS now also acts as an institution for collection, compilation, and dissemination of economic and financial statistics. It actively promotes global financial stability. It also performs the traditional banking function for the central bank community (gold and foreign exchange transactions). It has several committees working on different aspects of international financial stability. The Basel Committee for Banking Supervision (BCBS, henceforth referred to as the Committee) was formed at the end of 1974 by the Governors of G-10 countries. The Committee issued a series of documents beginning from 1975 on banking supervision.

The original accord was the first major international capital adequacy standard released by BIS with the focus on credit risk.[2] A minimum capital of 8 percent of risk-weighted asset was prescribed by the Committee. A simplified risk-weighting structure was given. For example, 0 percent for cash, 20 percent for claims on multilateral development banks, 50 percent for residential mortgages, and 100 percent for loans to private sector. The original accord served the purpose of bringing capital adequacy to the centre of the banking supervision. However, it was soon proved insufficient and rendered obsolete with rapid changes in the financial and banking sector. Several deficiencies in the existing accord were found and thus amendments were introduced in 1996 with additional focus on market risk.[3] It covered the four major risk categories of market risk: (a) interest rate-related instruments, (b) equities, (c) foreign exchange risk, (d) commodities risk. Technology-driven banks were more prone to operational risk and the amended accord failed to take this type of risk into account. Moreover, there were large-scale changes in the banking industry all over the world. Globalisation and liberalisation introduced new elements of risks in banking. Changing supervisory practices also brought about changes in the risk exposures. Several limitations in the existing standards were realised. First, it prescribed a single rate for capital adequacy, irrespective of the degree of risk within the category ('one size fits all' approach). Second, there was no incentive for quality credit; hence, there was no distinction between 'good' and 'bad' credit in terms of provision of capital. Third, it failed to adequately recognise operational risk. Finally, risk in newer financial instruments such as securitisation of assets and derivatives was not addressed. Several rounds of consultations took place at BIS with Central Banks, bankers, academicians, researchers, and industry experts. Hence, after

many amendments and taking into account all these factors, a comprehensive version of the Basel II revised framework was documented in 2006.[4] The contribution of the Committee has been noteworthy in promoting better supervision. Persistent effort has not only brought changes in the way risk was perceived but also forced banks to adopt best standards, promoting better financial health for banks and financial institutions. The accord has been voluntarily adopted by more than one hundred countries. The new Basel II accord is now considered as a benchmark for financial risk management.

RISK MANAGEMENT ACCORDING TO BASEL II AND THE ISLAMIC FINANCIAL INDUSTRY

One of the objectives of Basel II is to improve the risk management practices of internationally active banks, thus promoting international financial soundness and stability. There has been substantial improvement in Basel II as compared to the original accord in relation to recognition of risk. As seen in the previous paragraphs, the new accord recognises the importance of operational risk as well as providing a better understanding of market and credit risks. Basel II marks a shift from transaction-based supervision to risk-based supervision. It provides a wide range of risk weights which can be applied to calculate the required capital. It also provides a range of menus to choose from for the approach towards risk measurement. Basel II has covered a wide range of risks which were not previously included in the original accord, such as country risk, legal risk, liquidity risk, and reputational risk. The emphasis has been on efficient capital management. The importance of developing internal capabilities for risk assessment has been recognised and Basel II has an undertone of developing an organisational culture of risk management rather than a simple framework. Basel II has improved response to risk management from four different perspectives. First, it provides improved risk measurement methodologies by incorporating the latest innovations in financial engineering. Second, it provides improved risk monitoring by providing a wide range of indicators which can be used by the regulators. Third, it attempts to bring to the forefront the importance of reporting by including the third Pillar, which is market disclosure. Finally, it bridges the gap in risk management by introducing the role of supervision at the centre of risk management in Pillar 2. The delicately balanced three Pillars of Basel II are reinforcing on each other and provide the required support for developing a sound, stable, and dynamic risk-management structure.

The Islamic financial industry is a part of the global financial industry and hence cannot remain unconcerned and unaffected. The capital adequacy is going to remain the core issue for risk management, whether it is a conventional bank or an Islamic bank. The overall impact of a failure in either a conventional bank or an Islamic bank will be felt by the entire financial market and thus risk management needs to be integrated. The common concept of having sufficient capital cannot be refuted in Islamic finance. Thus, application of Basel II is a matter of adoption of the standard to the needs of the Islamic financial industry. The three pillars of Basel II are discussed in the following paragraphs, along with their relevance and applicability to Islamic finance.

THE THREE PILLARS OF BASEL II

The Basel II accord is based on three mutually enforcing 'Pillars'. The strong relevance of supervisory review and market discipline has been introduced along with the fundamental minimum capital requirement as three Pillars (Figure 3.1). The strength of the Basel II lies in the mutual support which is provided by each of the three Pillars. By including the supervisory review, the Committee has brought risk management into the realms of supervisors, who were in the past not directly related to risk management. It also re-emphasised the role of supervisors in overall risk management by providing them with an upper hand in the decision relating to the validity of the minimum capital calculation. Market discipline helped in bringing out the importance of transparency within the range of risk-management activities. The three Pillars together provide a flexible, risk-sensitive capital management framework, which can change the way risk is perceived by financial organisations.

The role of minimum capital requirement is equally important in the Islamic financial industry, although the calculation of the capital charge may differ, depending on the risk exposures. The role of supervisors is more critical due to the evolving nature of the Islamic financial industry. Strong regulatory support in the form of monitoring and assistance is needed for the Islamic financial industry. The social responsibility is of utmost importance in Islamic finance. Activities which are conducted by the Islamic financial institution should not be *Haram* and, when profits are generated, the *Zakat* should be paid. Along with this, there is a greater emphasis on the transparency and thus the third Pillar of Basel II has more relevance for the Islamic financial industry.

When estimating the minimum capital requirements, there are two types of capital that can be calculated by financial institutions: economic capital and regulatory capital. Economic capital is the amount of capital estimated

Pillar 1 Minimum capital requirements	*Pillar 2 Supervisory review*	*Pillar 3 Market discipline*
Calculation of capital charge is connected to credit risk, market risk, and operational risk, signifying higher charge for higher risk in each category.	Supervisors can review and revise the charge if they feel that the calculated charge does not adequately reflect and cover the risk.	The details of risk management are required to be made public by the bank, improving the sharing of information within the industry.

Figure 3.1 The three pillars of Basel II accord

by the bank's management that is required to cover and protect the shareholders from potential economic losses (unexpected negative changes in economic value). Regulatory capital is the amount of capital that the regulators require the institutions to hold as a safety against risks. The primary purpose of economic capital is to support transaction-level decision making, whereas the main intention of regulatory capital is to assess the bank's financial capability to manage its intrinsic risks. As opposed to regulatory capital, which is set by the regulators, economic capital is the internal estimate of capital required to be maintained. It is the required capital for an unregulated institution, which may or may not be the same as the regulatory capital required for that same institution. If a bank is constrained by regulatory capital, it should use the regulatory capital for its assessment; and if the bank is constrained by economic capital, it should use the economic capital. Basel II is attempting to align economic and regulatory capital more closely to reduce the scope for regulatory arbitrage. Setting a higher limit for economic capital provides some room for leverage for bankers. The Basel II stresses on a complete risk-management framework which can tie regulatory capital with the economic capital.

Islamic financial institutions have a more difficult task balancing between the economic capital and statutory capital. Non-availability of liquidity support from the money market, non-existence of inter-bank money market for Islamic banks, and absence of a secondary market created more pressure on the capital requirement of the Islamic financial institutions. This, coupled with the commitment for current account and investment account holders, exposes the Islamic financial institutions to larger capital requirements.

Pillar 1: Minimum capital requirement

The first Pillar of Basel II deals with the minimum capital requirement. This capital is the regulatory capital. The calculation of the minimum capital

is presented with the help of the capital adequacy ratio (CAR), which is defined as a ratio with the numerator representing the amount of available capital and the denominator a measure of the risk faced by the bank. Basel II defines the CAR as the ratio of the bank's capital (Tier I and Tier II) to its risk-weighted assets and it should not be lower than 8 percent. As compared to Basel I, there is no change in the numerator and the value of the ratio (8 percent). The change is in the denominator, by assigning the risk weights to different business activities faced by the bank. Symbolically, CAR is,

$$\text{CAR} = \frac{\textit{Tier I capital} + \textit{Tier II capital}}{\textit{Risk} - \textit{weighted assets}} \times 8\% \tag{3.1}$$

The Tier I capital must be at least 50 percent of the total capital and it includes paid-up share capital and disclosed reserves. Tier II capital, which can be a maximum 100 percent of Tier I, includes undisclosed reserves, asset revaluation reserves, general provisions and general loan-loss reserves, hybrid capital instruments, and subordinated term debt. The treatment to market risk from trading activities remains unchanged and there are substantive changes in the treatment of credit risk and introduction for explicit treatment of operational risk. There are several alternative approaches proposed by Pillar II for the treatment of the three financial risks (Table 3.1).

Having discussed the different aspects of credit risk, market risk, operational risk, and liquidity risk in chapter 2, it is evident that the risk exposures of the Islamic financial institution differ from the conventional financial institution. The risks in Islamic financial institutions are more contract-centric, rather than conventional product-centric. Even though the lines of business can be grouped into retail, corporate, and other, the risk exposures among them are not similar, as in conventional banks. The capital as it is classified in conventional banking as Tier I and Tier II cannot be used in Islamic banking since the capital in Islamic banking consists of different Islamic product groups.

Credit risk

The Basel II approach to credit risk is very exhaustive. Several options with detailed guidelines are provided. The Committee suggests choosing between two prime methodologies: Standardised Approach (SA) and Internal Rating Based (IRB) Approach. The first is an 'out-of-the-box' kind of solution which can be directly applied, whereas the second requires explicit approval of the bank's supervisors.

Table 3.1 Alternative approaches to credit, market, and operational risk

Type of risk	*Proposed approaches*	*Specific approaches*
Credit risk	Standardised Approach	
	Internal Rating Based Approach	Foundation Approach Advanced Approach
	Securitisation Approach	Standardised Approach Internal Rating Based Approach
Market risk	Standardised Measurement Approach	
	Internal Models Approach	
Operational risk	Basic Indicator Approach	
	Standardised Approach	Alternative Standardised Approach
	Advanced Measurement Approach	Internal Measurement Approach Loss Distribution Approach Scorecard Approach

Standardised Approach

The Standardised Approach (SA) is based on observable characteristics of the exposure. It provides fixed-risk weights for each supervisory category. Banks may use external ratings if approved by the national supervisors. For loans considered past-due, the recommended risk weight is 150 percent, unless already provided for. In the absence of any external rating, a risk weight of 100 percent is recommended. A new element of 'credit mitigants' consisting of an extended range of collaterals has been added to the Basel II accord. It also expands the range of external guarantors who meet certain minimum criteria of external credit ratings. The Retail segment has been modified to the extent that the risk weights for household mortgages are reduced and some loans for small- and medium-sized enterprises can be included in the retail segment.

Internal Rating Based Approach

There are two approaches which have been added in the new accord: they are foundation and advanced IRB. Banking-book exposures are to be

classified as (a) corporate, (b) sovereign, (c) bank, (d) retail, and (e) equity. The four quantitative inputs needed for IRB calculations for exposure to corporate, sovereign, and bank entities are: Probability of default (PD), which measures the likelihood that the borrower will default over a given-time horizon; Loss given default (LGD), which measures the proportion which will be lost from exposure in case the default occurs; Exposure at default (EAD), which for a loan commitment measures the amount of the facility that is likely to be drawn if a default occurs; and Maturity (M), which measures the remaining economic maturity of the exposure.[5] For retail exposures there is a single advanced IRB approach using the three inputs, PD, LGD, and EAD. Specialised lending is dealt with separately. Specialised lending has five sub-classes: (a) project finance, (b) object finance, (c) commodity finance, (d) income-producing real estate, and (e) high volatility commercial real estate. Under retail, the three sub-classes of exposures are: (1) exposures secured by residential properties, (2) qualifying revolving retail exposures, and (3) all other retail exposures. Banks working with IRB need to treat the equity exposures separately. The two approaches have some fundamental differences. Foundation IRB is based more on values set by the Committee, whereas the Advanced IRB largely uses estimates drawn by the bank.

Securitisation framework

According to the Committee, exposures arising from traditional and synthetic securitisation of similar structures that contain features common to both should apply a securitisation framework. The capital treatment of securitisation exposure must be determined on the basis of economic substance and not on legal substance. Banks must hold capital against all securitisation exposures. There are two approaches provided by the Committee for a securitisation framework: SA and IRB. The use of IRB is subject to the approval of the bank's supervisors.

Islamic financial institutions' exposure to credit risk is different and unstructured as compared to conventional financial institutions. Credit risk arises at different time intervals in a contract, and thus is highly dynamic and difficult to accurately estimate. Credit risk is more concentrated in contracts which are large in number. Both the approaches, standardised and IRB, as proposed by Basel II, cannot be applied to Islamic banks without several modifications. The applicability, even after modifications, does not appear to be clear. The highly distributed credit risk in Islamic banking across different products and time-lines warrants the need for an alternative or an amended approach to the Basel II methodology. A more detailed analysis of the estimation of credit risks in Islamic finance is presented in chapter 4.

Market risk

The Committee described detailed methods for the calculations of capital charges for (1) interest rate risk, (2) equity position risk, (3) foreign exchange risk, and (4) commodities risk. It provides several alternatives for assessing capital charge for options. The capital charge for interest rate is applied to the current trading book items. The capital charge for foreign exchange risk may exclude structured foreign exchange positions. The committee has prescribed two alternative models to measure market risk: the Standardised Measurement Approach and the Internal Model Approach.

Standardised Measurement Approach

The Standardised Measurement Approach deals with interest rate risk, equity position risk, foreign exchange risk, commodities risk. It also provides guidelines for the treatment of options. The minimum capital requirement for interest rate and equity exposures is based on two different charges calculated for 'specific risk' and 'general risk'. Regarding the foreign exchange risk exposures, there are two processes which are prescribed by the Committee. The first measures the exposures in a single currency and the second measures the risk inherent in long and short positions in different currencies. Commodity risk covers all the commodities except gold, which is covered under foreign exchange risk. The Committee addresses the complexity involved in the calculation of commodity risk. The commodity risk includes basis risk, interest rate risk, and forward gap risk. There are two approaches prescribed under the calculation of commodity risk exposures: a simplified approach and a maturity ladder approach with a time-band of seven steps (0 to 1 month, 1 to 3 months, 3 to 6 months, 6 to 12 months, 1 to 2 years, 2 to 3 years, and over 3 years). In both cases, the methodology adopted for measuring commodity risk should encompass directional risk, forward gap, and interest rate risk as well as basis risk.

Internal Model Approach

The use of the Internal Model Approach (IMA) is subject to the approval of the bank's supervisors. There are several qualitative criteria prescribed by the Committee for using IMA. These include: a regular back-testing programme, on-going validation of internal risk models, a routine and rigorous programme of stress testing, and an independent review of risk management systems. For interest rate, the risk measurement system should model the yield curve using one of the generally accepted approaches and it must incorporate separate risk factors to capture spread risk. For foreign

exchange, the risk measurement system should incorporate risk factors corresponding to the individual foreign exchange currencies. A more detailed approach for different industry sectors can be used for equity risk. For commodity prices, risk factors should correspond to each commodity market. Financial institutions using IMA must compute 'Value at Risk' on a daily basis using the 99th percentile with one-tailed confidence interval.

Classifying the risk exposures according to the Pillar 1 requirements is thus the first step towards ascertaining the capital adequacy. A template has been provided in Table 3.2 for the calculation of the total risk exposures under the three risks – credit, operational, and market – as described by Pillar 1. The template provides all alternatives in one place and thus can be used for all approaches; however, it is only suggestive and should be used after suitable adaptation.

Market risk exposures are mainly concentrated in commodity prices and foreign exchange in Islamic banking. Interest rate risk is not present in Islamic financial institutions directly, although it affects the position of the institution through mark-up rates. Equity price risk in Islamic financial institutions is through *Mushãrakah* and *Mudãrabah* financing. The Basel II recommendations of SMA and IMA do not fit directly for Islamic banking. Commodity risk is clearly visible in almost all types of contracts in Islamic banking, such as *Mushãrakah*, *Mudãrabah*, *Murãbaha*, *Salam*, *Istisnã*, and *Ijãrah*, as discussed in detail in the previous chapter. Due to the absence of regular hedging tools such as derivatives, the exposure of Islamic banks for foreign exchange is larger and more difficult to manage. A detailed analysis of market risk management in Islamic financial institutions is presented in chapter 5.

Operational risk

One of the major changes in the Basel II accord has been the recognition of operational risk as an important category of risk. With increasing reliance on technology, operational risk has acquired new dimensions. Operational risk is another area where a new approach has been developed under Basel II. Although a new field, reasonable clarity exists as far as the application of operational risk is concerned in the Basel II accord. Operational risk under Basel II includes legal risk, but excludes strategic risk and reputational risk. There is loss event-type classification provided by the Committee which can be used as a base to develop the bank's own classification based on the organisational needs (Table 3.3). The Committee stresses the need for adequate data collection to manage operational risk and provides three approaches for calculating operational risk capital charge with increasing

Table 3.2 Template for the calculation of the credit risk exposures as per Pillar 1 under Basel II

Credit risk
Standardised Approach
– Corporate
– Banks
– Sovereign
– Commercial real estate exposures
– Residential real estate exposures
– Other real estate exposures
– Qualifying revolving retail exposures
– Other retail exposures
Total standardised approach
Foundation IRB
– Corporate, sovereign and bank
– Equity portfolios
– Residential mortgage
– Qualifying revolving retail exposures
– Other retail exposures
Total foundation IRB approach
Advanced IRB
– Corporate, sovereign, and bank
– Equity portfolios
– Residential mortgage
– Qualifying revolving retail exposures
– Other retail exposures
– Total Advanced IRB approach
Securitisation exposures
Total of credit risk exposure
Operational risk
Operational risk under
– Basic Indicator Approach
– Standardised Approach
– Advanced Measurement Approach (AMA)
– Total of operational risk exposure

Continued

Table 3.2 Continued

Market risk
Market risk under
– Standardised Approach
– Interest rate risk
– Equity position risk
– Foreign exchange risk
– Commodity risk
Total of Standardised Approach
– Internal Models Approach
Total of market risk exposure

sophistication and risk sensitivity. The Basic Indicator Approach and Standardised Approach are directed towards banks with less significant operational risk exposures. The Advanced Measurement Approach is recommended for banks with a developed risk management framework.

Basic Indicator Approach

The Basic Indicator Approach (BIA) is a simple approach provided by the Committee for banks with non-significant risk exposures. This approach provides for a standards capital charge of average annual gross income over the past three years multiplied by a factor of 0.15 (known as alpha), which is given by

$$K_{B/A} = \left[\sum(GI_{1\ldots n} \times \alpha)\right]/n \tag{3.2}$$

where:

$K_{B/A}$ = the capital charge under the Basic Indicator Approach
GI = annual gross income, where positive, over the previous three years
n = number of the previous three years for which gross income is positive
α = 15%, which is set by the Committee, relating to the industry-wide level of required capital to the industry-wide level of the indicator.

There is no criterion prescribed under Basel II for using BIA except that banks that use BIA are encouraged to comply with the Committee's guidelines on Operational Risk as provided in *Sound Practices for the Management and Supervision of Operational Risk*.[6] It is recommended

Table 3.3 Detailed loss event type classification

Event type	*Category*
Internal fraud	Unauthorised activity Theft and fraud
External fraud	Theft and fraud System security
Employment practices and workplace safety	Employee relations Safe environment Diversity and discrimination
Clients, products and business practices	Suitability, disclosure, and fiduciary Improper business or market practices Product flaws Selection, sponsorship, and exposure Advisory activity
Damage to physical assets Business disruption and system failure	Disaster and other events Systems
Execution, delivery, and process management	Transaction capture, execution, and maintenance Monitoring and reporting Customer intake and documentation Customer/Client account management Trade counterparties Vendors and suppliers

Source: BCBS, International Convergence of Capital Measurement and Capital Standards, Basel Committee on Banking Supervision, Basel, June 2006, Annexure 9, pp. 305–307

that banks using BIA should attempt to move on to SA or AMA in the future.

Standardised Approach

The Standardised Approach (SA) is superior to BIA in terms of risk sensitivity. It provides specific risk weights for each business lines. Eight business lines are prescribed in the Basel II document. A factor beta (β) representing a proxy for the industry-wide relationship between the

operational risk loss experience and gross income for the specific business line is prescribed. The total capital charge is given by:

$$K_{TSA} = \left\{\sum_{years\ 1-3} \max\left[\sum (GI_{1-8} \times \beta_{1-8}), 0\right]\right\} / 3 \tag{3.3}$$

where:

K_{TSA} = the capital charge under the Standardised Approach

GI_{1-8} = annual gross income in a given year, as defined in the Basic Indicator Approach, for each of the eight business lines

β_{1-8} = a fixed percentage, set by the Committee, relating to the level of required capital to the level of the gross income for each of the eight business lines. The values are described in Table 3.4.

The main differences between the two approaches are the risk weight assigned for the business. In BIA, a common risk weight of 15 percent is allocated for all the business activities. More risk-sensitive values ranging from 12 percent to 18 percent are used in SA, depending on the business lines. Hence, banks have an incentive to move on to SA.

Advanced Measurement Approach

Under the Advanced Measurement Approach (AMA), the risk measure is generated by the bank's internal operational risk measurement system using quantitative and qualitative criteria prescribed by the Committee. The use of AMA is subject to approval of the bank's supervisors. Under AMA, a bank

Table 3.4 Beta factors for the different business lines

Business lines	*β factor*
Corporate finance (β_1)	18%
Trading and sales (β_2)	18%
Retail banking (β_3)	12%
Commercial banking (β_4)	15%
Payment and settlement (β_5)	18%
Agency services (β_6)	15%
Asset management (β_7)	12%
Retail brokerage (β_8)	12%

Source: BIS, International Convergence of Capital Measurement and Capital Standards, A Revised Framework, BCBS, Basel, June 2006, p. 147

is allowed to use risk mitigation to an extent (maximum 20 percent) of the total operational risk capital charge. Some of the criteria for using AMA are:

- The bank must have an independent risk management function.
- The bank's internal operational risk measurement system must be closely integrated into its day-to-day risk management processes.
- There must be regular reporting of operational risk exposures and loss experiences.
- The bank's operational risk management system must be well documented.
- Internal and/or external auditors must perform regular reviews of the operational risk management processes and measurement systems.
- If the minimum regulatory capital requirement is to be based on unexpected losses alone, then the bank must demonstrate that it has measured and accounted for its expected losses through internal business practices.
- The bank's risk measurement system must be sufficiently 'granular' to capture the tail of the loss estimates.
- The bank needs to have a credible, transparent, well-documented, and verifiable approach for weighting the fundamental elements, including: use of internal data, relevant external data, and scenario analysis.

Operational risk exposures appear to be higher in Islamic banks. The BIA approach as indicated by Basel II does not appear to be a case of perfect fit for Islamic banking. The 15 percent provision for operational risk of the average of three years gross income needs to be examined thoroughly before any implementation. The different risk weights as proposed in the SA under Basel II are not entirely applicable to Islamic banking. The allocation of 18 percent risk weight for business lines such as corporate finance, trading and sales, and payment and settlements may not represent the true picture of the risk exposures of Islamic banks as trading and sales in Islamic banking may include some *Murãbaha* transactions and some exposures from financing of large accounts through *Istisnã*. The 15 percent

risk weight allocated to commercial banking and agency services needs to be further examined before applying to Islamic banks. Retail banking, asset management, and retail brokerage has been allocated 12 percent risk weight in SA, which does not fully apply to Islamic banking. As discussed in chapter 2, *Murãbaha* financing is most commonly used for retail funding, such as car financing, etc. The risk exposures differ greatly during different stages of the contract and hence a blanket weight of 12 percent does not represent a true risk exposure. *Istisnã*, which is generally used to finance large accounts, appears to carry high risk from the analysis presented in chapter 2, Figure 2.15. The risk weight of 18 percent, if classified as corporate, or 12 percent, if classified as retail, does not appear to map the exposure completely. Operational risk management is further discussed in chapter 6.

PILLAR 2: SUPERVISORY REVIEW

The second Pillar of Basel II goes beyond the importance of supervisory review and establishes it at the core of risk management activity. It is believed that, as risk profiles change due to increasing complexities of the business, banks may take greater risks by hiding behind the existing risk framework, which may not be adequate to manage the new exposures. The role of supervisors is thus important in reviewing the constantly changing risk positions. The supervisory review process is to ensure that banks develop and use better risk management techniques. The Committee cautions that increased capital should not be taken as the only option for addressing increased risks confronting the bank. It advises the use of other means to address risks, such as: strengthening risk management, applying internal limits, strengthening the level of provisions and reserves, and improving internal controls. Capital should not be treated as a substitute for inadequate control or risk management processes. It focuses on three main areas: credit concentration risk, Interest Rate Risk (IRR) in banking books, and business cycle risks. The four key principles of supervisory review are:[4]

1. Banks should have a process for assessing their overall capital adequacy in relation to their risk profile and a strategy for maintaining their capital levels.
2. Supervisors should review and evaluate the banks' internal capital adequacy assessments and strategies, as well as their ability to monitor and ensure their compliance with regulatory capital ratios. Supervisors should take appropriate supervisory action if they are not satisfied with the result of this process.

3. Supervisors should expect the banks to operate above the minimum regulatory capital ratios and should have the ability to require the banks to hold capital in excess of the minimum.

4. Supervisors should seek to intervene at an early stage to prevent capital from falling below the minimum levels required to support the risk characteristics of a particular bank and should require rapid remedial action if capital is not maintained or restored.

Regarding the interest rate risk in the banking book, the Committee held the opinion that it is most appropriate at present to treat it under Pillar 2 of the framework. For credit risk, the bank must ensure that it has sufficient capital to meet the Pillar 1 requirements. Supervisors must review the credit risk stress test. When the banks use credit risk mitigation techniques, they give rise to residual risks which include legal risks, documentation risks, liquidity risks, etc. The supervisors should be concerned particularly about the residual risks when credit risk mitigation techniques are used. Identifying risk concentrations as the single most important cause of major problems in banks, and since they are not covered by Pillar 1, the Committee places the responsibility of reviewing them onto the supervisors. Risk concentration is any single exposure or group of exposures which can produce large losses. Since lending is the most common activity of the banks, credit risk concentrations can be a threat to the stability of the bank. A Counterparty Credit Risk (CCR) should be in place including identification, measurement, management, approval, and internal reporting of CCR. Regarding operational risks, the Committee suggests that supervisors should verify if the capital requirement under Pillar 1 is consistent and comparable with the industry standards. The Committee recommends enhanced communication and co-operation among supervisors of different countries.

Some of the recommendations of Basel II in Pillar 2 can be applied to Islamic financial institutions. Some of the specific recommendations which can be applied to Islamic financial institutions are:

Strengthening risk management system

Applying internal limits

Strengthening the level of provisions and reserves

Improving internal controls

Focus on credit concentration risk

Focus on business cycle risks

A few of the other recommendations, although very relevant for conventional banks, do not hold grounds for Islamic banks in the absence of supporting risk management models. Liquidity risk, which is classified as residual risk, is one of the most important risks in Islamic banks. Conventional banks have a strong inter-bank facility, strong overnight borrowing facility from the Central Bank, and a matured and liquid secondary market. Liquidity management is of paramount importance in Islamic banks due to the absence of regular inter-bank money market, overnight credit lines from the Central Bank, and secondary market. Liquidity risk management is thus at the core of risk management in the Islamic bank. Hence, Basel II recommendations on liquidity risk management under Pillar 2 are generally insufficient for Islamic banks. Credit risk concentration recommendations are applicable to Islamic banks since they have large credit exposures.

PILLAR 3: MARKET DISCIPLINE

The main objective of Pillar 3 – marker disclosure, is to compliment the minimum capital requirement and supervisory review process. Market disclosure is considered essential since it can provide effective means for consistent and comparable information. Market discipline can contribute to a safe and sound banking environment as required by the supervisors. Supervisors can use moral suasion, reprimands, and financial penalties to enforce disclosures. Realising the broader coverage of disclosures under accounting standards, the Committee has narrowed the scope of disclosure under Pillar 3 to avoid conflicts. The disclosures should be based on the materiality concept. The Committee did not set specific thresholds for information disclosure and rely on the users' test as a benchmark. The disclosures should be made semi-annually. There are clear guidelines regarding the capital disclosure. For Tier 1 capital, there should be separate disclosure relating to each category. In case there are any innovative, complex, or hybrid capital instruments in the capital, they should be summarised under their main features. There are specific guidelines for disclosure of credit risk exposures. The major quantitative disclosures regarding credit risk exposures include: major types of credit exposures, geographic distribution of exposures, industry type distribution of exposures, residual contractual maturity breakdown of the entire portfolio, amount of impaired loans, and the amount of exposures under each approach.

The absence of comparable information is one of the main issues in Islamic financial reporting. Since AAOIFI is not mandatory, there have been limited implementations, and the problem of non-comparability remains. Basel II recommendation regarding consistent and comparable information

is highly applicable to the Islamic financial industry. Due to social commitment attached to Islamic finance, there is a special need for market disclosure. Transparency is considered to be at the core of Islamic financial contracts and thus should also be reflected in reporting. It is mandatory to report the investment of funds, lines of business, activities, and sources of revenue. Along with this, as Basel II recommendations under Pillar 3, risk management details should also be made public. Basel II could not answer all the risk management issues for Islamic financial institutions; hence, there has been a need for alternative and supportive standards on risk management for Islamic financial institutions. The release of the Islamic Financial Services Board (IFSB) principles on risk management has been an important step in the direction of risk management in Islamic financial institutions.

IFSB PRINCIPLES OF RISK MANAGEMENT

As discussed in the previous chapter, the risk exposures of Islamic financial institutions differ substantially as compared to conventional banks. Due to the PLS nature of contract as well as the changing relationship between parties over time, a variety of risk exposures are introduced at different stages of the transaction. Safety and soundness of Islamic financial institutions and the Islamic financial market in general is thus a common cause of concern among regulators. Conventional models of risk management and supervision cannot be applied without modifications to the Islamic institutions. The Basel II standards have been developed with a conventional bank's perspective and hence do not apply to the Islamic financial institutions without suitable modifications. With the growing size of Islamic banking and financial industry all over the world, there have been efforts to develop prudent supervisory norms. Setting up of the IFSB is a consolidation of these efforts. The IFSB started its operations in March 2003 and is based in Kuala Lumpur. It serves as an international standard-setting body of regulators and supervisory agencies that have interest in the soundness and stability of the Islamic financial services industry. The work of the IFSB complements that of the Basel Committee on Banking Supervision, International Organisation of Securities Commission, and International Association of Insurance Supervisors. At the time of writing this book, there were 110 members of the IFSB, consisting of regulators, IMF, World Bank, BIS, IDB, ADB, commercial banks, and other institutions. One of the objectives of the IFSB is to promote the development of a prudent and transparent Islamic financial services industry through introducing new, or adapting existing, international standards consistent with *Shariah* principles and recommending these for adoption. In December 2005, the IFSB released the Guiding Principles of Risk Management and Capital

Adequacy Standard for Institutions (other than Insurance Institutions)[7] exclusively for Islamic financial services (IIFS). The following paragraph is a summary of these guidelines, which is based largely on the original document issued by the IFSB. Guidelines issued by the IFSB are in the form of fifteen principles focusing on six major risk areas of Islamic finance: credit risk, equity investment risk, market risk, liquidity risk, rate of return risk, and operational risk. A brief summary of these standards is provided in Table 3.5.

Table 3.5 The IFSB guidelines on risk management

Risk	*Principle*	*Guideline*
General requirement	Principle 1.0	IIFS shall have in place a comprehensive risk management and reporting process
Credit risk	Principle 2.1	IIFS shall have in place a strategy for financing, recognising the potential credit exposures at various stages of the agreement
	Principle 2.2	IIFS shall carry out due diligence review
	Principle 2.3	IIFS shall have in place an appropriate methodology for measuring and reporting the credit risk exposures
	Principle 2.4	IIFS shall have in place *Shariah*-compliant credit risk mitigating techniques
Equity investment risk	Principle 3.1	IIFS shall have in place appropriate strategies, risk management, and reporting processes in respect to the risk characteristics of equity instruments
	Principle 3.2	IIFS shall ensure that their valuation methodology are appropriate and consistent
	Principle 3.3	IIFS shall define and establish the exit strategies in respect of their equity investment activities
Market risk	Principle 4.1	IIFS shall have in place appropriate framework for market risk management
Liquidity risk	Principle 5.1	IIFS shall have in place a liquidity management framework
	Principle 5.2	IIFS shall assume liquidity risk commensurate with their ability to have sufficient recourse to *Shariah*-compliant funds

Continued

Table 3.5 Continued

Risk	*Principle*	*Guideline*
Rate of return risk	Principle 6.1	IIFS shall establish a comprehensive risk management and reporting process to assess the potential impact of market factors affecting rate of return on assets
	Principle 6.2	IIFS shall have in place an appropriate framework for managing displaced commercial risk
Operational risk	Principle 7.1	IIFS shall have in place adequate systems and controls
	Principle 7.2	IIFS shall have in place appropriate mechanisms to safeguard the interests of all fund providers

Note: IIFS – Institutions (other than Insurance Institutions) offering only Islamic Financial Services

Source: Guiding principles of risk management, Islamic Financial Services Board, December 2005, Kuala Lumpur

IFSB principles for credit risk

The IFSB principles are based on specific products and are applicable to profit-sharing assets (*Mushãrakah* and *Mudãrabah*). Due to their exposure to capital impairment, the IFSB suggests rigorous risk evaluation. The credit risk associated with securitisation and investment activities should also be taken into account while ascertaining total credit risk exposures. The IIFS can have credit risk exposures relating to receivables and lease (*Murãbaha*, *Diminishing Mushãrakah*, and *Ijãrah*) and working capital financing (*Salam*, *Istisnã*, and *Mudãrabah*). The IFSB focuses on default, downgrading, and concentration risks relating to credit risk. Since the IIFS can assume the role of financiers, suppliers and partners, they face risk relating to deferred payment and bad delivery of assets. For example, the risk can be related to delayed delivery of the subject-matter of *Salam* or *Parallel Istisnã*. Due to the changing nature of the relationship at different contractual stages, the commencement stage of credit risk may be different for different products. Hence, the IFSB advises to assess credit risk separately for each Islamic financial instrument. It addresses the integrated risks, where other risks give rise to credit risk. The IFSB recognises the high cost of default due to prohibition of penalty for default in some jurisdictions.

The Board of Directors should define and set the overall level of risk appetite, risk diversification, and asset allocation strategies, geographical spread, seasons, currency, and tenor. For example, in the case of *Salam* contracts, the IIFS may enter into the contract during a season when the products are most likely to be delivered and sold at maturity. Non-binding promise and legal enforcement may give rise to operational risk. Hence, the IIFS should ensure that (a) the expected rate of return on a transaction is commensurate with the risk incurred; and (b) excessive credit risk and risk concentration are managed effectively. Referring to the due diligence process, the IFSB recommends that counterparty reviews must be undertaken, especially where significant investment risks are present in participation. The review may include evaluation of business purpose, operational capabilities, enforcement and economic substance and realistic forecast of estimated future cash flows. Risk mitigation structure should be used wherever possible. The IFSB recommends taking up help from appropriate experts, including *Shariah* advisors and other industry experts for evaluation of new projects. For financing involving several related agreements, the IIFS should ensure that all components of the financial structure are contractually independent. The IIFS should establish limits on the degree of reliance and the enforceability of collaterals and guarantees and should formally agree with the counterparty regarding the utilisation of collaterals. The delicate issue of remedial action is approached with caution by the IFSB. There are two types of suggested measures: administrative and financial. The former includes: negotiations, debt-rescheduling, debt-restructuring, using debt-collection agency, legal action, and making a claim under *Shariah*-compliant insurance. The latter includes: imposing penalties and establishing the enforceability of collateral or third-party guarantees. For leased assets under *Ijãrah, Shariah*-compliant insurance coverage is advised.

Equity investment risk

This part of the chapter deals with risks inherent in the equity instruments which are held for investment purposes, particularly instruments based on *Mushãrakah* and *Mudãrabah*. On a cautious note, although both these instruments contribute substantially to IIFS's earnings, they include market, liquidity, credit, and other risks. Since both are profit-sharing financing, they are exposed to capital impairment risk. IIFS should agree with *Mudarib* and/or *Mushãrakah* partners on the appropriate valuation method for profits before entering into the contract. The IFSB provides a note of caution on overstatements or understatements of partnership earning. IIFS should have exit strategies for investments. Realising the difficulty of having liquidity for profit distribution, IIFS should agree with partners on methods of treatment of retained profits.

Market risk

Market risk exposure may occur at certain times throughout the contract period. Market risk exists in the case of tradeable, marketable, or leaseable assets and off-balance sheet individual portfolios. This risk is related to current and future fluctuations of market values of assets. In operating *Ijãrah*, the lessor is exposed to market risk on the residual value on premature termination of the lease. Similarly, in *Salam*, the IIFS is exposed to commodity price fluctuations on a long position. In the case of *Parallel Salam*, failure of the counterparty may expose the IIFS to commodity price risk, since it will have to be procured in spot market to honour the *Parallel Salam* contract. The IFSB suggests using *Shariah*-compliant methods to hedge the foreign exchange exposures. It also suggests establishing a sound and comprehensive market risk management process and information system. For valuation of assets with no direct market prices, the IIFS should have its own valuation of market risk positions. The IIFS should clearly define their risk appetite which is adequately supported by the related capital.

Liquidity risk

For the IIFS, there are two major types of fund providers: current account holders (CAH) and unrestricted investment account holders (UIAH). The UIAH are more prone to market information regarding rate of return, financial conditions, and *Shariah* rulings relating to IIFS. Any adverse event can trigger an exodus of these account holders, causing a serious liquidity crisis. Hence, a detailed analysis of UIAH with details of their expectations and incentives should form part of net funding requirements. IIFS should have liquidity management policies covering:[8]

- strategy for managing liquidity
- framework for developing and implementing sound processes for measuring and monitoring liquidity
- monitoring and reporting liquidity exposures on a periodic basis
- adequate funding capacity, including willingness and ability of shareholders to provide additional capital if needed
- access to liquidity through fixed asset realisation and options such as sale and lease-back
- liquidity crisis management

The quantitative factors addressed in the risk management policy will include: diversity and sources of funds, concentration of funding base, reliance on marketable assets, standby lines of external funding. The qualitative factors include: particular skills of treasury management, quality of MIS, IIFS's reputation in market. For measuring and monitoring liquidity, the IFSB has suggested constructing maturity ladders with appropriate time bands. Three types of cash flows are identified: known cash flows (as in the case of *Murãbaha*, *Ijãrah*, and *Diminishing Mushãrakah*), conditional but predictable cash flows (like *Salam* and *Istisnã*), and conditional and unpredictable cash flows (like certain categories of *Mushãrakah* – where investment is for an open-ended period). IIFS should assess maximum amounts of cumulative liquidity mismatches.

Rate of return risk

Rate of return risk (RRR) is generally associated with overall balance sheet exposures where mismatches arises between assets and balances from fund providers.[9] Relating to the importance of the RRR, it is argued that it is a strategic risk since one of the primary responsibilities of the IIFS is to manage investment account holderd expectations, and hence should form a part of the balance sheet risk management. Since RRR emanates from the balance sheet positions, the IIFS should have competent staff to undertake analysis of risk exposures arising from consolidated balance sheet activities. IIFS is exposed to increasing long-term fixed rates in the market which can affect balance sheet positions. While calculating the rate of return, IIFS can use a gapping method for allocating positions into time bands. IIFS should use appropriate cash flow forecasting techniques based on behavioural maturity and underlying assumptions and parameters. The IFSB suggests using balance sheet techniques to minimise exposures using: determining and varying future profit ratios, developing new *Shariah*-compliant instruments, and issuing securitisation tranches of *Shariah*-permissible assets. Competitive pressure may bring in displaced commercial risks, where the IIFS may waive their rights to the part of profit (*Mudãrabah*) in favour of investment account holders. IIFS should have clear and well-defined policies and procedures which should have the approval of the IIFS's board of directors. A Profit Equalisation Reserve (PER) can be formed out of gross income of IIFS which can be used to maintain a desired level of return over a period of time. This should have formal approval by the IIFS's board of directors. Similarly, an Investment Risk Reserve (IRR) can be created out of the income of investment account holders.

Operational risk

Other than the risk arising from failed or inadequate internal processes, people, and systems, the IIFS should include the risk of *Shariah* non-compliance and failure of fiduciary responsibilities in operational risk management. The risk of diminishing reputation and limiting business opportunities is also included under the operational risk. *Shariah* compliance is extremely important to the IIFS and hence a failure to comply with such principles may result in a transaction being cancelled and income being considered as illegitimate. *Shariah* compliance should be considered at the time of accepting deposits and investment funds, while providing finance and conducting investment activities for their customers. A *Shariah* compliance review should form part of existing internal or external audits. A historical database can be created consisting of cases of non-*Shariah*-compliant incomes, which can be used as a guideline for the future. The IFSB advises on limiting the risk transmission between current and investment accounts. There should be timely and adequate disclosure of material information to investment account holders and to the market. To manage a fall in the rate of return, the IIFS can set up reserves with detailed guidelines regarding transfers in and out of the reserves, thresholds for specific reserves, and closure of the reserves.

Other than these specific principles, the IFSB emphasises the role of the supervisory authority. Some of the recommendations regarding the role of supervisory authorities include: maintaining a detailed description of each instrument, developing information-sharing procedures, establishing criteria and procedures for dealing with non-wilful defaulters, and developing adequate risk management framework, policies, and procedures.

SUMMARY

Islamic financial contracts are typified by the changing relationship between the contracting parties during the lifetime of the contract. This has a direct bearing on the risk exposures. Soundness and safety for banks depend to a great extent on the capital held by them. Since capital is expensive to hold, there is a constant attempt to find the optimal mix of capital for business and regulatory requirement. The original Basel accord was the first-ever systematic attempt at a global level to provide a framework for capital adequacy. A minimum charge of 8 percent of risk-weighted capital was proposed in the original accord, which was voluntarily accepted by many countries. Due to the rapid changes on the financial canvas, the original accord proved to be insufficient to cover increasing intricacies. The new

Basel II accord revolutionised the concept of risk management. With its detailed analysis of credit, market, and operational risk, the Basel II accord brought operational risk into the realms of risk management. The three mutually enforcing Pillars are the foundation of Basel II and were discussed in this chapter.

The first Pillar concentrates on the calculation of the minimum capital charge using several optional methodologies. It provides three approaches for credit risk: SA, IRB, and Securitisation frameworks. Similarly, for market risk, SMA and IMA are proposed. There are three approaches for operational risk provided under Pillar 1: BIA, SA, and AMA. All the different approaches were discussed in this chapter. These approaches are not largely applicable to Islamic financial industry due to several reasons: first, due to the absence of rating for Islamic finance; second, due to the changing nature of the relationships during the lifetime of the contract; third, due to difficulties in estimating PDs, LGDs, and EADs for Islamic finance. On the front of market risk, Basel II has provided two possible alternatives. Market risk concentrations are very high in Islamic finance. Almost all the products are exposed to market risk in Islamic finance, including: *Mushãrakah*, *Mudãrabah*, *Murãbaha*, *Salam*, *Istisnã*, and *Ijãrah*, through commodity prices.

The calculation of operational risk exposures under Basel II uses three alternatives. Under BIA, the standard capital charge of 15 percent is used for the average gross profit of the last three years. SA goes a step further and allows for bifurcation of business lines and thus the risk weights also. The allocation of the different weights for Islamic financial activities is under review and is still not clear.

As discussed, Supervisory Review, the second Pillar of Basel II, has limited applicability for Islamic finance. Some of the common recommendations can be applicable to Islamic financial institutions. However, the liquidity risk, which is treated as a residual risk under Basel II, is one of the core risks in Islamic banking. Non-existence of inter-bank money market, daily overdrafts from the Central Banks, and secondary market makes the liquidity risk exposures very huge for the Islamic financial institutions. Credit concentration risk can also sometimes be very large in Islamic banking and Basel II recommendations can be applied in order to manage it.

The social responsibility of Islamic financial activities is of utmost importance and hence there is a great emphasis on disclosure. The third Pillar of Basel II on market disclosure is largely applicable to Islamic financial institutions. Disclosures related to business activities, profits and losses, use of funds, investments, etc., are all necessary in order to maintain the confidence of customers in Islamic financial institutions. Risk management practices in Islamic financial institutions are evolving and thus it is more

important to share this information in order to develop best practices for the industry.

The IFSB is playing a key role in the development of standards for risk management in the Islamic financial industry. Their recent release of standards for risk management is the first attempt at consolidating the efforts for bringing Islamic financial risk management under one umbrella. As shown in this chapter, the IFSB standards attempt to provide a guideline for risk management. The IFSB has recognised six major types of risks in the Islamic financial industry: credit risk, equity investment risk, market risk, liquidity risk, rate of return risk, and operational risk. The IFSB has released 15 principles covering these risks. It recognises the credit risk exposures at different stages of the contract. It focuses on both types of credit risk, exposures relating to receivables and lease as well as working capital financing. The exposures for equity investment risk are mainly through *Mushãrakah* and *Mudãrabah*. The IFSB suggests identifying methods for the treatment of retained profits to avoid difficulties of liquidity arising out of profit distributions. According to the IFSB, market risk exists for tradeable, marketable, and off-balance sheet individual portfolio. Banks may use *Shariah*-compliant hedging tools for managing foreign exchange exposures. The volatility related to UIAH poses the liquidity risk for Islamic financial institutions. Some of the suggested ways to manage liquidity includes diversification of sources of funds, concentration of funding base, and a standby line of external funding. Rate of return risk is generally on balance sheet exposure. Islamic financial institutions should use appropriate cash flow forecasting techniques. The IFSB suggest the creation of a profit equalisation reserve and investment risk reserve.

Basel II is primarily for conventional banks and thus does not offer a great help to Islamic financial institutions. However, in line with any other industry guidelines, some of the principles of risk management as proposed in Basel II are applicable to the Islamic financial industry. The fundamental role of capital cannot be changed and thus the role of risk management in any institution.

NOTES

Disclaimer: Note that neither the Basel Committee nor the BIS have endorsed the summary and are not liable for any misinterpretation that may or may not occur during or due to the summarisation as appearing in the text. Please note that the original text of the Basel II guidelines is available free on the BIS website at www.bis.org

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CHAPTER 4

Credit Risks in Islamic Finance

INTRODUCTION

Credit risk appears when a financial institution is expecting a payment that has been contractually agreed between the institution and the counterparty and the obligors are unable – or in other words defaults – to fulfill their obligations. Credit risk also initiated also when there is a change or underestimation in the rating of the counterparty. Financial institutions that provide Islamic financial products are also exposed to credit risk because of the emphasis on lending in the *Murãbaha*, leasing in the *Ijãrah*, promising to deliver or to buy in *Istisnã* and *Salam*, and investing on business performance in the *Mushãrakah* and *Mudãrabah* contracts. Financial problems related to either the individual counterparties (i.e. health problems) or to more general economic situations (i.e. market recession) may be some of the reasons for the obligors to default.

Islamic contracts are very much driven by agreements that have unique and individual characteristics. Such characteristics are more qualitative in nature and are not always well defined and recorded in comparison to the more conventional contracts. For instance, during the lifetime of Islamic contracts there could be cases of unclear definition of whether and how the credit risk exposure is covered from guaranties and collaterals. Another important aspect that should be noted is that, due to relatively recent implementation of Islamic financial contracts, there is limited information about the qualitative as well as quantitative criteria used to set the contracts. In addition, the above institutions are facing challenges of introducing new or modified structures of the existing contracts and portfolios. Note, finally, that the increasing number of bankruptcies globally and the competitive spreads in loans and the risk-adjusted credit policies are some of the reasons that renders credit risk assessment more important than ever before.

Factors such as globalisation of financial markets, economic conditions of the country, and individual cultural characteristics in different regions and

markets increase the complexity of credit risk management. In contrast to the conventional contracts, the majority of credit risk assessments for the Islamic financial products are based on subjective analysis. Banks that are operating in Islamic regions or providing Islamic contracts are in many cases motivated by information stemming from different obligors, and the result may be subjective and based on experts to approve (or not) the contracts, e.g. a *Murãbaha* contract. Traditionally, financial institutions were placing great emphasis on the relationship with their customers; however, nowadays institutions must also be able to predict and then consider the behaviour of their customers in terms of their payment obligations. Having a great number of borrowers with different financial statuses and from various market sectors, financial institutions have to apply techniques and methodologies for implementing sophisticated models in order to upgrade their credit risk management systems and approve or reject in an objective way the applications for Islamic contracts. Therefore, a wide variety of credit models have been built in order to measure credit risk and provide reliable estimates for credit risk parameters such as the probability of default (PD) and loss given default (LGD).

This chapter consists of three sections that deal with qualitative- and quantitative-based credit risk assessment models. Furthermore, it gives a description of credit risk parameters and credit rating systems and their validation.

CREDIT RISK EXPOSURE IDENTIFICATION

In credit risk exposure analysis, a key factor is the identification of the relations between the counterparties, the Islamic financial contracts and the

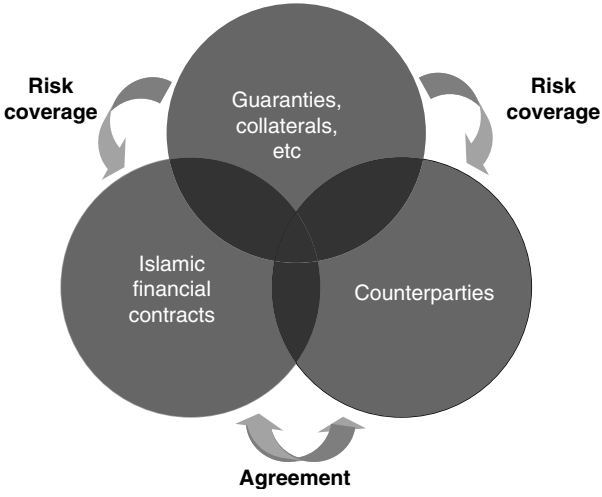

Figure 4.1 Relations between the Islamic financial counterparties and contracts and the guaranties and collaterals

guaranties and collaterals used to cover a percentage of the potential losses in the case of defaults. More analytically, each counterparty is linked with one or more contracts; moreover, it may be linked with other counterparties defined as guarantees and collaterals. In reality, within the institution there are many counterparties that may be linked to several contracts. In addition, many Islamic financial contracts are linked to a great number of counterparties and many different types of guaranties and collaterals are used to cover in parallel the exposure of several contracts and counterparties. Bearing in mind that these three parties are linked together with different degrees, such as in regards to the contracts' lifecycle or in regards to the coverage from guaranties and collaterals, the problem of identifying and measuring the credit risk exposure is a complicated process.

Counterparties

In the structure of the Islamic financial products, counterparties are all the parties that are involved in the Islamic contract agreements and partnerships. Thus, in the *Murãbaha* and the *Salam* contracts, alongside the bank, both the seller and buyer are considered as the counterparties. Accordingly, in the *Ijãrah* contracts the renters/lessees and in the *Istisnã* contracts the buyer, user contractor, or manufacturer are the counterparties accordingly. Finally, in the *Mushãrakah* and the *Mudãrabah* partnership agreements, the business partners and agents are the corresponding counterparties.

As mentioned previously, what really matters in the credit risk exposure analysis is to have a system in place that links all counterparties with the involved contracts. Also, there is a need to show the links with guaranties and collaterals that will be used to cover the risks in case of defaults. For instance, a counterparty may agree with an institution on several *Murãbaha* and *Istisnã* contracts, and at the same time may also have a *Mushãrakah* partnership business agreement, as illustrated in Figure 4.2. On the other hand, as can be seen from the same Figure 4.2 several counterparties can also be linked to the same contract; for instance, counterparties A and D participate by 5 and 95 percent accordingly on a *Mushãrakah* contract; whereas in the *Istisnã* contract there are three different counterparties: A, C, and D. Furthermore, different collateral and guaranties may cover several counterparties and contracts directly or via other counterparties. For instance, the *Istisnã* contract is directly collateralised by 30 percent from the collateral C; also indirectly by the counterparties A and C that are collateralised from collateral/guaranty A (25 percent) and B (5 percent) respectively.

Another important issue is that collaterals or guaranties may be linked with other collaterals or guaranties that have different ratings; such groups must be well defined and linked according to the degree of dependence and rating. Any group of the same contracts or a link between them must also be

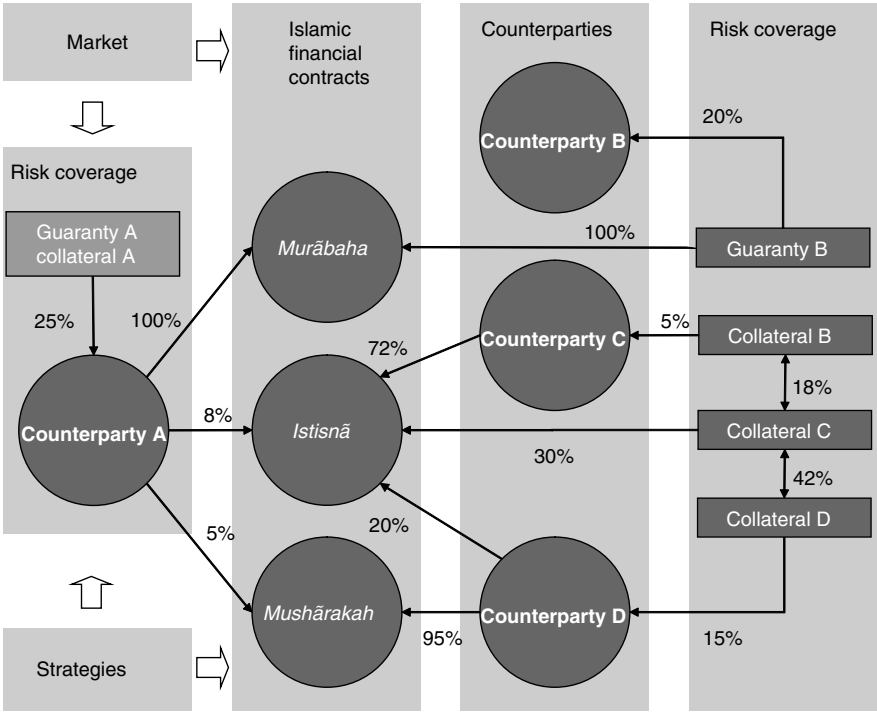

Figure 4.2 Representation of the links between a counterparty with several contracts and risk coverage by several guaranties and collaterals

identified. Note that market conditions and the institution's strategies influence the behaviour of the counterparties as well as the performance of the Islamic products. In a case where the counterparty is unable to fulfil its payment or delivery obligations related to one or more contracts, the institution is exposed via several other contracts that are linked to the same counterparty. Bear in mind that in many such cases, a default in one contract may cause a consequence of defaults to the others. Of course, there are cases where the loss in case of default is relatively small due to collaterals or guaranties that are applied. Collaterals or guaranties, however, must be rated at a level that would enable then to cover the potential losses initiated from the defaults of counterparties. Summarising the above, in counterparty analysis the following points should be considered:

- The market conditions and the institution's strategies that may influence the counterparty's behaviour
- The type and the volume of the contracts where the counterparty is linked, defining also the degree of participation

- The links between the contracts that refer to the same counterparty
- The rates of the guaranties and collaterals and their inter-links, as well as the links to the contracts and counterparties. Note that the counterparties must be covered by guaranties and collaterals that are rated with a higher grade.

In Islamic finance where there may be special identification in regards to the ratings for the guaranties and collaterals, financial institutions may have only certain indications of the actual risk coverage to their contracts' exposure. However, such indications must be defined quantitatively and be part of the risk management system. The assessment of the counterparties is also related to qualitative criteria such as the external or internal rating, the industry, or the geographical location.

CREDIT RISK ASSESSMENT MODELS

The definition and implementation of the methodologies used for modelling credit risks is an important issue to be considered by the risk analysts. In this section, different methods and techniques for developing models for credit risks that are arising from Islamic products are described. Moreover, the assumptions in this modelling are also highlighted. The corresponding advantages and disadvantages of the models are also discussed to evaluate their use at the implementation phase.

Qualitative methods – expert systems

Financial institutions are assessing the creditability of the borrower that agrees on Islamic financial contracts based on qualitative methods. Such methods define systems that are based on the judgement of experts who are involved in the credit-approval process. The resulting expert systems combine the analysis of the credit-worthiness of the obligor with the practical experience and observations of the experts who apply the analysis. Therefore, the quality of empirical models of expert systems is very much dependent on how accurately they depict the subjective experience of financial experts. Most commonly, the factors that are considered in the assessment process of the credit-worthiness analysis of the obligor are determined empirically; moreover, their influence and weight in the overall assessments are based on subjective experiences.

The design of the expert systems is driven by rules that combine the criteria used for the expert's judgements. The aim of such systems is to design and then combine expert rules by taking into consideration experiences related to the behaviour of the client. Moreover, the rules must consider any

information related to the type of contracts, the market conditions, as well as any other factors that influence the client's behaviour.

More analytically, the general practice is that the experts, based on their experiences, are predefining several credit-worthiness characteristics that are playing an essential role in the future behaviour of the obligor. Based on a predefined rating scale, the degree of credit-worthiness is rated accordingly. Each rating is driven by the individual qualitative characteristics of the obligor that refer to his/her expected behaviour. For instance, qualitative criteria that are related to family, educational, and professional background may be used to evaluate and mark the degree of rating correspondingly, according to the experts' subjective opinion concerning the specific obligor. The above-mentioned ratings may also be determined by other factors such as the actual type of contracts that the client has agreed on, the conditions referring to the future market conditions (for instance, economic recession), and to market risk factors. Note that credit officers assign ratings that are based on financial ratios, opinions on quality management, and other data.

The aforementioned ratings are then linked to a risk value that is defined qualitatively, i.e. 'low', 'below average', 'medium', 'above average', and 'high'. These risk values may correspond to a scale of quantitatively crisp grades. Finally, the individual factors' grades are combined to produce an overall assessment grade. Summarising the above, the credit risk assessment based on qualitative criteria involves the following steps:

1. The experts are rating the obligor based on predefined qualitative credit-worthiness characteristics together with some additional factors that may influence the client's behaviour

2. The links for the ratings are defined in a qualitative manner that is determined by the experts

3. The quantitative base risk grade drives the level of risks

4. The individual grades are aggregated to generate an overall assessment. Note that the aggregation process may use expert system's aggregation rules, which cannot be influenced by the credit analysts.

Financial institutions should rate qualitatively the credit-worthiness of the client based on as much information as possible and well-defined subjective criteria that may be driven by objective factors.

Figure 4.3 illustrates the expert process as discussed above.

As mentioned above, based on qualitative criteria, the expert has to identify the expected behaviour of the client under some circumstances that may influence their ability to keep their promise in regards to the Islamic

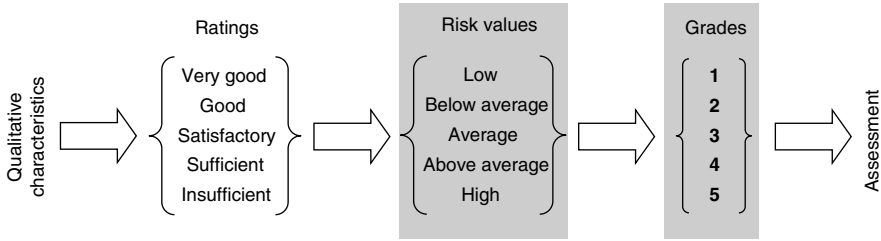

Figure 4.3 Model layout of the expert system for credit risk assessment

financial contract as agreed. Thus, by applying the *Murãbaha* contract, the 'experts' of financial institutions are facing the challenge of how to identify the criteria that will evaluate whether the client – or, in other words, the 'buyer' – of the goods will comply with the agreed payment obligations that are set as instalments on fixed time buckets.

In *Ijãrah* leasing financial contracts, the financial institution that plays the role of the lessees should define rules and criteria that are related to future behaviour of the counterparty (lessor) that may expose the institution to credit risk, such as covering cases of early leave based, for instance, on the type of the asset or service that is being rented (i.e. car, house, business property, or service, etc.) and its dependency on the external (market, business, and operational) factors.

In the *Mushãrakah* and *Mudãrabah* partnership type of contracts, the qualitative criteria that financial institutions may define and apply to assess the credit risk exposure are more subjective and rather complex. The default on expected cash flows is mostly related to the actual resulting business profit, where the financial institution may be directly or indirectly responsible.

It is important, finally, to highlight that, by providing Islamic contracts, financial institutions need to justify whether the client's guaranties, beyond the actual goods, commodity, or physical assets contained within the contract, will be able to cover any case of a default from the buyer's side.

Quantitative methods

The use of quantitative methods for assessing credit risks that financial institutions are exposed to by providing Islamic financial products are based mainly on quantitative statistical-based models. There are mainly two types of information data that financial institutions can consider for modelling the credit risks that they are exposed to:

- the data that refer to the past and current behaviour of the counterparty (i.e. lender, partner, etc.) and
- the data that defines the losses of the associated risks.

By building quantitative models, risk analysts may have to make several assumptions and therefore there is a level of uncertainty that can influence the results of the model. For instance, there may be an uncertainty for the factors that might be difficult to predict, or an uncertainty for the correctness of the estimation of parameters, and thus uncertainty of how close the model is to reality. Wrong assumptions, or wrong explanations of the assumptions, may result in an incorrect development of a model that may also lead to wrong decisions.

In the construction of the quantitative methods, risk analysts should follow processes with certain steps that need to be concrete and adequately validated so as to avoid a 'black-box' nature of the model. The main steps are presented as follows:

- *Identifying the availability and accessibility of historical data, data clearance, unification, and selection to be used for credit financial risk analysis.*

  Due to several systems installed within different departments and banking business sectors, the data availability and accessibility may become a complex process. Nowadays, financial institutions tend to use data-warehouses where, in a single location, all financial data can be stored and shared by various analytical departments. The IT system engineers must be able to perform some cleansing of the data – processes that enhance data quality such as converting all dates to a common date format and using one unique code per counterparty. Additionally, there must be a clear definition and identification process in regards to the meaning of the financial data that are stored in data-warehouses in a logical and unified way. Consider, for instance, the case where, although each transaction system works with the concept of notional value, the name of this field varies across transaction systems. One system might call it 'notional value', another 'nominal value', and yet another 'current principle' or 'balance'. Such information is not unified even though they are stored into a common warehouse.

  Moreover, the accuracy, efficiency, and appropriateness of data are very important issues, so that the model is built not only upon a sufficient number of data but also upon real and representative data of the population. The selection and aggregation of the available information data should be set in a system that extracts, transforms, and loads them to a risk management system tool.

  In credit risk analysis, it is very crucial that the model is built upon a sufficient amount of information referring to the defaults of the obligors. The percentage of such failures to obligations should be at least 25 percent of the sample. This is because in reality the financial institution usually has low-defaulted portfolios and a big number of non-defaulted

clients. The remaining 75 percent of the sample is the percentage of the clients that succeed in their payment obligations.

- *Simulating data used for the credit financial risk analysis.*
  Based on mathematical approaches, on scenarios, or even on their combination, information data can be generated to be used for credit financial risk analysis. Using mathematical techniques, one approach is to 'shock' the existing historical data and generate slightly different behaviour in regards to the creditability of the obligator. On the other hand, using some scenarios of future behaviours, data can be generated accordingly. Note, however, that by applying simulation techniques the resulted data are dependent on the selected mathematical methodologies as well as the assumptions made for the scenarios.

- *Determination of model methodology.*
  The model that should be used for assessing credit risks could be based upon empirical methodologies as mentioned above or based on quantitative statistical methodologies. Alternatively, a combination of the two methodologies may form hybrid models, as is mentioned in the following paragraph. It is important to know that by applying models that are based fully or partly on quantitative information, the functional relationship of the model should be well defined.

- *Assessment of the parameters of the model.*
  The parameters that are used in the construction of the model should be scientifically established to ensure a good predictive power of the model mapping, performance, and stability.

- *Qualitative and quantitative validation.*
  It is important that the performance of the model and the stability of the parameters are validated on an ongoing basis.

- *Conclusions.*
  By applying quantitative models, the resulting conclusions need to be very carefully extracted, based upon the appropriateness of the model, the application of the parameter assumptions, and the proper choice of the confidence levels. The model should also be assessed by human judgement. This is for the risk analysts to ensure that it performs well and has good predictive power (forward-looking model). Note that the human judgement should take into consideration all other relevant information that the model is unable to consider.

Financial institutions that are providing Islamic financial products are facing the challenge of developing and applying quantitative-based models.

Banking information systems that are performing in Islamic markets are usually dealing with many problems in regards to the data clearance and unification. Moreover, cultural issues play an important role in keeping information data referring to borrowers' behaviour and/or to the resulting losses due to credit risks. Added to this, the legal issues in collecting information related to borrowers are critical in several markets offering Islamic financial products.

Hybrid models

The combination of empirical-based models with the quantitative-based models result in the hybrid form of credit-assessment models. In practice, by using only empirical or only quantitative models, financial institutions may have poor and inadequate forward-looking results. Quantitative-based models, on one hand, have the great advantage of evaluating in an objective way the methods and results related to the prediction of the obligors credit-worthiness. At the same time, quantitative models are unable to take into consideration all the credit-worthiness factors, and so very important information on the borrowers' characteristics would be lost in individual cases without the empirical help of credit experts. The objectivity of quantitative systems in the elaboration of quantitative data combined with the superiority of empirical systems in the incorporation and analysis of qualitative criteria leads to a better classification of risks. The above-mentioned combined model could employ advance fuzzy logic systems that use both the qualitative empirical systems expressed as linguistic rules and the results from the quantitative analysis. Nonlinear functions are used to express mathematically the qualitative linguistic terms of the rules for applying such model integration.

CREDIT RISK VALUATION

The main parameters that should be considered in the valuation of credit risks are the expected and unexpected losses. The calculation of the expected and unexpected losses requires the calculation of the probability of default (PD), the loss given default (LGD), and the exposure at default (EAD). Their definitions and estimation is one of the main challenges that financial institutions are facing nowadays. Moreover, defining the occurrence of default should also be clearly set by the institution. The modelling of credit risk is entirely based on the estimation of the probability of default and the loss given default.

Defaults

In general, from the institution's point of view, default occurs when there is a loss that is initiated from the counterparty's inability to comply with its

obligations. However, as there is no standard definition of what constitutes a default there are different definitions that may be used for different purposes. Specifically, for the typical Islamic financial contracts default occurs either due to payment inability such as in the *Murãbaha* and *Ijãrah* contracts, or due to delays and/or failures of deliveries referring to a commodity or constructed asset at the agreed date, i.e. in the *Salam* and the *Istisnã* Islamic financial contracts. In the case of the *Mushãrakah* partnership financial contract, the responsibilities for the defaults that refer to the inabilities of payments or delays on deliveries are shared, to a certain degree, between the institution and the business partner(s). Finally, in the *Mudãrabah* partnership agreement, the occurrence of default is relatively unclear as it refers to the delays or inabilities to repay in regards to the expectations from the business venture counterparty.

What is defined as inability of repayments or delays in repayments may be subjective to the institution that is providing such contracts. Time is usually set to a fixed amount of days and may differ from one region/market to the other and correspondingly from the different regulatory bodies (for Basel II, the days to default for credit risk is set to 90). It is important to highlight, however, that the definition and the measurement criteria referring to the different types of defaults should be clearly explained and defended to the regulators in regards to their use in the evaluation of the institution's exposure.

Probability of default (PD)

The Probability of Default (PD) for the Islamic financial products is the likelihood that the counterparty will be unable to comply with his/her payment and/or delivery obligations.

Specifically:

- For the *Murãbaha* contracts, it is the likelihood that the buyer of the goods (counterparty) will be unable to re-pay the instalments that he/she is obligated to.
- For the *Ijãrah* contracts, it is the probability that the lessee (counterparty) will be unable to re-pay at instalment points or at the end of the contracts (according to what have been agreed). Moreover, it could be the probability of any early leave, from the lessee side, before the contract's maturity date.
- For the *Salam* contracts, it is the probability from the seller's (counterparty) side to default on delivering the commodity at the delivery date. On the other hand, it is also the default probability from the buyer (counterparty) to buy the commodity at the agreed price.
- Similarly to the *Salam* contracts, for the *Istisnã* contracts, from the manufacturers and/or constructors (counterparties) side, it is the likelihood

of default on delivering the commodity or constructed asset at the delivery date. Moreover, for the financial institution, it is the probability of not receiving the agreed selling price from the buyer or user (counterparty).

- In the *Permanent Mushãrakah* contracts of partnership where the business partner(s) has the role of the counterparty, it is the likelihood for the business to default in providing the expected cash. However, in the *Diminishing Mushãrakah* contracts, it is the probability that the partner(s) (counterparty) default on buying the equities at the agreed pre-fixed price using the instalment basis.
- In the *Mudãrabah* contracts of partnership agreement and during the investment period, it is the probability that the business venture (counterparty) defaults in carrying on the business development and/or the project's implementation. Moreover, during the profit and loss period it is the likelihood that the business venture defaults in providing the expected profit.

The estimation of the PD for the Islamic financial products is one of the most challenging issues for financial institutions. The main steps that are commonly used for this purpose are:

- Analysing the credit risk aspects of the counterparty;
- Mapping the counterparty to an internal risk grade which has an associated PD; and
- Calculate the PD.

In general for the calculation of the PD, the credit history of the counterparty and the nature of the investment are taken into account. There are several approaches that financial institutions could implement for estimating the counterparty's probability of default. Most of them are based on qualitative and/or quantitative models as discussed in the previous section. Past information data referring to the counterparties can be used to evaluate the corresponding behaviour. Such information for the PD calculation may come either by extracting them from the existing historical databases, or by observing the current data, or by simulating future market conditions and counterparty behaviours that are driven by predefined scenarios.

Probability of Default is the most straightforward parameter to estimate using data available from the credit institutions. However, by using readily available data, estimating PDs is very difficult, because it is assumed that the credit institution will keep reliable records about the behaviours of the credit assets and to efficiently estimate some other parameters necessary for its estimation. Thus, many banks are using external ratings agencies such as

Egan Jones, Fitch, Moody's Investors Service, or Standard and Poors for estimating the PDs.

Estimating the probability of default

The estimation of the probability of default is rather a difficult task, but not as much as the LGD. The main challenge for estimating the PD is to define the criteria set to form the quantitative as well as the qualitative definition of default. In most cases the two types of criteria are complementary to each other in the sense that quantitative criteria should be assessed after using qualitative ones. For instance, the criteria referring to the 'unlikeliness-to-pay' clause in the Basel II document (see Basel Committee on Banking Supervision, 2005[1]) should be first assessed qualitatively and then quantitatively. Note, finally, that the definition of default should be based on the nature of the credit products under study.

Quantitative criteria

Statistically based, the probability of default (PD) for a specified class of Islamic financial contracts, e.g. the one based on *Murãbaha* financial contracts, is defined as the number of such contracts that were defaulted during a certain period of time. Thus, the annual default rate or probability of default is the percentage rate of the contracts that were defaulted in relation to the total portfolio of contracts during the period of one year, while the biannual default rate is the same measure for a period of two years. Mathematically expressed, the probability of default for 'Contracts' within the period t (i.e. one year) is represented as in the following equation (4.1):

$$PD_t = \frac{DC_t}{TC} \times 100 \tag{4.1}$$

where PD_t is the annual percentage probability of default, DC_t is the number of defaulted contracts during the period t under examination, and TC is the total number of contracts of the examined class.

For the different types of financial Islamic contracts and their underlying assets, the definition of their defaults on, for example, payment, delivery, expected profit, is based on criteria that are derived either from the financial institution or from the regulators. Therefore, for the normal *Murãbaha* financial contracts, default is the inability or insufficiency of the debtors to pay a substantial portion of their lend capital for a predefined set period (such as three months or 90 days).

Quantitative criteria should be set therefore in regards to the parameters such as 'portion', which may refer to the loan or renter payments in the *Murãbaha* and *Ijãrah* contracts respectively, to the sales of the commodities or assets in the *Salam* and *Istisnã* contracts, and to the profits in the *Mushãrakah* and *Mudãrabah* contracts of partnerships. Accordingly, the parameter named 'period' could be referred to the delays in payments or deliveries as defined in the construction of the Islamic contracts described in chapter 2. Moreover, the qualitative criteria could also be combined to define the default driven by their inter-relation. For instance, in regards to the two aforementioned criteria, when the amount of payment instalments in the *Murãbaha* contract or deliveries in the *Salam* and *Istisnã* contracts is high, then the buffer period for the obligor to default is increasing accordingly.

The 'materiality' is another point that must be clarified in order to provide a concrete definition of the probability of default. The 'materiality' notion coincides with the meaning of 'substantiality'. The most common implied definition that banks consider as 'material' is the fact that the debtor is unable or unwilling to pay the instalments (including or not the profit), to buy or to deliver the asset as agreed for more than μ consecutive months (usually, μ is set as three or six months). This is the level after which the 'road' to default is irreversible for a certain confidence level.

All approximations assume that the single measure of PD is estimated by averaging a number of annual estimations of PDs realised during different past years. The averaging should be extended to a sufficient number of years in order to cover a full economic cycle. Nonetheless, the estimation of PD should contain a forward-looking element in order to protect the financial institution from anticipated future loses arising from credit risk.

Based on the scheduled payments, repayments, or deliveries, the estimations of PD for μ number of past due months can be defined by replacing the DC_t in (4.1) with $\sum_{i=1}^{n} d_i$. Thus, the probability of default is found as in the following equation (4.2):

$$PD_t = \left[\left(\frac{\sum_{i=1}^{n} d_i}{TC} \right) \times 100 \;\middle|\; d_i = 1, \forall \left(\frac{TPDAI_i}{CAI_i} \times \frac{M}{AIF_i} \right) > \mu \right] \tag{4.2}$$

where n is the number of loans or underlying assets within the credit portfolio, d_i is a parameter that equals to zero (0) if the loan or underlying asset is 'active' or equals to one (1) if it is 'in default', *TPDAI* is the total past due amount of instalments or delivery for the agreement i, CAI_i is the contractual amount of instalments or payments that had to be paid since the

first past due amount had appeared, M is the number of months for the period t (that is, 12 for an annual period), AIF_i is the frequency of instalments or deliveries (if more than one) within a period t that is usually set as a year.

Case Study A simple example concerning fixed monthly repayment instalments of a *Murãbaha* contract is illustrated by the following Table 4.1 of default events.

The Probability of default for every year is estimated by applying equation (4.1). Thus, the PD for the first composition of the *Murãbaha* contract portfolio is:

$$PD_{2006} = \frac{DC_{2006}}{TC} \times 100 = \frac{60}{8600} \times 100 = 0.69\%$$

The PD for the second period and the composition of the portfolio is estimated by, first, subtracting the already defaulted loans from the total number of loans. The remaining number of outstanding, 'healthy', loans is 9,000 minus the 40 defaulted ones, resulting in 8,960 loans; assuming, however, that none of the defaulted loans during the last period have returned into 'healthy' ones. Thus, the contracts that have remained defaulted should be subtracted from the total portfolio. As a result, the PD is given by:

$$PD_{2007} = \frac{DC_{2007}}{TC} \times 100 = \frac{80}{(9300-60)} \times 100 = 0.86\%$$

Table 4.1 Different cases for estimating the probability of default based on quantitative criteria

Period for measuring the defaults	*Sum of the examined loan class*	*Number of defaulted loans*	*Probability of default*
31 Dec 2005–1 Jan 2007	8,600	60	0.69%
31 Dec 2006–1 Jan 2008	9,300	80	0.86%
31 Dec 2007–1 Jan 2009	10,500	90	0.91%

Based on the above consideration, in the third period and during the composition of the portfolio, PD is also given by:

$$PD_{2008} = \frac{DC_{2008}}{TC} \times 100 = \frac{90}{(10000-60-80)} \times 100 = 0.91\%$$

Finally, if the three-year period from 2006 to 2008 is conceived as a full economic cycle period, the PD, applied in the forthcoming calculations for the estimation of credit risk, is the average value of the above-mentioned separate annual PDs. Hence, the PD is given by:

$$PD_{2006} = \frac{DC_{2006} + DC_{2007} + DC_{2008}}{3} = 0.82\%$$

The above-mentioned calculation is rather a statistical one and this is based on actual past information of default cases.

Qualitative criteria

In many cases the estimation of the probability of default needs more than the aforementioned quantitative definitions to effectively describe the credit-standing of the debtor. Thus, the 'unlikeliness-to-pay' is a qualitative criterion that refers to cases where the debtor, albeit that it has not been exceeding the threshold of μ months, is observed to be unlikely to pay its obligations to the bank. Note, moreover, that the qualitative criterion 'unlikeliness-to-pay', as well as the quantitative set period μ after which the contract (i.e. *Murãbaha*) is considered as default, are both unclear in the estimation of the probability of default.

Using qualitative criteria, most of the times they are driven by the quantitative ones. Therefore, the 'materiality' referring to the past payment instalments or defaults of a debtor (or type of debtor) is the quantitative element that is considered in the behaviour analysis of the same contract or similar ones that have been defaulted. In other words, and going back to the historical events, the risk manager should separate all default events according to the quantitative definition of default and then establish the aforementioned level as the 'materiality' that the risk manager is pursuing. Bear in mind, however, that the past behaviour may give only a part of the truth about the future behaviour of the obligator. Such analysis is very much dependent on the qualitative criteria that the risk analyst has to set according to the availability of the corresponding quantitative information that will support the analysis. For instance, the past payment instalments of a debtor under study that refers to a *Murãbaha* short-term loan may give a minor indication for the future rental payments in the long-term *Ijãrah* contract.

Failure to choose the right selection of qualitative and quantitative criteria will most probably give a wrong profile in terms of the debtors' creditability.

Exposure at default (EAD)

Exposure at default (EAD) is the estimation of the institutions' exposure in the event of, and at the time of, counterparty defaults. Based on the Basel Credit Risk Model, the potential exposure, in currency, is measured for the period of 1 year or until the maturity date, whichever comes first. Under Basel II, a bank must provide an estimate of the exposure for each transaction, commonly referred to as Exposure at Default (EAD), in a bank's internal system. All these loss estimates should seek to fully capture the risks of an underlying exposure.

Under the foundation approach proposed by Basel II, the EAD is calculated by taking into account the underlying asset, forward valuation, facility type, and commitment details. It is important to note that guarantees, collaterals, or securities are not considered (i.e. the estimation ignores Credit Risk Mitigation Techniques with the exception of on-balance-sheet netting, where the effect of netting is included in Exposure At Default). For on-balance-sheet transactions, EAD is identical to the nominal amount of exposure. If the advanced approach is applied, banks are allowed and obliged to determine the appropriate EAD to be considered for each exposure. However, in this case, the bank will need to demonstrate to its supervisor that it is able to meet additional minimum requirements pertinent to the integrity and reliability of these estimates. All estimates of EAD should be calculated for any specific provisions where a bank may have raised against an exposure.

Loss Given Default (LGD)

Loss Given Default (LGD) is a weighting of the loss when a default occurs. After realising that a default has taken place, financial institutions that have granted a credit to an obligor try to recover the outstanding amount of the defaulted event. The LGD is derived within a credit risk model by taking into account any collateral or security that covers the corresponding loss due to the default. If a credit institution fully recovers the outstanding amount (exposure at default), the resulting loss would be zero. However, the procedure of the loss coverage may take a long time, in many cases several years, and thus there are various elements that should be taken into account within this period.

In the case where the procedure is long-term, all the cash flows are shifted to an unknown future date, but not necessarily to the same date. The payments of the agreed amount or the deliveries that are received at a future

date are not worth the same (most of the time, less) than if they were received or delivered according to the original schedule. The financial institution may also face liquidation problems, i.e. from default of payments in *Murãbaha* contracts, as well as inability to fulfil its own obligations, i.e. defaulting to deliver in *Salam* and *Istisnã* contracts. In addition to the actual cost resulting from the default, the procedure for collecting the outstanding amount assumes some administrative costs. Such additional costs may include operational costs and legal costs, such as cost incurred when suing the obligator and the costs of lawyers.

The loss given default (LGD) is usually defined as the ratio of losses to exposure at default (EAD). There are broadly three ways of measuring LGD:

- Market LGD, which is based on the observed prices from the market soon after the time where the actual default event occurs. This is the market price of the goods in the *Murãbaha* contract, the market rental in the *Ijãrah* contract, the commodity or asset price in the *Salam* and *Istisnã* contracts.
- Workout LGD, which is based on the estimated cash flows, result from the contracts that default considering the timing of the event. This is the expected cash flow from the payments in the *Murãbaha* contract, from the renter in the *Ijãrah* contract, from the sales of the commodities or assets in the *Salam* and *Istisnã* contracts, and from the profits in the *Mushãrakah* and *Mudãrabah* contracts of partnerships. Note that this method is more complicated than the directly observed market LGD.
- Implied Market LGD, which is an entirely different approach to obtain an estimate of LGD. It considers the 'credit spreads' of the (much larger universe of discourse) non-defaulted, but however risky, cases in Islamic contracts that may result in defaulted events.

An important parameter to estimate in the identification and assessment analysis of the LGD is the estimation of the recovery rate (RR). When the EAD is expressed in absolute terms – that is, in its nominal value at the time of default – the recovery rate is expressed in percentage terms, as shown in the following equation (4.3):

$$RR = \frac{\sum_{i=1}^{T}\left[\frac{\omega_i + \psi_i - \varphi_i}{(1-\lambda)}\right]}{EAD} \times 100 \tag{4.3}$$

where ω_i is the variable attributed to the recovered part of the asset paid in cash by the obligor at time interval i, ψ_i is the variable attributed to the

recovered part of the potential collateral related to the asset at time interval i, φ_i is the variable attributed to all administrative costs realised at time interval i, and λ is the variation of market value in percentage. Note that, as it is very difficult to assign costs or receivables at a specific point in time, financial institutions should be permitted to assign them using time intervals (yearly or shorter time buckets). In this case, the cash inflows and cash outflows are assumed to be realised at the end of the time interval. Note, finally, that the accuracy of recovery rate increases when the time interval decreases.

The LGD is related to the recovery rate as defined in the following equation (4.4):

$$LGD = 1 - RR \tag{4.4}$$

As mentioned above, the LGD parameter increases its value in relation to the collateral asset. Thus, the LGD parameter relies heavily on the nature of the asset. If the asset is not backed by a collateral asset, the LGD will be high; if the asset is backed by a collateral asset, the LGD will be lower.

The calculation of the LGD is one of the most challenging tasks for financial institutions. Some of the main reasons that make such estimation so difficult are:

- the availability of quality data for defining the default, assessing the recovery from the collaterals, and estimating the cost resulting from the defaults;
- the different priorities of payments in relation to other payments the obligor is past due;
- the legal regime for collections before or after the obligor declares itself bankrupt may differ from country to country;
- the legal regime for collections before or after the obligor declares itself bankrupt may differ from time to time throughout the collection period;
- the uncertainty of the duration of cash payments made by the obligor.
- the continuous changes (variations) in the market values of the assets that are directly applied in equation (4.3).

Credit value-at-risk based on expected and unexpected losses

In market risk, the actual returns on assets are used in order to construct the returns' distribution of a specific product, or the returns' distribution of a

portfolio of products. This distribution is the basis for market VaR estimation, driven by the notion of maximum loss for a certain confidence level and a pre-specified holding period. Similarly to market risk, the estimation of the credit VaR is based on the distribution of the actual losses observed in a credit portfolio considering also certain confidence level and a pre-specified loss-holding period. Note that, in market risk, the assumption that usually underlies the distribution of the portfolio is that it follows multivariate normal distribution. On the other hand, credit risk portfolios are likely to follow distributions that are close to lognormal.

There are two types of losses, notably expected and unexpected, that are considered in the estimation of Credit VaR. These losses are placed in the map of loss distribution as illustrated in Figure 4.4. In principle, the expected loss is related to the loss that a financial institution may incur during its ordinary business. Therefore, financial institutions are able to continue their operations by simultaneously having a certain level of losses. In the Basel II framework, this level of losses is related to the level of provisions that a bank should set aside in order to cover these losses. On the other hand, unexpected loss is the loss that a financial institution may face under extreme circumstances that lie beyond the level of expected losses.

The Expected Credit Loss (ECL) is calculated based on the PD, LGD, and EAD as shown in equation (4.5):

$$ECL = PD \times LGD \times EAD \tag{4.5}$$

Taking into account that the EAD depends on the culture and specific policy of the individual financial institution, in this analysis it is assumed to

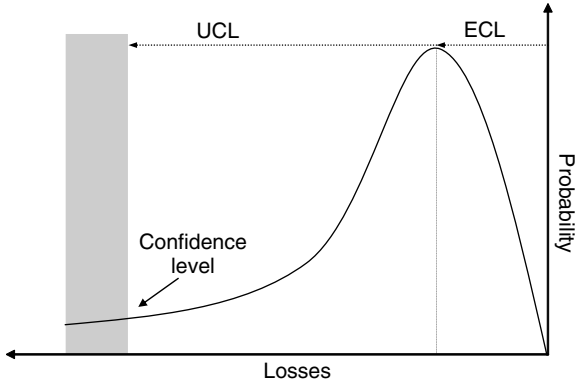

Figure 4.4 Distribution of expected and unexpected losses in credit risk

be one unit currency. Based on the above assumption, the estimation of the expected credit loss defined in equation (4.5) transforms into equation (4.6):

$$ECL = PD \times LGD \tag{4.6}$$

The Unexpected Credit Loss (UCL), on the other hand, is based on full parametric approaches and thus can be represented as in the following equation (4.7):

$$UCL = \sigma_{credit} \times m \tag{4.7}$$

where m is the appropriate quantile of the credit loss distribution, in order for the model to reach the credit VaR confidence level given by equation (4.8):

$$m = \frac{VaR_{credit}^{(\bullet,\bullet\bullet)} - EL}{\sigma_{credit}} = \frac{UL}{\sigma_{credit}} \tag{4.8}$$

where $VaR_{credit}^{(\bullet,\bullet\bullet)}$ is the measure of Credit VaR for • confidence level and •• holding period, and σ_{credit} is the volatility of the individual asset expressed in terms of the volatility of PD and LGD as defined in the following equation (4.9):

$$\sigma_{credit} = \sqrt{PD \times \sigma_{LGD}^2 + LGD^2 \times \sigma_{PD}^2} \tag{4.9}$$

Using the distribution illustrated in Figure 4.4, the ECL and UCL are distributed over a target horizon. The credit VaR is then measured as the deviation away from ECL as defined in equation (4.10):

$$VaR_{credit}^{(\bullet,\bullet\bullet)} = ECL - UCL \tag{4.10}$$

Based on the above equation (4.10), the difference between credit VaR and expected loss defines the unexpected credit loss as in equation (4.11):

$$UCL = ECL - VaR_{credit}^{(\bullet,\bullet\bullet)} \tag{4.11}$$

The credit VaR refers to the unitary one that is the VaR used to quantify the risk of a unique credit element, such as a single *Murãbaha* contract. In reality, however, there are multiple assets in a credit portfolio. The analysis of correlations between the portfolio's assets is particularly useful for the estimation of the LGD of a credit portfolio. Moreover, in the multiple assets portfolio, the correlations between the defaults that have occurred on its different assets are used in the estimation of the portfolio's PD. Note that the

former type of correlation is named 'assets correlation' and the latter 'default correlation'. The analysis of the assets correlation is performed in a similar way to the returns in market risks. On the other hand, the analysis of the default correlation is based on the cases and the degree where a default in one asset may or may not cause another asset to become defaulted. In turn, using the default correlations, the standard deviation $\sigma_{p,\ credit}$ of the credit portfolio is estimated as illustrated in equation (4.12):

$$\sigma_{p,\ credit} = \sqrt{\sum_{i=1}^{n}\sum_{j=1}^{n}\rho_{ij}UL_iUL_j} \tag{4.12}$$

where ρ_{ij} is the correlation coefficient for assets i and j and it is given by equation (4.13):

$$\rho_{ij} = \frac{P(D_i \times D_j) - PD_i \times PD_j}{\sqrt{PD_i \times (1-PD_i)}\sqrt{PD_j \times (1-PD_j)}} \tag{4.13}$$

where $P(D_i \times D_j)$ is the correlation between the defaults on assets i and j.

In the case of parametric models and based on equation (4.7) and the standard deviation ($\sigma_{p,\ credit}$) defined in equation (4.12), the corresponding UCL of the credit portfolio is given by the equation (4.14):

$$UCL_p = \sigma_{p,\ credit} \times m \tag{4.14}$$

Note that the assumption in the above definition of the UCL is that the portfolio follows the same probability distribution as the individual asset. The unexpected loss of the portfolio of credit assets consists of the sum of the unexpected losses of the individual assets a that the portfolio comprises of, as defined in equation (4.15):

$$UCL = \sum_{i=1}^{a} UCL_i \tag{4.15}$$

Economic capital and Credit VaR

The Credit VaR estimation should be viewed as the economic capital to be held as a buffer against the UCL. This is because the estimation of the economic capital considers the risk arising from the unexpected nature of the losses as distinct from expected losses (as illustrated in Figure 4.4), which are considered as part of doing business and are covered by reserves and incomes. Thus, in credit risk, economic capital is required as a cushion for an institution's risk of unexpected credit default losses, because the actual level of credit losses suffered in any one period could be significantly higher than the expected level. Note that economic capital covers all unexpected

events except the catastrophic ones, for which it is not possible to hold capital.

In economic capital estimation, there is no common agreement on the definitions referring to key parameters such as confidence level and time horizon that should be well defined and set. Most of the time during the estimation of the economic capital, credit institutions choose a higher confidence level; for instance, more than 99 or 99.9 percent that is usually fixed by the regulatory authorities. Moreover, the time horizon in economic capital calculation may also vary. Financial institutions that provide Islamic products should apply a time horizon that reflects the contracts that may construct the institution's accounts of their portfolios. Thus, when portfolios of *Mushãrakah* and *Mudãrabah* contracts are considered, the time horizon may need to be long (years) in the estimation process of the corresponding economic capital. On the other hand, the confidence level referring to accounts or portfolios for the *Murãbaha* contracts should be set on a high degree to align with the expected value of credit risk.

Loss data and Credit VaR estimation

The suitability of the methodologies used for producing efficient estimations of the Credit VaR is related to the loss data distribution and thus should be assessed within the context of the corresponding availability of historical loss data. Thus, financial institutions may keep records in regards to the losses resulting from the counterparty defaults of re-payments in *Murãbaha* and *Ijãrah* contracts. Moreover, in the *Salam* and *Istisnã* contracts, the losses initiated from the delays of the sellers, manufacturers, and/or constructors. Also, the losses resulted from the corresponding payment inability from the buyers or users. Financial institutions should also know the history of their losses concerning their *Mushãrakah* and *Mudãrabah* partnership agreements.

Within financial institutions, the above-mentioned data may only be fully or partly available, or in some cases are even missing completely. Therefore, as will be discussed in the following paragraphs, different techniques should be employed, depending on the availability or non-availability of the loss data.

Fully available historical loss data

In the case where financial institutions have full availability of historical loss data, there are two methodologies that could be applied for estimating the Credit VaR. These are the historical simulation method as well as the variance–co-variance method applied to historical losses.

When the availability of historical loss data refers to a long time period, for the entire distribution of losses, the credit VaR can be estimated either

over the entire observation period, named 'inter-temporal credit VaR', or based on an individual period, e.g. year, named 'year-in-time credit VaR' estimation. In the former case, data need to be collected in large quantities for each year, attributing each loss to the respective credit asset. The sequence of annual credit losses comprises time series of credit losses. In the second case, where only one year is considered, the credit loss observed should be attributed to each asset or each asset class. Note that asset classes exhibit similar characteristics, behaving similarly in the marketplace, and are subject to the same laws and regulations. Optimally, a completed and constructing credit loss distribution should include the loss that has appeared during the past year (365 days) for each day and each asset class. The loss for each asset should be accounted for in the year in which it appears. Consequently, there would be daily observations for annual losses for every year and every asset class.

Partly available historical loss data

Most financial institutions do not have adequate historical loss data that can be used for the construction of the entire probability distribution over the entire period of time. Thus, in many cases the historical data referring to existing past losses are only partly available, which means that the adequacy of the historical database is unable to fully aid the credit risk analysis for estimating the Credit VaR. Therefore, when historical loss data are missing, the most appropriate methodology to model credit losses should be based on both available historical data and Monte Carlo simulation.

For instance, if for each year there is availability of only scattered and scarce data of asset losses then, based on these data, the Monte Carlo simulation should be applied. This method defines a number of the possible simulated distributions of the loss data for each single year. To complete the construction of the credit loss evolution, Monte Carlo simulation should be applied on each asset or asset loss for multiple years.

Lack of historical data

In order to estimate the loss distribution, financial institutions that lack historical loss data should apply Monte Carlo simulations. Based on the values of the assets that construct the credit portfolio, the loss distribution can be inferred. By applying Monte Carlo simulations, these asset values are shocked and thus generate new distribution of losses. However, it is important to note that, while using Monte Carlo simulations, an assumption is made about the distribution from which random numbers are drawn. This assumption should be based on the anticipated shape of the distribution of credit losses.

CREDIT RISK MITIGATION

The exposure at default (EAD) can be reduced using several mechanisms that are also recognised by Basel II. As already discussed earlier in this chapter, institutions are exposed to credit risk that is initiated from Islamic financial products and correspond to lending in the *Murãbaha*, leasing in the *Ijãrah*, promises to deliver or to buy in *Istisnã* and *Salam*, and investments failure in the *Mushãrakah* and *Mudãrabah* contracts. Moreover, institutions are exposed to additional credit risk via the guarantees, referring to the above Islamic financial products, granted by institutions, organisations, or even individuals. Institutions, however, are mitigating credit risk exposures by employing collaterals or guarantees granted by tier counterparties. A Guarantee is a contractual agreement with a third party which has a lower risk weight than the original counterparty of the exposure and will take over the claim in case of default of the original counterparty. The fraction of the exposure which is covered (by the guarantee amount) has a lower risk weight and contributes to a lower capital charge for the institution. Collateral, on the other hand, is an asset used partly or totally to secure the obligation of the counterparty by refunding the losses in the event that a default occurs.

For financial institutions using collaterals, the mitigation of credit risks is expressed in terms of reducing the EAD or LGD whenever they apply the Basel II standardised or IBR foundation approach, respectively. On the other hand, using guarantees (for the covered part of the exposure), the reduction is expressed in terms of risk weights. Taking these mechanisms into consideration, financial institutions are allowed to reduce the capital charge reserve associated to different credit risk activities. Note that the quality (credit rate) of the guarantor should be better than the quality of the direct counterparty that guarantees its exposure.

When collaterals and guaranties are applied, the financial institution should consider specific rules concerning:

1. The *eligibility* that looks at whether the operational conditions are met, and thus the institution may or may not be allowed to use specific pieces of collateral. Such conditions are defined by the regulators of central banks, IBSB,[2] Basel II, etc. The same selection mechanisms could apply in a similar way for guarantees. One should pay attention to the case where the counterparty, which exposure is to be covered by a guarantee, belongs to the same group as the one granting the coverage. There could be some accrued risk that both counterparties could experience default at the same time.
2. The *amount* of collaterals and guaranties that cover all the exposures from all contracts that are attached to the counterparty. The exposures are

summed up and the collateral amount is used to reduce the sum of the whole exposure.

3. The *allocation* of the coverage. The way that the coverage amounts from collateral and guarantees are allocated (proportionally or based on the actual risks) to reduce the risk associated to different claims.

CREDIT RATING SYSTEMS

Credit rating is indicating the credit-worthiness and the reliability of the counterparties (i.e. individuals and corporations, etc.) in regards to its financial obligations. There are different types of credit rating systems according to the rating dimensions, the rating assignment techniques, and the historical data used to produce the ratings. The degree of credit rating is mainly based on an assessment that combines both quantitative and qualitative criteria, as were discussed earlier in this chapter. Such criteria are referring to the behaviour (mainly historical) of the counterparty's in regards to their borrowing and repayments, as well as the availability of assets and extent of liabilities. Regardless of the type and the methodology used for the rating system, it should be well validated in order to give confidence in its suitability for the specific financial institution and in order that it depicts the pragmatic credit-worthiness of the obligors. Therefore, validation is the internal assessment of the credit institutions' rating system and it should involve regular reviews of the rating system's quality and suitability on the basis of ongoing operations.

Rating systems therefore consist of several credit rating grades that rank the credit-worthiness of the obligors. At the same time, the credit ratings are also indicating the relative risk on the institution's credit exposure. In most Westernised econonomies, ratings are available from other independent firms, i.e. Standard & Poor's, Moody's, and Fitch. However, many financial institutions, including the ones that are providing Islamic financial products, may hire their own credit analysts and thus prepare and use their credit ratings for internal use.

In its most widely known form, a rating system might be either expressed as letters (A, B, C, etc.) or as whole numbers – for instance, from 1 to 10; the former type of ranging expression is mainly used by the public agencies, whereas the latter is usually expressed by a bank's internal ratings. Table 4.2 provides a classification of the credit rating degrees from AAA to D. The larger the number of grades, the better, because it means better discrimination of credit risk and, at the same time, avoids granularity. Note that, for most rating bodies, the counterparties that are rated between AAA to BBB are within the investment zone, whereas lower grade, i.e. BB to D, are within the speculative zone.

Financial institutions may classify credit risks depending on obligor characteristics; in this case, the rating system is assumed to be one-dimensional. On the other hand, institutions may assess the rating based on the characteristics of the transactions and thus evaluate the loss severities; in such a case the rating system is two-dimensional. Obligor and loss severity ratings must be calibrated to values of the defaults and the loss given defaults (LGD), respectively. Therefore, financial institutions may assign obligor ratings that are associated with the PDs. Accordingly, the loss severity rating is associated with the values of the LGD, or is directly assigned to the LGD values for each transaction (facility).

There are two different types of techniques for assessing the credit rating systems, namely:

- point-in-time and through-the-cycle rating; and
- qualitative and quantitative rating.

They are both explained analytically in the following paragraph.

Point-in-time and through-the-cycle

Based on the *point-in-time* rating systems, the main driver of the assessment is the information at the time of the rating. Thus, the obligors are assigned on certain ratings according to the frequency of 'default' cases concerned within a particular time or relatively short time period, i.e. a year. Thus, the point-in-time ratings changes from one period to the other as borrowers' circumstances change, moreover including the changes initiated from the current or short time market economic conditions. Applying, on the other hand, the *through-the-cycle* rating systems, the ratings take into consideration the obligors' attitude through all the phases of the cycle, as well as distressed circumstances that might influence the obligors' credit-worthiness in the long term. Similarly to the *point-in-time*, the *through-the-cycle* ratings system should be updated from period-to-period (i.e. year-to-year) due to the corresponding changes in a borrower's conditions. However, since the *through-the-cycle* rating systems take into consideration downturns in the economy and consider stress circumstances, period-to-period ratings are less influenced by the changes in the economic environment.

Obviously, the specific short periods for the *point-in-time* and the cycle periods for the *through-the-cycle* systems that should be considered for assessing the ratings defers for the different types of the Islamic financial products linked to the counterparties. Thus, in the *Murãbaha* and *Ijãrah* contracts which are dealing with the normal repayments, the period and cycles under consideration are usually smaller that in the *Salam* and the

Istisnã contracts that mainly refer to manufacturing and/or construction projects.

In general, the *point-in-time* rating systems are more suitable for estimating the economic capital as it is taking into account the defaults for a particular period of time. It is also suitable for identifying the counterparty's credit behaviour of a loan as well as for calculating provisions. On the other hand, for long-run contracts and investment purposes, the decision-making should be based on *through-the-cycle* rating systems analysis. Rating agencies are commonly known to use *through-the-cycle* rating approaches.

Qualitative and quantitative rating techniques

In rating, financial institutions and agencies may use methodologies that are based on qualitative judgemental criteria or quantitative information data or a combination of the two. Although there are different techniques and approaches for applying them, the best choice depends on the case under consideration and the availability of the information and the risk philosophy of each financial institution.

The qualitative rating systems demonstrate the results of an empirical rating model. Empirical models are based on experts' judgement and experience. Their combination with quantitative information, as discussed later, is most appropriate. The quantitative rating systems, however, are formulated based on mathematical rating models that are capable of using and combining the available quantitative information. Such credit risk rating classification models utilise techniques based on two types of structure:

- parametric; and
- non-parametric

The first category is based on more analytical mathematical techniques where the different model parameters and their relations need to be well defined. Moreover, any assumptions made should also be defined and considered in the model's results accuracy. For rating purposes, statistical mathematical models are mainly used; however, such models are very dependent on the data quality and availability as well as the techniques used to analyse the statistical results. Poor data and analysis may provide inefficient rating results.

Non-parametric-based models are used to estimate and forecast the main components of credit risk assessment such as the PD and LGD. Such models are usually based on neural networks, expert systems, fuzzy logic systems, and multi-criteria analysis. Using neural networks, for instance, a large number of quantitative information may be used and transferred to

artificial intelligence knowledge; expert and logic management systems are capable of combining qualitative criteria with quantitative information data. By applying linguistic rules, the rating systems are designed similarly to the way the human 'experts' think; increasing, therefore, their robustness to a high degree. The linguistic rule-based expressions are simple mathematical equations and thus they allow fast and uncomplicated design of the proposed rating grading methodology, where previous knowledge on default cases may not be fully available. Moreover, using such techniques, rapid prototyping of the rating strategies can be implemented, because their design is only based on the expert knowledge and thus an immediate commencement of the implementation can be made. As a result, such techniques minimise the cost of design and implementation. Finally, and more importantly, a significant benefit in applying such an approach is the transparency of the rating process based on linguistic rules that are easy to understand and modify. However, such techniques are mainly dependent on the designer's expert knowledge; thus, a knowledgeable designer will produce more efficient rating rules.

The structure of most Islamic financial contracts has a high degree of 'qualitative' flexibility, in terms of the definition of default as well as in the assessment of grading the counterparties. As a result, a mixed based approach where both qualitative criteria and quantitative information are combined should be most appropriate for applying rating systems to such products.

Table 4.2 Classification of the levels of credit ratings with the indication of the creditability and the reliability as well as the meaning in terms of exposure

Rating Degree	*Creditability Reliability*	*Exposure*	*Meaning*
AAA	Highest	Lowest	The creditability of the counterparty is rated to the highest (best) degree – the counterparty is extremely reliable with regard to financial and/or delivery obligations and thus is exposing the institution to a lower degree.
AA	Very high	Very low	The counterparty's creditability is rated to a very high (very good) degree – the reliability of the counterparty in regard to its financial and/or delivery obligations is still very high and thus the exposure of the institution is still to a very low degree.

Continued

Table 4.2 Continued

Rating Degree	*Creditability Reliability*	*Exposure*	*Meaning*
A	High	Low	The creditability and the reliability of the counterparty to financial and/or delivery obligations are still rated high, whereas the exposure of the institution to credit risk is to a low degree.
BBB	Medium	Medium	The degree of both creditability and reliability of the counterparties may be susceptible to economic conditions, the credit risk exposure are at a medium degree.
BB	Caution	Caution	Caution for the creditability and reliability of the counterparties as well as for the institution's exposure is necessary. However, the counterparties rate have the best sub-investment credit quality.
B	Partially acceptable	Partially acceptable	The creditability and reliability of the counterparties with this rate are partially acceptable. It is vulnerable to changes in economic conditions.
CCC	Low	High	Such rate implies that the counterparties are currently vulnerable to non-payment and/or non-deliveries, whereas their behaviour is highly dependent on favourable economic conditions. The degree of exposure in credit risk is high.
CC	Very low	Very high	The counterparties with this rate are highly vulnerable to a payment and delivery default. Their creditability is very minor. Consequently, the institution is exposed to a high degree.

Continued

Table 4.2 Continued

Rating Degree	*Creditability Reliability*	*Exposure*	*Meaning*
C	Significantly low	Significantly high	Counterparties with such rates are close to or already bankrupted; however, for payment and/or delivery it may continue with its obligations. The institution is exposed to a significant degree.
D	Dangerous	Alerted	Payment default on some financial and/or delivery obligations have actually occurred from the counterparties that are rated with this rating grade. Institution is on alert position due to such defaults.

VALIDATING THE CREDIT RATING SYSTEMS

The credit rating system that the institution is using should be validated at pre-defined intervals as well as whenever there are new or modified parameters due to market and contract conditions. For this validation, the qualitative criteria must firstly be examined and then the quantitative analysis should be used in the systems' rating process.

Qualitative validation

The validation of the Credit Rating Systems that is based on qualitative criteria should consider:

- the design and implementation of the model for the rating system;
- the quality of the data used as input to the rating system; and
- the internal use of the rating system in the credit institution's credit approval process (testing the use of the rating system).

Financial institutions must give a great emphasis on the validation of the qualitative criteria. Insufficient qualitative validation could provide the institution or the regulators with a wrong valuation of the appropriateness of the rating system. As the qualitative criteria are rather subjective, their

validation is a rather difficult process and their validation, however, is very critical as it can influence the future exposure of the institution.

Design and implementation of the rating system's model

The institution must provide a full documentation for the design and implementation process for the precise model used for the rating system so that it can easily be valuated. Therefore, the documentation should be transparent, consistent, and complete. More analytically, such document should at least include:

- the selection of the criteria chosen for the rating system that is implemented;
- the type of the rating system model;
- the description of the rating method;
- the dataset used as an input to the rating system;
- the validation process and possible results during the model development;
- the mathematical functions used to implement the model;
- the definitions of the above functions as well as of the non-parametric components of the model;
- the definitions of the obligor's 'default' as well as of the 'loss'; and
- the calibration of the model output to the default probabilities.

The data integrity issue

Data integrity plays a major role in the quality and trustworthiness of the results of the rating systems. The data collection builds the historical database referring to the past default cases, in payments or deliveries, and generally all the information used to identify the counterparty's behaviour. This is essential for the development of a rating system that is built on adequate and reliable history and that leads to accurate estimates of the parameters of credit risk – such as the PD, LGD, and EAD. Any definitions together with the assumptions made for the use of these data as input information to the rating models should also be well defined.

Financial institutions that provide conventional and/or Islamic financial products should follow some basic requirements for the data definition, collection, and usage:

- the rating history of the obligors and guarantors;
- the time where the data have been used for assigning the ratings;
- the key data and the associated data management methodology used to derive the rating;
- the data that identify the obligors and exposures resulting out of their default status;
- the dates and circumstances of such defaults;
- data on the PDs associated with rating grades.

In the event that the financial institutions use their own estimates of the LGDs, then they should be able to collect and store complete historical information data on the ratings such as the LGD estimates associated with each rating scale, the dates the estimates were done, the methodology used to derive the facility ratings, and realised LGDs associated with each defaulted exposure.

Testing the use of the rating system

Financial institutions must be able to test and provide an approval process for the internal use of their rating systems. The consistent development of the rating system should be followed by a credit approval process that includes, and are not limited to, the setting of the strategic limit, the pricing of the profits (payments), and the definitions of the delivery for the different Islamic products and partnership contracts, and in general the institution's policy concerning credit risk management.

Quantitative validation

In the quantitative validation, what should be examined is the ability of the rating system to discriminate, based on quantitative analysis, between solvent and distressed obligors and to categorise them according to the appropriate classes and seniorities. Moreover, the accuracy and robustness of the rating results should be valuated as they play a significant role in terms of the rating system's efficiency and reliability. Good robustness is a

guarantee of the stability of the system that will need to be sensible on small modifications of the input data without, however, applying any changes in the rating model. Note that the rating systems are updated from time to time and thus should be capable of being modified when there are changes in conditions referring to market, counterparties, strategies, etc.

Based on the quantitative analysis, the validation of the Credit Rating Systems, in regards to the accuracy of their estimates, should consider:

- the functionality (parametric and non-parametric) and the supported methodologies;
- the back-testing;
- the benchmarking; and
- the stress-testing.

Functionality test

The functionality and the supported methodologies applied in the rating system are mainly tested based on statistical tools, including the CAP and ROC curves, the Gini co-efficient,[3] and the Kolmogorov–Smirnov test. Such tools are comparing the usage of the parametric and non-parametric components of the system with its ability to discriminate between solvent obligors and the ones with a higher probability of default; moreover, they measure the integrity of a rating system, regarding the allocation of risk between the obligors.

One of the most common techniques for the statistical test is to define good benchmarks where the performance of the model will be compared in terms of its discriminatory power and results, to some confidence level. Unfortunately, it is difficult to find or define realistically the perfect benchmark as every structure of the financial institution and every synthesis of their contracts' portfolios varies. Several statistical tests should be employed by the experts that analyse the results of the system's functionality. An efficient number of tests (according to the complexity of the model) will give the ability of explaining the results accordingly and in relation to each other. As mentioned above, the discriminatory power, the stability, and the robustness of rating systems should be on a satisfactory level in regards to the following basic validations:

- the *in-sample validation*, where two-thirds (66.66 percent) of the sample is the 'training sample' and is used for modelling buildings or, in

other words, identifying the parametric and non-parametric components based on the observed data, and fitting them to the credit risk evaluation;

- the *out-of-sample validation*, where the remaining one-third (33.33 percent) of the development *in-sample* is used as the 'test sample' of the rating system's performance;
- the *out-of-time validation*, where the validation is divided in two periods: the observation period (usually a year of data collection from accounts booked during this period) and the performance period (usually 12–18 months after the observation end date) of the accounts observed. Then, the rating system's analysts should test the behaviour of the model with a sample from a more recent period, which is usually the period after the performance date.

Figure 4.5 illustrates the periods and samples used for the rating valuation.

Back-testing

By using back-testing, the model of the rating system is compared with the realised historical data of the credit institution. Note, however, that the data used for the back-testing should not only be available but also reliable for the purpose of the particular testing. Normally, the frequency of such testing is at minimum once every year. Financial institutions should then check whether the realised default rates are between (or beyond) the estimated PD range of each rating class. In the case where the rating system is built in-house, back-test should also be performed for the LGD parameters. In cases where the estimated parameters differ significantly from the institution's history, the causes of the problem should be detected and the appropriate adjustments should be made to the model. It is important to highlight that such comparisons in the back-testing process, together with any model's modification, should be clearly documented. Note, finally, that it is often alleged that, using the back-testing approach, the resulting parameters of credit risk (PD, LGD) may not be very accurate. This allegation concerns mostly low-default portfolios. In general, financial institutions should

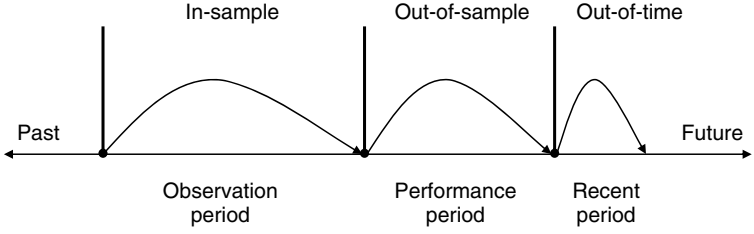

Figure 4.5 Periods and samples used for the rating valuation

perform statistical tests using back-testing and define (as a policy) the allowable deviations between realised and estimated data.

Benchmarking

By applying the benchmarking approach, there is a comparison between the estimations of the rating system's model with the results of external assessment institutions and prestigious and broadly known models. This method is based on qualitative comparative analysis where the two types of results, actual and benchmarked, need to be aligned using the same underlying measurements. Such an approach is very useful, especially when there is a lack of efficient and reliable past data and the back-testing is unable to give credible results. Data referring to Islamic financial products may raise such issues and thus benchmarking may be extremely beneficial for the financial institutions to apply and develop a system of Islamic products' benchmarking that will be interpreted in relation to the results from back-testing

Stress-testing

The stress-testing scenarios are employed to ensure the forward-looking ability of a model. In other words, it tests the ability of the model from normal to extreme conditions. Therefore, the scenarios take into consideration the phases of a down-turn in the economic cycle that may affect the payment or delivery capabilities of the counterparties of the Islamic contracts (i.e. *Murãbaha*, *Ijãrah*, *Salam*, and the *Istisnã*); and consequently may influence the business performances that are related to the Islamic financial partnership contracts (i.e. *Mushãrakah* and *Mudãrabah*).

Stress-testing exercises must be a part of the institution's internal ongoing risk management processes as one of the main tools for evaluating the model of the rating system, and measurement of the influence on the capital adequacy. Risk analyst must design and perform stress-testing scenarios that are representative of the credit institution's history and experience, by also taking into consideration the economic and business conditions that are referring to Islamic financial product and contracts. Stress-testing scenarios should be performed on a regular basis, at least once every year, considering, in addition to the above, the assessment of the capital adequacy as well as any strategies of the financial institution in terms of their product, portfolios, and overall financial and business policies.

All the assumptions made for risk scenarios must be well defined and considered in the testing evaluation process. Thus, based on Basel II regulations, the institution must hold a capital amounting to at least 8 percent of their risk-weighted assets in order to cover their credit risks. Another crucial parameter is the probability of default by the individual borrowers. Analysts

may increase the probability of default by 30 to 60 percent during the different scenario designs and thus to increase stress-expected loss that are corresponding to the different downgrades in the rating scale of the Islamic products' portfolio.

Risk analysts may also select the appropriate scenarios that refer to the rating models that can be based on statistical methods. The risk parameters are estimated from historical data that may also be used in the identification process of the rating model, and then scenarios representing the extreme events of the probability distribution are selected. Finally, another scenario option is the model-based analysis, especially in the case where macro-stress tests are applied. This method is based on an econometric model, in which the interrelationships of the relevant risk factors can be shown.

Stability and robustness of a rating system

Both the stability and robustness of the rating system being used by the financial institution should be tested according to the recent profile of the obligors. Any changes in terms of payments and delivery obligations in the contracts' agreements or even on the institution's strategies should be well integrated with the model. Thus, the model should be providing efficient ratings adaptable to small changes; on the other hand, it should be easily modified when major changes occur. The stability of a rating system should be tested according to the phases of the economic and business cycle. Realistically talking in most cases, historical data from a full economic and business cycle is not available. This implies that the financial institutions are unable to measure the consequences of a downturn of the above-mentioned cycles. This is the reason why it is highly recommended that when models are built, micro-economic and macro-economic variables should be considered, which could be stressed in order to give results in the case of an economic recession. The stress scenarios of the macro-economic variables could concern the GDP growth, the unemployment rate, the Consumer Price Index, etc.

SUMMARY

The estimation of the expected loss is relatively easier for simple and homogenous contracts than for the complex heterogeneous ones. Since the Islamic financial contracts are more complex than the conventional ones, financial institutions that provide such types of contracts are facing additional challenges. As discussed in this chapter, financial institutions are exposed to credit risk that correspond to lending in the *Murãbaha*, leasing in the *Ijãrah*, promises to deliver or to buy in *Istisnã* and *Salam*, and investments failure in the *Mushãrakah* and *Mudãrabah* contracts.

This chapter has given an insight into credit risk exposure identification. In credit risk exposure analysis, a key factor is the identification of the relations between the counterparties, the Islamic financial contracts, and the guaranties and collaterals used to cover a percentage of the potential losses in case of defaults. Islamic financial contracts are linked to counterparties and different types of guaranties and collaterals are used to cover in parallel the exposure of several contracts and counterparties.

Furthermore, the chapter identified different methods and techniques for developing models for credit risk that results from Islamic products. The corresponding advantages and disadvantages of the models were also discussed to evaluate their use in the implementation phase. The models that were considered fell under two groups: qualitative and quantitative. Models under the qualitative group are namely expert systems driven by rules that combine the criteria used by expert's judgements. These non-parametric qualitative rating systems are flexible and free from statistical bias as they are not based on certain statistical hypotheses. The ones falling under the quantitative group are based mainly on quantitative statistical-based models. The aforementioned validation of the quantitative analysis is mainly subject to statistical random fluctuations and thus there is a certain degree of freedom when interpreting the results. This is mainly the reason why such validation is less significant and critical than the qualitative ones. Most quantitative rating systems are driven by mathematical techniques that are transparent in their supported methodologies and rating results. However, they could also be driven by qualitative parameters and so can be influenced by subjective characteristics. Frequently, the two aspects of such validation complement each other and are used to form hybrid models. The hybrid models bring together the advantage of evaluating in an objective way the methods and results related to the prediction of the obligors' credit-worthiness as used in the quantitative models and at the same time take into consideration all the credit-worthiness factors and important information on the borrowers' characteristics used in the qualitative models.

The main parameters that should be considered in the valuation of credit risks are the expected and unexpected losses. This chapter discusses in depth, using mathematical functions, the calculation of the expected and unexpected losses, which requires the computation of the probability of default (PD), the loss given default (LGD), and the exposure at default (EAD). The entire modelling of credit risk is based on the estimation of the probability of default and the loss given default. Their definitions and estimation is one of the main challenges that financial institutions are facing today. This section of the chapter also highlighted credit value-at-risk (VaR) based on expected and unexpected losses. The estimation of the credit VaR is based on the distribution of the actual losses observed in a credit portfolio considering also certain confidence level and a pre-specified loss holding

period. The Credit VaR estimation is viewed as the economic capital to be held as a buffer against unexpected losses. The suitability of the methodologies used for producing efficient estimations of the Credit VaR is related to the loss data distribution and thus should be assessed within the context of the corresponding availability of historical loss data, as discussed. As explained, financial institutions that lack historical loss data should apply Monte Carlo simulations in order to estimate the loss distribution.

The chapter also talked about how financial institutions are mitigating credit risks by employing collaterals or guarantees granted by tier counterparties. For financial institutions using collaterals, the mitigation of credit risks is expressed in terms of reducing the EAD or LGD. When a guarantee is used, which is a contractual agreement with a third party, it has a lower risk weight than the original counterparty of the exposure and will take over the claim in case there is a default of the original counterparty.

Furthermore, the chapter discussed the credit rating system that the institution should use. This system must be validated at pre-defined intervals as well as whenever there are new or modified parameters due to market and contract conditions. For this validation, the qualitative criteria must firstly be examined and then the quantitative analysis should be used in the systems' rating process. For the qualitative validation analysis, the design and implementation of the rating system's model, the data integrity, and the testing of the usage of the rating system must all be considered. On the other hand, in the quantitative validation analysis such tests as the functionality test, back-testing, benchmarking, stress-testing, should be undertaken. Finally, the stability and robustness of the chosen rating system must be determined. The model should be able to provide efficient ratings when small changes arise, but be easily modified when major changes occur.

NOTES

1. Basel Committee on Banking Supervision, 'International Convergence of Capital Measurements and Capital Standards, A Revised Framework' (2005).
2. Islamic Financial Services Board, Guiding Principles Of Risk Management For Institutions Offering Only Islamic Financial Services (December 2005).
3. G. Corrado (1912), *Variabilità e mutabilità*, Reprinted in *Memorie di metodologica statistica* (Eds. E. Pizetti and T. Salvemini). (Rome: Libreria Eredi Virgilio Veschi, 1955).

CHAPTER 5

Market Risks in Islamic Finance

INTRODUCTION

The notion of market risk management and hedging is of recent origin in Islamic financial markets. Importers and exporters, for example, would often adopt a 'do nothing until you need to' approach to hedging against adverse exchange rate fluctuations. This was partly due to a culture that, for many years, encouraged the view that risk was something to be accepted, rather than to be reduced. It was also an attitude promoted by the fixed exchange rate to the US dollar ($) which was powerful in most Middle Eastern countries, particularly because the most important export for most of these economies – oil – was priced in dollars, where nowadays it is also exchanged in Euros (€).

According to the guiding principles (provided by the Islamic Financial Services Board) of risk management for institutions offering Islamic financial services, market risk is defined as the risk of losses in on- and off-balance-sheet positions arising from adverse price movements in market prices, i.e. fluctuations in values in tradeable, marketable, or leaseable assets and in off-balance-sheet individual portfolios. Additionally, market risks are risks that are related to the current and future volatility of market values from specific assets, e.g. the commodity price of *Salam* or *Istisnã* assets, the market value of *Ijãrah* agreements, the market value of *Murãbaha* assets purchased to be delivered over a specific period, and of foreign exchange rates. Furthermore, market risk appears on trading positions in *Sukûk* products. Market risk in the Islamic financial markets inherently exists within the lifetime of the Islamic contracts and, as such, its increased severity attracted market risk participants to be involved with its identification, modeling, and control.

In this chapter, the main concepts related to market risks are discussed, including identification of market risk factors, rate of return risks,

commodity risk in Islamic finance, FX rate risks, and equity price risks. It also discusses valuation issues on equity prices and FX rates, the quantification of foreign exchange risk, equity risk and commodity risk, the data that are referring to market risk factors, and the sensitivity analysis in market risk. Market risk valuation models are presented in regards to identification and implementation of VaR models for Islamic financial contracts. Evaluation methods of market risk are also presented, including variance–co-variance method, Monte Carlo simulation method, and Historical simulation. Finally, the use of back-testing and stress-testing for market risk exposures are also discussed.

IDENTIFICATION OF MARKET RISK FACTORS

By providing Islamic financial products, banks are facing four major categories of market risk factors that influence the value of the assets held over the lifetime of the contracts that build up the accounts of financial institutions. The four types of risks that expose financial institutions to market risk are:

1. rate of return (mark-up) or benchmark rate risks related to market inflation and interest rate;

2. commodity price risks because, unlike conventional banks, they typically carry inventory items (predefined prices);

3. FX rate risks in the same way as conventional banks;

4. equity price risks, mainly in regards to the equity financing through the PLS modes.

Figure 5.1 illustrates the four risk factors that exist in the different Islamic financial products.

RATE OF RETURN RISK

Interest rate is a significant element used in Westernized conventional financial products to valuate, align, and harmonise their current and future market prices with the corresponding market movements. On the other hand, the use of interest rate is forbidden in the structure of the Islamic financial product. Changes in the market interest rate, however, result in some risks regarding the earnings of Islamic financial institutions. Therefore, for

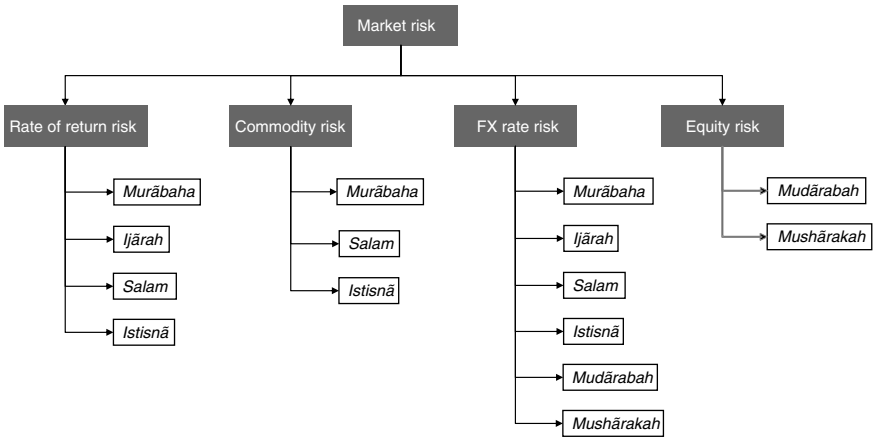

Figure 5.1 The four types of market risks that exist in the different Islamic financial products

considering the risk initiated from the fluctuation of the market, in the construction of Islamic contracts, financial institutions are using an alternative rate called rate of return, which is based on different benchmarks.

In the *Murãbaha* financial contracts, the considered rate of return should be aligned with the repayment instalments that include the price of the commodity together with the institutions' profit. In the case that the rate of return, which is fixed in the *Murãbaha* contract, appears to be different from the actual market rate, then there may be a loss in the benefits that should be earned from this contract. Moreover, in the *Ijãrah* leasing financial contract, the rate of return payments defined by the institution's benchmarks should also correspond to the actual market prices. A failure in this case will cause the institution loss in opportunity that could be gained out of the *Ijãrah* leasing. Finally, by providing *Salam* and *Istisnã* contracts, financial institutions should define the price of the commodity in respect to the future delivery date, based on the estimated benchmark rates. In case the actual market price differs from the rate of return value, the institution may face difficulties to resell and reinvest the delivered commodity and receive the expected profit from the *Salam* and *Istisnã* agreements.

Islamic financial contracts that have fixed income assets driven by rate of returns cannot be adjusted in regards to changes in the benchmark market rates. As a result, financial institutions that provide such contracts are facing risks arising from the movements in the market interest and inflation rates. Note that financial institutions are using benchmark rates, for the absence of any Islamic index, based in most cases on the London Inter-Bank Offered Rate (LIBOR). This is a widely used benchmark for short-term interest rates. Such index is used to align the market risk associated to Islamic

financial product with the movements in LIBOR rates. Nowadays, in all markets, new benchmark rates are also defined mainly based on polls of indexes. On the other hand, different types of market yield curves are mainly used to model the predictive market rates.

Market yield curves

The market yield curve provides information about the market future expectations illustrated on a graphical representation of the yields for a range terms to maturity. For instance, yields for maturity from one day (overnight) to thirty years terms can be illustrated by a yield curve. The yield curves are considered to be a predictor of future economic activities and may provide signals of pending changes in economic fundamentals. However, there is no single universal yield curve that maps and describes the future economic changes.

Types of yield curves

In Islamic financial products the yield curve attempts to represent the future behaviour of the markets for the performing contracts. As the markets are reacting differently to economic situations, there are many yield curves for representing them within the future set time periods. There are mainly four types of yield curves that can be used to define such market behaviours and are driving the market parameters of the Islamic financial contracts:

- The *Normal* yield curve, where the curve rises as the maturity lengthens, is increasing positively. This curve reflects an expectation for the economy to grow smoothly in the future. Note, however, that the degree and the rate of the growth vary according to the market conditions, driven by a great number of internal and external parameters.
- The *Steep* yield curve, where the curve rises steeply, represents the behaviour of an economy that is expected to improve quickly in the future. Such types of curves may be applied at the beginning of an economic expansion.
- The *Flat and Humped* yield curve, where the former one maps an uncertainty in the economy, e.g. high volatility with constant mean; moreover, in the latter curve, the short-term and long-term yields are equal and the mid-term yield is higher.
- The *Inverted* yield curve that occurs when long-term yields fall below short-term yields. This curve maps rather abnormal and bad economic situations in the future. Inverted yield curves imply that the market believes inflation will remain low due to situations like recession in the economic or economic sector. In general, an inverted curve indicates a worsening economic situation in the future.

Careful analysis on the design of market yield curves will provide fair contracts from both the bank and lender, where the former will earn enough profit; whereas the latter will benefit from those contracts providing additional benefits to the market. Yield curves can be applied to define the rate of returns that should be considered when the Islamic financial products are offered on the market.

Applying yield curves

One of the very important factors in determining a yield curve is the currency in which it is denominated. Moreover, the economic situation of the countries and companies using each currency is a primary factor that should be considered in determining the yield curve. Thus, financial institutions and investors that are dealing with Islamic financial contracts and agreements may combine different types of yield curves by considering the expected economic and market conditions. For instance, in the recession times the Islamic financial contracts should map their parameters related to market risks by using the Inverted yield curve. However, the market prices for constructed assets such as buildings that are being invested in, by the *Istisnã* financial contracts, are rising rapidly on such extreme market conditions and thus should be mapped by the Steep yield curve.

The direction and the shape of the yield curve is widely analysed and monitored by the market participants. Yield curves, i.e. in *Murãbaha* and *Ijãrah* Islamic financial contracts, are usually upward sloping asymptotically with a positive slope, as lenders/investors demand, form longer lending terms, higher rates from borrowers; the longer the maturity, the higher the yield, with diminishing marginal growth. There are few explanations for this phenomenon: it may be that the market is anticipating a rise in the risk-free rate; if investors hold off investing now, they may receive a better rate in the future, since the chance of default from the borrower increases in terms of maturity, so the lenders demand to be compensated accordingly.

The yield curves are affected by the expected inflation rate. In contracts like *Murãbaha*, the expected inflation rate is at least considered in the profit added to the repayments. Therefore, in the event that the future expected inflation rate tends to be higher, investors demand greater premiums for longer terms to compensate for this uncertainty. Therefore, the longer the term, the higher the profit resulting from the upward-sloping yield curve. However, note that nowadays the demand for shorter-term contracts is increasing substantially; as a result, the long-term yields fall below short-term yields. This is actually an inversion of the yield curve and slopes downward. As a result of this abnormal and contradictory situation, in the

long term the bank may settle for lower yields if, however, the bank has strong indications that the economy will slow or even decline in the future. The high cost of short-term contracts diverts from gains that would otherwise be obtained through investments and business expansions. This makes the economy vulnerable and slows it down, moving towards a recession status.

Valuation based on rate of return risks

The valuation formula of the Islamic financial products that are based on rate of returns and benchmarks is expressed as follows:

$$P = \sum_{t=1}^{n} \frac{CF(t)}{\left(1 + \frac{y}{m}\right)^{t}} \tag{5.1}$$

where P is the price and/or profits of the financial instruments such as *Murãbaha*, *Ijãrah*, *CF(t)* is the cash flow at time point t, m is instalment payments (times) per year, y is yield to maturity, n is total number of periods.

Keeping all other components of the above valuation constant, the level of cash flows affects the agreement for the price of the contract according to a non-linear positive relationship. On the other hand, the higher the yield to maturity is, the lower the resulting price or profit and vice versa.

The above Islamic financial products exhibit a convex relationship between yields mentioned above and the price of the commodities or asset for large changes in market interest rates. However, this relationship cannot be fully captured by the measured duration. The change in the price and profits of the above-mentioned instruments in a percentage value, which is driven directly or indirectly by the rate of returns and benchmarks – or, in other words, by the market interest rate changes – can be modelled and valuate-based on the Taylor expansion series as defined in equation (5.2):

$$\frac{dP}{P} = \frac{1}{P}\frac{dP}{dy}dy + \frac{1}{2}\frac{1}{P}\frac{d^2P}{dy^2}(dy)^2 + \frac{1}{P}error$$

where P is the price or profits of the Islamic contracts, and y is the yield to maturity.

Convexity introduces a non-linear element (optionally) in the market price and profit valuation of the above-mentioned contracts. Mathematically expressed, it yields the second derivative of the contract's price or profit in

respect to interest rate changes. Analytically, it is given by:

$$\frac{d^2P}{dy^2} = \sum_{t=1}^{n} \frac{\frac{t(t+1)}{m} CF(t)}{\left(1 + \frac{y}{m}\right)^{t+2}} \tag{5.3}$$

where $C(t)$ is the time period at time point t, m is the number of profit payments that is set per year.

The impact of duration and convexity is given by the first and the second term of equation (5.3), respectively. The effects from theta, rho and lambda (vega) can also be incorporated in the error term. In the case that all 'Greek' effects are included, the VaR is based on the full-valuation method. It is clear that a higher degree of non-linearity indicates a higher degree of risk (see Group of Thirty,[1] 1993). However, estimation of gamma is a very difficult task to carry out analytically. Thus, it is preferable to employ non-parametric or parametric models.

COMMODITY RISK IN ISLAMIC FINANCE

Commodities are physical assets with unique attributes. Commodity risk is the risk arising from movements in commodity prices. The fluctuation of the commodity prices is a significant source of market risk. In Islamic finance, contracts that deal with purchasing commodities and/or their production are exposed to commodity price risk.

Commodity risk occurs when there is potential for changes in the price of a commodity that is planned to be purchased or sold, such as in *Murãbaha* Islamic financial contracts. In *Murãbaha* contracts, a seller agrees with the purchaser to provide a specific commodity. The bank is financing the contract on a certain profit added to the initial commodity's price. The difference between the agreed and the future market price of the commodity is the actual exposure of the corresponding risk that banks take. Furthermore, when the banks are providing the *Salam* and the *Istisnã* Islamic financial contracts, they are also exposed to commodity risk. When the *Salam* contract is applied, the financial institution (who is the buyer) makes advance payments on a negotiated price for a commodity. However, the delivery of the commodity is at a specific time in the future, where its price may differ from the set one. Similarly, when the *Istisnã* contract is used, the price of the commodity is paid in advance at the time of the contract and the commodity of sale is manufactured and delivered later. A detailed description on how and when the commodity risk is exposed in *Murãbaha*, *Salam*, and *Istisnã* Islamic financial contracts is presented in chapter 2.

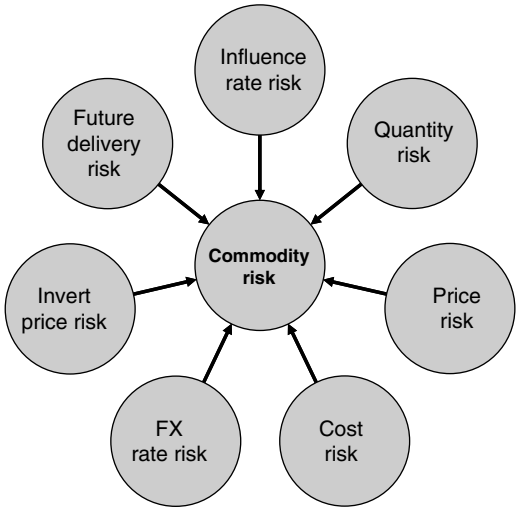

Figure 5.2 Interaction and relation between commodity risk in Islamic finance with other commodity risk factors

There are several drivers that influence commodity risks, which are needed to be identified for the different types of contracts. Islamic financial contracts that are exposed to such risks are similar to forward contracts and they have to be hedged accordingly.

Drivers of the commodity risk

The behaviour of commodities in Islamic finance are driven both directly and indirectly by many different risk factors, including price risk, cost risk, market's influence rate risk, FX rate risk, quantity and time risk, future delivery risk, and invert price risk, as described below. Figure 5.2 illustrates the interaction and relation between commodity risks with other risk factors.

Financial institutions should consider the drivers of the commodity risk referring to Islamic financial contracts:

- *Price risk*
  Commodity price risk affects consumers and end-users such as manufacturers, governments, processors, and wholesalers. When a commodity changes, the cost of its purchase also changes; modifying, however, the profit, such as in *Salam* and *Istisnã* contracts. Price risk also affects commodity producers, as their variation affects directly the production and the business income. Thus, since the prices of the commodity influence the production and business revenues, they also influence directly

the decision making about them. If the price goes below a threshold, producers may reduce existing production or limit new production. On the other hand, if the price of the commodity rises, the associated production may become attractive and increase in its level. As a result, the decision making concerning the production affects the supply and demand, which in turn is affected by the changes of the commodity price. The factor of supplying the commodities is a function of production and product delivery. Finally, the value of commodities is also affected by attributes such as physical quality and location. In general, there are several factors that affect the price of the commodities, including:

– The expected level of inflation

– The exchange rates

– The general economic conditions

– The cost of production

– The ability to deliver on time

– The availability of substitutes

– The weather conditions, especially for agricultural commodities and energy

– The political stability.

Price risk is generally the greatest risk affecting the livelihood of commodity producers and should be managed accordingly.

- *Cost risk*
  The cost of manufacturing the commodity is an additional input risk that should also be considered in Islamic contracts. For instance, the manufacture of the commodities or the construction of assets referring to *Istisnã* contract are directly or indirectly affected by the cost of raw materials and other production costs. Thus, if the producer of the commodity is unable to cover such manufacturing costs, a default on delivery may arise with downstream consequences on other risks, e.g. credit and operational. Financial institutions that agree on such contracts must consider and evaluate the risk of cost by effectively defining the price risks of the surrounding products and services needed to produce the commodity.

- *Market's influence rate risk*
  Market's influence rate is directly influenced by the commodity price where they need to be harmonized in proportion to this rate. Thus, changes in the influence rate must be adequately considered in the *Murãbaha* financial contracts. This is because one of the main parameters for estimating the profit that financial institutions are making out of this contract is the price of the commodity at the maturity date of the repayments. Any underestimation of this price is exposing the financial institution to commodity price risk. Furthermore, commodities that are purchased in advance, such as in the case of the *Salam* and the *Istisnã* Islamic financial contracts, expose the bank to market influence rate risks that correspond to the commodity price fluctuations.

- *FX rate risk*
  When the commodity price, set, in Islamic contracts by the financial institution (e.g. a buyer) and the other party (e.g. a seller), on the domestic currency and the commodity is traded in another currency, the exchange rate will be a component of the total price of the commodity. Therefore, financial institutions are directly or indirectly exposed to commodity risks that are initiated from their trading in multi-currency FX rates. Thus, in the *Istisnã* and *Salam* contracts, the bank may agree to purchase a commodity from the domestic market and make an agreement on selling it to a foreign market; in this case, the trade uses more than one currency and thus is exposed to FX rate risk.

- *Quantity and time risk (through the demand for purchasing the commodity)*
  Quantity and time risk is related to the capability of the manufacturer to produce the planned amount of commodities at a specific period. *Istisnã* contracts may expose the bank to a high degree to this type of risks. On the other hand, the market demand for the commodity on different time periods may influence the quantity that should be produced. For instance, if a manufacturer or a farmer expects a high demand for a commodity and thus plans the season accordingly, there is a risk that the demand from the market is less than has been produced or vice versa. The commodity's market demand could be dependent on uncontrollable factors. However, both the manufacturer or farmer and the financial institution will suffer losses by being unable to sell the expected amounts of products.

- *Future delivery risk*
  In the *Salam* and *Istisnã* financial contracts, there is a delivery of a commodity at a future time. In *Salam* agreements, the financial institution is

expecting to receive the commodity at a set future time. The sale in the *Salam* contract should be less expensive than a cash sale. The *Salam* contract agreement allows the purchaser to lock in a price, thus protecting the purchaser from price fluctuation. However, the price of the commodity at the delivery time may be different from the market price and thus the financial institution is exposed to commodity price risk.

Moreover, in the *Istisnã* sale, the price is paid in advance at the time of the contract and the object of sale is manufactured and delivered later. However, any failure from the seller, who has already received the advanced payment, to deliver the commodity at the set time may cause commodity risk with significant losses. Delay of the delivery may result in additional charges and in general commodity price fluctuation.

- *Invert price risk*
  There are occasions when the market is following specific commodity price structures. This may appear when the demand for cash, by the seller, or near-term delivery, by the purchaser, of a commodity exceeds supply, or even when there are supply problems. Then, an invert or backwardation market may result. Therefore, the market influences directly the price of the commodities for immediate available supplies, resulting in prices for near-term delivery to rise above prices for longer-term deliveries. Such types of commodity risks affect both the *Salam* and the *Istisnã* contract agreements. The period where the backwardation market is applied affects the deals of the above contracts. When the market moves from backwardation to the normal price structure, both the seller and purchaser may suffer significant losses.

Table 5.1 illustrates a pattern of the factors that initiate commodity price risk in the *Murãbaha*, *Salam*, and *Istisnã* Islamic financial contracts.

In Islamic finance, the financial contracts that carry commodity risks, such as *Murãbaha*, *Salam*, and *Istisnã*, differ from the other contracts in

Table 5.1 Factors that initiate commodity risk in Islamic financial contracts

	Factors initiating commodity risks						
Types of contracts	*Price risk*	*Cost risk*	*Influence rate risk*	*FX rate risk*	*Quantity and time risk*	*Future delivery risk*	*Invert price risk*
Murãbaha			☑				
Salam	☑		☑	☑		☑	☑
Istisnã	☑	☑	☑	☑	☑	☑	☑

several significant ways, primarily due to the fact that most of them have the potential to involve physical commodity deliveries. Note that commodities involve issues that affect their prices and trading activities, such as quality, transportation, delivery location, shortages, spooling, and storability. Moreover, market demand and the availability of the commodity's substitutes could be important factors in the emergence of commodity risks. Substitutes may become attractive when the commodity price fluctuates, becomes expensive or, more importantly, when there are delivery difficulties. The effect of commodity may not only be temporary but in many cases may become permanent.

By providing Islamic products that are related to commodities, i.e. *Murãbaha*, *Salam*, and *Istisnã*, financial institutions need to have a risk tolerance of managing their potential commodity risks. Institutions and scholars are required to understand the actual nature of the commodity risk that they are exposed to as well as the available products that could be used to support in developing risk-management strategies. Scholars and financial risk managers should also consider how to manage commodity risk through good decision- and strategy-making.

FX RATE RISKS

FX rate risk is a form of risk that arises from the change in price of one currency against another. Most of the Islamic financial contracts that are provided by financial institutions may be exposed to foreign exchange fluctuations arising from general FX spot rate changes in cross-border transactions, operations, and the resultant foreign currency receivables and payables.[2]

FX rate risk may arise when the financial institution buys the commodities in the *Murãbaha* contract using foreign currency. Moreover, in the agreement of a *Ijãrah* contract, the deal of leasing between the financial institutions (lessees) and the lessor may involve commodity or service from foreign markets that requires trading on FX currencies and therefore financial institutions are exposed to FX rate risk. Moreover, institutions are also exposed to such risks when the commodities in *Bai-Salam* contracts are related to the foreign currency, either before the delivery date or at the time of reselling them. Additionally, *Istisnã* financial agreements concerning construction of assets using capital investment or operating in foreign regions may also cause such exposure. Finally, in the *Mushãrakah* and *Mudãrabah* financial contracts of partnership, when the investment of the financial institution refers to commodities, assets, or business operations across the national borders, they may face FX rate risk too.

EQUITY PRICE RISKS

Equity price risk in regards to the Islamic financial contract agreements is the risk that the financial institution is exposed to by its investments' depreciation as a result of business or market dynamics that are causing losses. The *Mushãrakah* and *Mudãrabah* Islamic financial contracts may result in equity price risks. This is mainly because one of the main characteristics of both the joint venture *Mushãrakah* Islamic financial contracts and *Mudãrabah* Islamic business venture agreements is the sharing, between the financial institution and the partner, of profit and loss that is driven by the share in the investment's equity.

Based on the main definition of the permanent *Mushãrakah* partnership contracts, the participation of both parties in the investment's profit and loss is corresponding to the share of its equity stake. Any changes of the equity price may modify the balance of the equities between the two parties. Such modifications may cause either losses or additional gains to the financial institution according to its equity participation and the business profit and loss balance sheet. Moreover, any major losses and defaults on the expected profits may result in selling the equities at the market price. This price is usually less than the nominal one. In this case, the financial institution is exposed to a major equity price risk.

When the partnership between the financial institution and the partner is based on diminishing *Mushãrakah* contracts, there is an agreement for the partner to buy all equity shares on a pre-defined fixed price. Any mismatch between the fixed equity prices with the market (potential) prices is exposing the institution to equity price risk. Moreover, any inability from the partnership side to buy the equity or carrying on with the business may influence the equity price.

In the *Mudãrabah* contract, any inability of business continuation may result in a last equity payment and force the equity price to a level lower than the nominal one and thus exposing the financial institution to equity price risks.

VALUATION ISSUES ON EQUITY PRICES AND FX RATES

The valuation models for financial products referring to equity prices and FX rates has a high degree of complexity due to the lack of being able to follow the prices in the marketplace, and so they do not exhibit gaps in their returns. Moreover, based on valuation models, not all inputs are known or cannot be somehow estimated, such as the dividends for equities. The main drawback of equity models is that it is difficult to quantify the level of

dividends on a perpetual basis, even on a profit and loss sharing model applied for Islamic finance. There are also several micro-economic and macro-economic factors that cannot be easily modelled and drive the prices of FX rates. Furthermore, both risk factors, namely equities and FX rates, are liquid-traded financial products and their distributions of returns do not exhibit gaps. Thus, instead of using a model for their valuation, it is preferable for the risk manager to use their prices directly from the market.

QUANTIFICATION OF FOREIGN EXCHANGE RISK, EQUITY RISK, AND COMMODITY RISK

The quantification analysis and valuation of rate of return risk and benchmarks must consider a high number of market factors that are modelled by future yield curves. These curves (or factors) have high complexity in their identification as well as a high degree of interrelation. On the other hand, for FX risks, every percentage of change in FX rates affects the price of the position with the same percentage. Thus, their evaluation is rather simply applied for generic cases where most of the Islamic financial contracts are classified.

The equity price may be fixed in *Diminishing Mushãrakah* contracts; however, any last equity price and exit of the partnership is based on the market price of the equity. Equities appear to have quite smooth distributions of returns and they can efficiently substitute for any valuation models. Nevertheless, the image is different when market indexes are used, instead of the data that exactly represent the movement of the equity under examination. In this case, market risk exists by holding the equity, which is not represented by the movement of the index. This risk is known as specific risk of the equity.

For all Islamic financial contracts, the quantification of the commodity risk which is arising from movements of the commodity's prices should be based on these prices. Note that the behaviour of the commodity price risk can be very similar to that of equities, especially in the case of specific risks. For instance, the use of an energy index cannot fully explain the movement of oil because there are specific factors that drive the price of oil. Similarly, the analysis of the specific risk for equities coincides with the respective analysis for commodities.

DATA REFERRING TO MARKET RISK FACTORS

Islamic financial products carry more than one market risk factor; moreover, even a simple portfolio usually contains different types of contracts.

This combination of risk factors and contracts increases the complexity of collecting and combining the information needed for market risk analysis. The different risk factors referring to commodity prices, equity prices, and FX rates may replicate movements in the cash products. Most of the movements can be easily picked up from organised exchanges; however, several risk factors cannot be directly observed in the market place and should be calculated by using other sources of information (market interest and benchmark rates). In cash products, such as in the *Murãbaha* contracts, this difficulty may arise from the fact that the yield to maturity is driven by a variable function where the payments that produce the cash flows follow different time points from those implied by market benchmarks.

Market data such as prices referring to Islamic products and agreements are exchanged directly or indirectly at regular points in time. In the Islamic financial contracts, the different points in time that are mainly considered for trading market data used during market risk analysis are the ones that refer to the contracts' agreement date and the delivery dates. These prices correspond to trading actions such as buy, sell, rent, etc. Moreover, all market data underlying the yield curves and benchmarks are mainly used for the rate of return risk analysis in the *Murãbaha*, *Ijãrah*, *Salam*, and *Istisnã* financial contracts. In the agreements of *Salam*, *Istisnã*, and partially for the *Murãbaha* financial contracts, the prices and the cost of the commodities or services, the influence rate and the FX rate, the quantity and time, and the invert process are the main market data that should be considered for their market risk analysis. In the financial contracts based on profit and loss, notably the *Mushãrakah* and *Mudãrabah* contracts, the equity prices and their possible trading should be extracted for their market risk analysis. Finally, the data corresponding to the currencies and FX rates are used for analysing the associated risk for all types of Islamic financial contracts.

In general, the more complex the synthesis of the portfolio or balance sheet accounts constructed by Islamic products, the higher the number of risk factors involved and the higher the amount of data needed from the associated databases. It is important to highlight that the trading processes during the lifetime of Islamic financial products is less dynamic than conventional financial products. The frequency of data collection referring to the above-mentioned time points is less than in conventional financial products and thus the collection of information data, from the database systems, is rather a straightforward process. In the selection of market data, financial institutions have multiple accesses to different systems and types of databases. However, any inability to extract information data that refers to market risk factors could make the market risk valuation and management process weak without providing and adding any value to the management of the bank's portfolios or the accounts on its balance sheet.

There are many problems arising during this data extracting process, where some of them are: misplaced digits or a misplaced decimal point, any repeated datum, and any missing datum or a datum that is equal to zero that has been inputted by mistake. Financial institutions are mainly using ETL (Extract, Transfer, and Load) systems that are transferring the information from the core database/warehouse to the risk management system. Such process must be efficiently done to map all financial contracts within the associated accounts. Errors in information data may result in an under- or over-estimation of the volatility and thus will affect the measurement of the Value at Risk (VaR). There are different techniques and methodologies that financial institutions could employ to minimise such risks and loss of information data. For instance, in order to fill up the gap arising from a missing datum, interpolation techniques can usually be applied.

SENSITIVITY IN MARKET RISK

Sensitivity is a significant factor that plays a critical role in the market risk analysis. Sensitivity to market risk in Islamic products reflects the relationship between the cause from a financial risk factor and its adverse impact to the financial institution's earnings from these contracts. The causes are initiated from the volatility in risk factors arising in Islamic financial contracts, i.e. rate of returns, foreign exchange rates, commodity prices, or equity prices, and the impact usually refers to the changes in price or return of the contracts.

In market risk analysis, the volatility of the risk factors is transformed into market risk by either linear or non-linear means that is encompassed into a unique measure, called market sensitivity. Thus, every change in risk factors has an equal quantitative percentage effect on the total position invested in the product (sensitivity of one). Note, however, that the rate of return or interest rate risk measurement is a more complicated task. Its sensitivity, in respect to market volatility, is a non-linear function and is usually a difficult one in terms of the computational power needed.

Based on the above, the market risk measurement is established by the integration between the Sensitivity and Volatility as illustrated in equation (5.4):

$$\textit{Market risk} = \textit{Sensitivity} \times \textit{Volatility} \tag{5.4}$$

The degree of significance referring to the sensitivity factor becomes higher when the characteristics of the contracts involved in the quantification of market risk are non-linear.

MARKET RISK VALUATION MODELS

As already mentioned, market risks referring to Islamic financial contracts (or agreements) arise from the movements in the level or volatility of the market prices underlying the products and services that refer to these contracts. There are two types of analysis for valuating the market risks. The first is called 'static', simply because no change in positions related to financial contract is taken into account; however, the only element that might vary is the market conditions. The second is called 'dynamic', which is a forward-looking analysis based on defined market price scenarios, business strategies, and customer behaviours. The market positions are moving over time and the prices are always influenced by the customers' behaviour. This behaviour should be considered in the future business strategies that should be related to market prices. In other words, market prices are driven by the rules of the market and such rules have to be considered in financial risk analysis. Moreover, the business strategies need to be defined according to the customer behaviour and future market price conditions. Market changes arising over a certain time frame and thus effective changes over time should be taken into account. In order to do that, assumptions on future cash flows and their reinvestment need to be made. Dynamic analysis is a strong tool for planning the future business in regards to what and how the bank should provide its Islamic financial contracts so that they can be profitable to the institution and beneficial to its clients. Both static and dynamic simulation plays a key role in risk management and institutions must be able to perform both types of analysis. One of the main elements of such evaluation analysis is the VaR that is applied in both types of analysis, used as a measurement indicator for the market risk referring to Islamic financial contracts.

VaR MODELS FOR ISLAMIC FINANCIAL CONTRACTS

Value-at-Risk is one of the most well-known methodologies to quantify and valuate market risk in a systematic fashion. Based on Islamic financial contracts that contain market risks, financial institutions attempt to measure losses on a constant portfolio over a specified period. This period for conventional finance contracts usually refers to the next day or next ten days; whereas, for the Islamic contracts, this may be different (usually it is longer as the Islamic financial products are less dynamic in terms of the market risk factors; in addition, due to the luck of available market risk loss data). The measurements of losses are calculated with regards to whether this time limit is exceeded on a given fraction of time (typically, a probability level of

1 percent). Except for the simplifying assumption of constant portfolio synthesis during the time horizon, VaR models possess some latent, but equally crucial, weaknesses, arising from the fact that they are tailor-made models. Because of this, the data inputs should be carefully assessed before the appropriate model is applied.

In VaR model analysis, both the position data and the market data are used. Figure 5.3 shows the process flow of market and position data for implementing the VaR approach that finally results in the risk evaluation analysis reports. Note that the definition and the nature of the data are the key factors that drive the decision about which model is going to be used. Moreover, the position risk and risk factors in the construction of the Islamic contract-based portfolios should be identified.

Having both position and market data, every VaR mechanism, *implicitly* or *explicitly*, is driven by the selection or estimation of the components illustrated in Figure 5.4 and includes the assumptions for the data distribution, the window length of the data used for parameter estimates, the confidence level, the holding period that defines the time horizon for holding the investment, and the individual volatilities and co-movements between or among risk factors defined by using return time series. Note that in a case where the frequency of the data used is very high, VaR models assume zero mean return; however, the inclusion of the mean of returns in lower-frequency data is suggested when VaR measures are estimated.

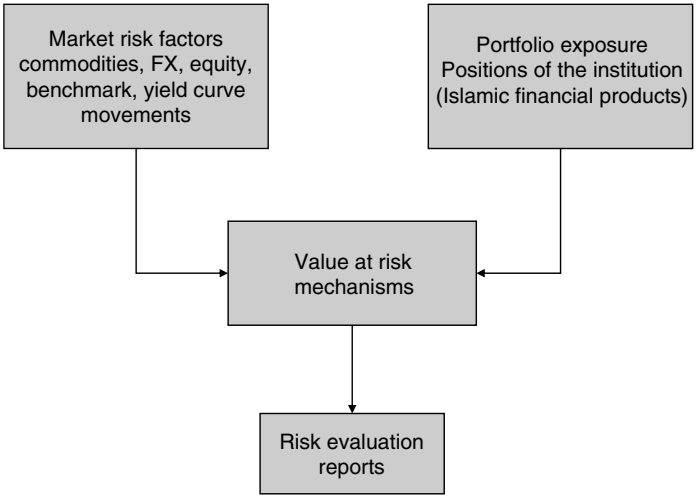

Figure 5.3 Flow chart referring to the Value-at-Risk approach

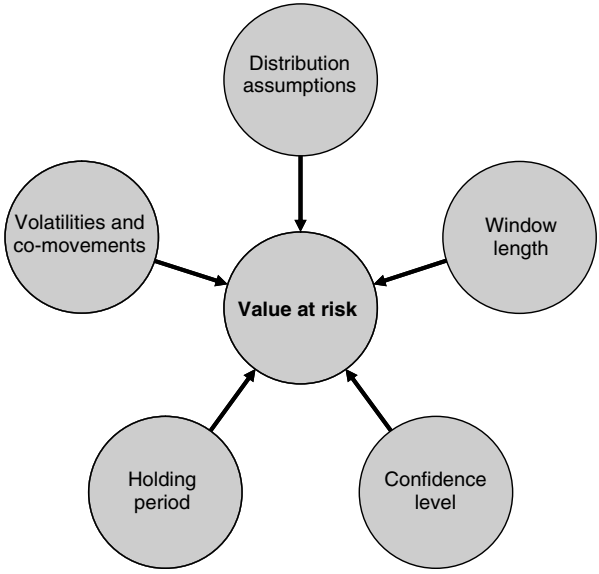

Figure 5.4 Main components considered in VaR models

POSITION AND MARKET DATA

For the implementation of the VaR model, there are two classes of data that should be carefully used and assessed: *position data* and *market data*. It is impossible to estimate the VaR without position data and the necessary market data. The former type of data (position) is defined within the systems that map the performance of contracts (or underlining contracts) in the institution's accounts or portfolio; whereas the source of the latter type of data (market) is usually done by using either interpolation techniques (described briefly in the following paragraphs) or extensive simulation methods as discussed later in this chapter.

Interpolation techniques

Interpolation is a technique for constructing new data points based on a discrete set of known data points. There are different interpolation techniques, including linear interpolation, the exponential and cubic spine interpolation that can be applied according to the data availability, and the level of approximation is needed as described in the following sections.[3]

Linear interpolation

There are some cases where the information data of the Islamic financial product, such as prices and rates, are not observed directly in the market

place or are partially missing. Therefore, it is essential to find methods for constructing those values from the most relative values observed. The simplest approximation of the estimation of the aforementioned information data is the linear interpolation. This approximation is based on the data points that are located in between the actual data which are assumed to be on a straight line. Thus, the estimation of a rate r^* for a *Sukûk* bond corresponding to time distance τ is located between the payment rates r_{n+1} and r_n that are corresponding to time distances τ_{n+1} and τ_n. The rate r^* is therefore estimated by the following equation (5.5):

$$r^* = r_n + \frac{r_{n+1} - r_n}{\tau_{n+1} - \tau_n}(\tau - \tau_n) \tag{5.5}$$

Note that the time distance τ belongs to [τ_{n+1} and τ_n].

The advantage of the linear interpolation is its simplicity and the fact that, in many cases, it can produce good approximations of reality. On the other hand, if the yield curve is seen as a whole, the method produces sharp changes between time points under consideration. Using polynomial interpolation where it is assumed that a yield curve exhibits smoother alterations in its shape can be used to overcome the above-mentioned drawback.

Exponential interpolation

Another natural candidate for producing missing data is the exponential interpolation. This approximation is used whenever the shape of the yield curve is considered to be of a similar shape. The exponential interpolation is expressed as in the following equation (5.6).

$$r^* = r_n e^{-(\ln((r_{n+1}/r_n)/(\tau_{n+1}/\tau_n)))*\tau_n} + e^{(\ln(r_{n+1}/(\tau_{n+1}/\tau_n)))*\tau_n} \tag{5.6}$$

Note that this approximation is largely and successfully applied with the factor that estimates the profit in the Islamic products. Thus, this technique is suitable for interpolating between discount factors corresponding to different periods in time that corresponds to the contract negotiations such as in *Salam* and *Istisnã*, where there is market price consideration on delivery date and the future selling date.

Cubic spline interpolation

One of the most widely used techniques in financial engineering is cubic spline interpolation.[4] It is the most suitable technique for modelling yield curves, zero curves, and forward curves. Note, however, that it may produce biased results if some data are more concentrated in relation to some others.

POSITION RISK AND EXPOSURE RISK

Nowadays, various financial institutions offer a wide spectrum of Islamic financial products. For such products, the VaR estimation is based on infrastructure that combines the *market data* and *position data* in order to achieve continuous portfolio valuation. Note that position risk or exposure risk is the risk attributed to a specific position due to the exposure in one or more risk factors. In the VaR analysis, there is a strong assumption that the synthesis of the portfolio, i.e. the one that contains, for instance, Islamic financial contracts, remains unchanged throughout the holding period. Thus, in the construction of the portfolio, risk managers must be aware that, during their VaR analysis, the portfolio should remain steady.

Under the above assumption, the set of market risk factors remains the only source of risk. Thus, the market factors that drive the value of commodities in the *Murãbaha*, *Salam*, and *Istisnã* Islamic financial contracts are commodity prices. The main factors that drive the FX in all Islamic financial products are the FX rates. Similarly, the factors that drive the equities in the *Mushãrakah* and *Mudãrabah* agreements are the equity prices. Moreover, the factors that drive the rate of returns in the *Murãbaha*, *Ijãrah*, *Salam*, and *Istisnã* financial contracts are the yield curves. Finally, the factors that drive the profits in the *Sukûk* bonds are the ones that are related to the risk factors of the underlying contracts as well as their corresponding volatility of the underlying asset prices.

EVALUATION METHODS OF MARKET RISK

The evaluation of a portfolio is based on the same approaches invented during the 90s where a professional team from JP Morgan Bank started to engage themselves with the bank's *'morning report'*. This report was produced early in the morning by the risk management department and was produced to inform the top management about the perceived market risk for the next day's positions. The market risk was translated in terms of *how much money the bank had the possibility of losing by assuming that it retained the previous day's portfolio*. In order to evaluate the overall market risk that was assumed to be undertaken by the bank, risk professionals employed by JP Morgan developed three alternative quantitative methods:

- The Variance–Co-variance (VC) – parametric – approach
- The Monte Carlo (MC) approach
- The Historical-Simulation (HS) approach.

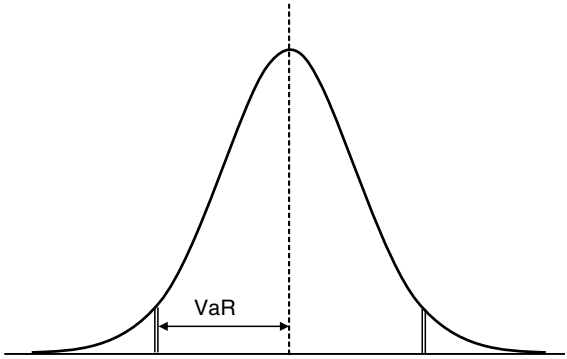

Figure 5.5 Normal distribution of the changes caused by the value of a market analysis portfolio

These three approaches can be used to quantify not only the Westernized type but also the Islamic financial products by deriving the distribution of the changes caused in the value of a portfolio at the end of the holding period. In most cases, in market risk analysis this distribution appears to be nearly symmetric and is often approximated as normal (see Figure 5.5), which may allow for analytical solutions to be developed. The distribution may also be estimated using Historical-Simulation returns. Finally, a Monte Carlo simulation can be used to create a distribution based on the assumption of certain stochastic processes for the underlying variables. The data that are considered in this distribution and are used in VaR models are the ones within the boundaries set by the confidence level as illustrated in Figure 5.5.

As will be explained later, the first and the second methods (VC and MC) are based on parametric estimation, while the third one (HC) is based on non-parametric estimation. Moreover, the number of different product types or, in other words, the number of different data types, has a direct effect on the difficulty of VaR estimation; that is to say, the higher the number of assets, the higher the time needed for VaR estimation under all three traditional approaches. More specifically, under the VC approach, an increase in the number of positions taken has a direct exponential effect on the number of calculations needed. Under the MC approach, a similar increase in the number of positions causes more significant calculation difficulties. Instead, the magnitude of the effect is lower under the HS approach, although there is also an increased storage need.

VARIANCE–CO-VARIANCE METHOD

The variance–co-variance method is applied when there is the assumption that the risk factors follow a multivariate normal distribution and that they

exhibit serial independence. Thus, this method is suitable for *Mushãrakah* and *Mudãrabah* Islamic financial contracts where there are cash earnings/profits. The method could also be applied to the *Murãbaha* and *Ijãrah* contracts, where the market value may vary from the actual payment instalments.

The key parameter for VaR estimation under the variance–co-variance method is the measurement of volatility. Note that, in order for the volatility to be estimated, it is essential to determine the time series of the prices or returns (profits) for each of the contracts that are under consideration, i.e. commodity prices referring to *Mushãrakah* contracts, returns on payments on the *Ijãrah* contracts, and returns referring to the profits or shares earned by the *Mushãrakah* and *Mudãrabah* agreements. The above-mentioned returns implicitly drive the risk factors and are presented by using either logarithmic or arithmetic scales, although the former produce smoother measures of volatility. The concept of volatility, according to the variance–co-variance method, is approximated by the variance or standard deviation of returns. The estimation of the standard deviation can be made by using either *equally-weighted* historical data or *unevenly-weighted* historical data. The difference of the latter in relation to the former technique lies in the fact that each of the historical market data receives a different weight when the volatility is estimated.

Equally-weighted historical volatility

The estimation of the volatility σ_{it} of the risk factor i, which is based on *equally-weighted* historical data of returns R_{is} in the time interval between $t-T$ and $t-1$, is estimated as in the following equation (5.7):

$$\sigma_{it} = \sqrt{\frac{1}{T-1}\sum_{s=t-T}^{t-1}(R_{is}-\mu_{it})^2} \tag{5.7}$$

where

$$\mu_{it} = \frac{1}{T}(R_{i1} + R_{i2} + \ldots + R_{iT}) \tag{5.8}$$

Note that T is the time window and t is the point in time. Nowadays, the 'effective' time window T is usually set by the regulatory agents, even though the original concept was related to the average life of weights assigned to the observations[5] (see Jorion, 2002). According to the documents of the Bank for International Settlements[6] (BIS), the 'effective' time window for the conventional contracts should be no less than one year or, by interpreting the statement, 250 observations (T = 250). However, in the

estimation of the equally-weighted volatility $\hat{\sigma}_{it}$ referring to Islamic financial contracts, to create an 'effective' time window more observations may need to be taken into consideration, as these types of contracts are less dynamic in measurements than the conventional ones. Financial analysts usually exclude the mean from the volatility estimation formula as, in most financial time series, the true mean is close to zero and any attempt to estimate it will produce statistically insignificant results. Thus, the mean metric can be excluded from the above estimation without significant changes in the volatility estimation.

Weighted schemes

By implementing the *weighted schemes*[7] approach, the estimation of the volatility σ_{it} of the risk factor i is based on the assumption that the current volatility depends on the past squared residuals and on short-term and long-term volatility. The following equation 0 defines the generic model of the weighted schemes approach, widely known as the GARCH(s,s) specification:

$$\sigma_{it} = \sqrt{\gamma V_L + \sum_{s=t-T}^{t-1} a_s (R_{is} - \mu_{it})^2 + \sum_{s=t-T}^{t-1} \beta_s \sigma_{is}^2} \tag{5.9}$$

where,

$$\gamma + \sum_{s=t-T}^{t-1} a_s + \sum_{s=t-T}^{t-1} \beta_s = 1 \tag{5.10}$$

V_L is the long-term variance, γ is the weight assigned to V_L, α_s and β_s are at point in time s, the positive amount of weight given to residuals and volatility, respectively.

The GARCH(1,1) model defined in equation (5.11) has an economic interpretation in the sense that it depends on the most recent financial variability – shocks – by defining the squared residual and the prevailing circumstances, by defining the most recent estimates of the variance rate. This model calculates relatively good short-run predictions, incorporating the impact of the long-run variance level as in equation (5.11).

$$\hat{\sigma}_t = \sqrt{\gamma V_L + a\,(R_{t-1} - \mu)^2 + \beta \sigma_{t-1}^2} \tag{5.11}$$

where $\alpha + \beta + \gamma = 1$.

Note, finally, that the GARCH(1,1) model recognises that, over time, the variance tends to get pulled back to a long-run average level of variance;[8] on the other hand, it eliminates the serial correlation from the squared residuals.

An alternative way of weighted schemes is the *exponentially-weighted moving average* model (EWMA), also known as integrated GARCH (IGARCH), according to which $\alpha = 1-\lambda$, $\beta = \lambda$, and $\gamma = 0$. The volatility σ_{it} estimated based on the *exponentially-weighted moving average* model is defined as formulated in equation (5.12).

$$\sigma_{it} = \sqrt{(1-\lambda)\sum_{s=t-T}^{t-1} \lambda^{t-s-1}(R_{is})^2} \tag{5.12}$$

where λ is a parameter called 'decay factor' and ranges between zero and one. This smoothing parameter places less weight on observations as the time distance from the present becomes larger. Moreover, the smaller the value of λ, the less weight is assigned to past observations and the higher the ratio according to which the weights are lowered.

Variance–co-variance matrix and VaR

One of the main elements in constructing the variance–co-variance method is the estimation of the variance–co-variance matrix. The elements of this matrix classify the possible co-movements among the spectrum of the *unitary VaR* estimates as they are addressed by the pair-wise correlations formulated in equation (5.13):

$$\rho_{ijt} = \frac{\sigma_{ijt}^2}{\sigma_{it}\sigma_{jt}} \tag{5.13}$$

$$\sigma_{ijt}^2 = \frac{1}{T-1}\sum_{s=t-T}^{t-1}(R_{is}-\mu_{it})(R_{js}-\mu_{jt}) \tag{5.14}$$

where ρ_{ijt} is the correlation between asset i and j at time t, and σ_{ijt} is the co-variance between asset i and j at time t. Note that the estimation of co-variances according to the RiskMetrics approach, presented above, is given by:

$$\sigma_{ijt}^2 = (1-\lambda)\sum_{s=t-T}^{t-1} \lambda^{t-s-1}(R_{is}-\mu_{it})(R_{js}-\mu_{jt}) \tag{5.15}$$

When the portfolio includes more than one position, the computation of VaR requires an estimation of the entire variance–co-variance, or correlation matrix. Thus, the estimation of the portfolio's VaR needs more complicated approaches than simply adding the unitary VaRs. The assets in a portfolio move in independent directions, mapped by the correlation matrix. Based on this matrix together with the unitary VaRs, the *portfolio's VaR* is

estimated as defined in equation (5.16):

$$VaR_P = \sqrt{\vec{x}^T C \vec{x}} \tag{5.16}$$

$$C = \begin{bmatrix} \rho_{1,1} & \rho_{1,2} & \cdots & \rho_{1,n} \\ \rho_{2,1} & \rho_{2,2} & \cdots & \rho_{2,n} \\ \cdots & \cdots & \cdots & \cdots \\ \rho_{n,1} & \rho_{n,2} & \cdots & \rho_{n,n} \end{bmatrix} \tag{5.17}$$

$$\vec{x} = \begin{bmatrix} VaR_1 \\ VaR_2 \\ \cdots \\ VaR_n \end{bmatrix} \tag{5.18}$$

where the matrix C in equation (5.17) contains all the co-movements among the volatilities as estimated in equation (5.13) and the elements in vector $\vec{x}$ in equation (5.18) as defined by the unitary VaRs.

MONTE CARLO SIMULATION METHOD

The Monte Carlo simulation is applied when, on a portfolio, the risk factors have a high degree of non-linearity. In this case, the probability distribution of the changes in the portfolio value is rather unknown. Even by making assumptions about the distribution of the risk factors, it is hard to deduce the P&L distribution analytically. Based on different mathematical approaches, the changes in risk factors (rate of returns, price volatility, shares, and FX rates) can be simulated. For instance, implementing Geometric Brownian Motion (GBM), the method produces numerous changes in the value of the portfolio with the help of a random generator procedure.

The Monte Carlo simulation is by far the most powerful method to compute VaR and is able to account for a wide range of exposures and risks, including non-linear price risk, volatility risk, and even model risk. The Monte Carlo method is a flexible enough method to incorporate time variation in volatility, fat tails, as well as extreme scenarios. Moreover, this method is capable of performing simulations in regards to passage of time which is used to create structural changes in the portfolio. On the other hand, in Monte Carlo simulations, the main drawback is the computational time. If the valuation of assets on the target data is also involved in the simulation, the method requires an additional simulation, which implies an increased computational time. As a result, this method is very 'expensive' to

implement in terms of system infrastructure and intellectual development. Another weakness of this method is the 'model risk', meaning that it relies on the model of stochastic processes which adds underlying risk factors. Finally, the Monte Carlo method requires the use of the variance–covariance matrix, as well as having some kind of dependency on historical data. Detail analysis on how to formulate the matrices and the steps to estimate the VaR by applying Monte Carlo simulation can be found in Kalyvas & Akkizidis.[3]

HISTORICAL SIMULATION

The historical simulation method provides a straightforward implementation of full valuation. The underlying methodology consists of going back in time and applying current weights to time series of historical asset returns (equation (5.19)) involved in the computation of VaR. By doing this, a history of a hypothetical portfolio of Islamic contracts is reconstructed using the current position.

$$R = \sum_{i=1}^{N} w_{i,t} R_{i,k} \tag{5.19}$$

where the weights w_t are kept at their current values and the returns reconstruct the history of a hypothetical portfolio using the current position. The assumption applying this method is that the present portfolio construction is frozen at all points in time in the past. According to the historical simulation method, m different scenarios concerning probable future price movements can be applied. Those scenarios are taken from past experiences by utilising all past multivariate returns included in the used time window. The full set of hypothetical prices is used to define the new portfolio value and thus it creates the portfolio distribution of returns which, together with a predetermined confidence level, is used to estimate the VaR. In historical simulation analysis, VaR is the worst loss observed, after ignoring n negative returns that correspond to the confidence level.

The main characteristics of the historical simulation method are that it is the most cost-effective and the least time-consuming approach in terms of computational needs. Moreover, this method is relatively simple to implement as long as there is availability of (high frequency) historical data represented mainly in time series. Additionally, using historical simulation, the time horizon defined in VaR estimation is rather an easy choice. Furthermore, this method relies on actual measurement returns and therefore it considers non-linearities and non-normal distributions. The full valuation is simply obtained based on the actual historical data and not on any valuation models as applied, for instance, in the Monte Carlo method. Finally, and more importantly, the

historical simulation is capable of considering fat tails because it refers to the true distribution of returns without assuming any specific distribution.

On the other hand, in the implementation of the historical simulation method there is a strong assumption that there is sufficient history of price (or profits) changes. This is in many cases very hard to obtain from the Islamic financial contracts. For instance, to obtain the corresponding 1,000 simulations, it may require a few years of collecting continuous historical data. Thus, such a method is probably the most costly in terms of storage requirements. Note, however, that some Islamic financial contracts have short lifetimes and histories or may not have the associated history that is needed on record. Another strong assumption in this method is that the past represents somehow the immediate future to an acceptable level. Moreover, the method gives the same weight to all observations in the window, including old data points. Finally, this method becomes rather difficult to implement for large and complicated structured portfolios.

A short description of the advantages and drawbacks that financial organisations may face by applying Historic, Monte Carlo, and Variance–Co-variance Methods is presented in Table 5.2:

Table 5.2 Advantages and drawbacks by applying Historic, Monte Carlo, and Variance–Co-variance Methods

Methodology	*Advantages*	*Disadvantages*
Variance – Co-variance	■ Easy to implement ■ Computationally fast ■ Easily amenable to analysis	■ Requires variance–co-variance matrix ■ Dependent on historical data ■ Can account for non-linear risks (with difficulty)
Monte Carlo	■ Can account for complex non-linear risk structure	■ Computationally complex ■ Requires variance–co-variance matrix ■ Dependent on historical data
Historic	■ Easy to calculate ■ Based on actual results ■ Non-parametric ■ Can account for non-linear risks	■ Requires large database ■ Historical results may not be appropriate ■ Lack of drill-down ability

BACK-TESTING AND STRESS-TESTING FOR MARKET RISK EXPOSURES

The different methodologies for applying the VaR models to portfolios that contain Islamic financial products should be tested by the financial institutions to evaluate their efficiency and applicability. The test referring to the efficiency should be made by the institution on its specific portfolios. This is due to the fact that financial institutions may possess different financial products with different combinations and thus may follow different investment policies. Moreover, when structural changes are taking place in the nature of the portfolios, financial institutions must also test the efficiency of the VaR model by periodically performing back-tests. The back-test is applied to check whether the VaR predictions correspond to observed market changes. Moreover, institutions that provide Islamic financial products should also check their vulnerability in extreme circumstances that conventional VaR measures fail to predict. As these extreme market events may be catastrophic for the institution, their consideration and analysis have significant degree. Therefore, financial institutions should conduct regular stress-tests along with the results produced by VaR models. The following section presents the theoretical and, occasionally, the practical aspects of back-testing and stress-testing applied by the financial institutions.

Back-testing

In back-testing there are two perspectives that should be considered to evaluate the efficiency of the models under consideration. The first one is about testing if the criteria referring to the confidence levels are fully set; the second one is about testing other models that are candidates for introduction as internal models in the financial institution. Note that, in the former perspective, the confidence level together with the ratio of the number of times that the model underestimates the actual portfolio change to the total number of predictions made are the two characteristics of the model that should be used in order to evaluate its performance. In the event that the above ratio exceeds the confidence level set by the VaR model, the model is considered to be insufficient to represent reality. Moreover, when the phenomenon appears on an occasional basis, the number of failures may sporadically deviate from the confidence level mentioned above. Note that the Basel Committee introduced a matrix that assigns the number of failures, or in other words 'exceptions', to a multiplication factor, as illustrated in Table 5.3.

As shown in this table, the exceptions (or overshooting) are distributed within three 'traffic light' zones, where the multiplication factor increases accordingly. When the number of exceptions falls in the green and yellow

Table 5.3 The three zone 'traffic light' for the overshooting and the multiplier factor

Zone	*Overshooting*	*Multiplier*
Green	1	3.00
	2	3.00
	3	3.00
	4	3.00
Yellow	5	3.40
	6	3.50
	7	3.65
	8	3.75
	9	3.85
Red	10	4.00

zones, this indicates that the internal model is appropriate and fully or partially acceptable; whereas, when the number of exceptions falls in the red zone, it indicates that the internal model is either inappropriate or needs major corrections.

Stress-testing

Financial institutions are using 'Stress-testing' for assessing the event and consequences of risks that may appear under extreme circumstances. It is actually used to fill the gap in the concept of VaR methodology. Note that the VaR is used to provide a probabilistic prediction on losses that are likely to happen for a pre-specified holding period and confidence level. Thus, it is difficult to ensure that, by using VaR, extreme cases are fully covered. Moreover, as the VaR methodologies are based on predefined models, they inherently carry a model error risk and thus their resulting evaluation of risk may fail to a certain degree. Supervisory authorities have introduced stress-testing as a complementary, but obligatory, test to VaR estimations, in order to assess the vulnerability of financial institutions to exceptionally unexpected, but plausible, usually non-probabilistic, financial events.

In modern risk management analysis, both financial institutions and regulatory entities need to evaluate specific aspects of extreme risk events arising from either individual business lines of the organisation or individual

position types of trading and/or banking portfolios. Thus, extreme commodity price risks that appear in the *Murãbaha*, *Ijãrah*, *Salam*, and *Istisnã* financial products, as well as in the equity price for the *Mushãrakah* and *Mudãrabah* agreements, need to be tested and evaluated by the institutions. In general, there are two different types of 'stress-testing' that financial institutions and supervisory regulators accept:

- scenario-based
- sensitivity-based.

Scenario-based tests assume that, for all categories of risk factors, their changes happen simultaneously. This assumption reflects the consensus of risk professionals that the aforementioned spectrum of events will happen instantaneously in the near future. Scenarios can be chosen from either a historical or hypothetical event or a combination of both.

The aforementioned prices of the Islamic products can be evaluated based on the price shift and price volatility shift analysis. Such analysis is driven by stress scenarios that are defined at the level of the basic risk factor categories (rate of return and benchmark rates, FX rates, equity markets, commodities) or the level of individual risk factors. Note that the term 'price volatility' is used to describe the price fluctuations, i.e. of a commodity. Thus, volatility is measured by the day-to-day percentage difference in the price of the commodity. Despite the level of prices, the degree of variation defines a volatile market. Since price is a function of supply and demand, it follows that volatility is a result of the underlying supply and demand characteristics of the market. Therefore, high levels of volatility reflect extraordinary characteristics of supply and/or demand.

In the case of price shifts, the stress scenarios may be defined as additive or multiplicative shifts. Moreover, they may be defined by means of volatility functions of the risk factors. The scope in the analysis of price shift and price volatility shift is to estimate the value changes of Islamic financial contracts based on stress scenarios, which may be defined for changes in prices and volatilities. Moreover, the scope of such analysis is also to fulfil the regulatory requirements with respect to the calculation of market risk based on the stress scenario-matrix approach.

Financial institutions employ the sensitivity-based tests to evaluate the impact of price changes on the value of a portfolio. Because financial institutions exhibit a variety of portfolios that could contain several Islamic financial products, the tests are made for both directional changes; that is, for negative and positive changes. In addition to the bidirectional changes in market risk factors appearing in Islamic products, financial institutions are also employing stress-tests that are referring to the links between the related

positions of a portfolio. These positions are usually taken according to a sensitivity factor and/or a correlation estimator. Thus, financial institutions should be able to identify what kind of change in each sensitivity factor and/or each correlation estimator would adversely change the value of the portfolio; moreover, they should also set the exact test for individual estimations.

It is somewhat unavoidable to distinguish between scenario-based tests and sensitivity-based tests, in the sense that some scenario-based tests implicitly assume some scenarios for sensitivity or correlation estimators. The most apparent paradigm is the case of the simultaneous adverse change on all market risk factors. In practice, this technique assumes a unique unity correlation for all bilateral product co-movements.

SUMMARY

Islamic financial institutions are exposed to market risk primarily through four types of risks, which are rate of return or benchmark rate risks related to market inflation and interest rate, commodity price risks as they typically carry inventory items (predefined prices), FX rate risks in the same way as conventional banks and equity price risks, mainly in regards to the equity financing through the profit- and loss-sharing contract modes. These types of risks were discussed extensively in this chapter and are summarised below. Yield curves are considered to be a predictor of future economic activities and may provide signals of pending changes in economic fundamentals. There are mainly four types of yield curves that can be used to define such market behaviours and drive the market parameters of the Islamic financial contracts: the Normal yield curve, the Steep yield curve, the Flat and Humped yield curve, the Inverted yield curve. Each one is useful for different purposes and for different types of Islamic financial contracts. The use of these curves is explained in this chapter.

The fluctuation of the commodity prices is a significant source of market risk which creates commodity risks, arising from movements in commodity prices. In Islamic finance, contracts that are dealing with purchasing of commodities and/or their production are exposed to commodity price risk. The behaviour of commodities in Islamic finance are driven both directly and indirectly by many different risk factors, including price risk, cost risk, market's influence rate risk, FX rate risk, quantity and time risk, future delivery risk, and invert price risk. By providing Islamic products that are related to commodities, i.e. *Murãbaha*, *Salam*, and *Istisnã*, financial institutions need to be able to manage these potential commodity risks. These commodity risks were explained extensively in the course of this chapter.

One of the main characteristics of both the joint venture of the *Mushãrakah* and *Mudãrabah* contracts is the sharing of profit and loss that is driven by the share in the investment's equity. This type of venture can result in equity price risks. The quantification and management of equity risk should be based on available market prices.

Islamic financial products carry more than one market risk factor; moreover, even a simple portfolio usually contains different types of contracts. This combination of risk factors and contracts increases the complexity of collecting and combining the information needed for market risk analysis. Market data underlying the yield curves and benchmarks are mainly used for the rate of return risk analysis in the *Murãbaha*, *Ijãrah*, *Salam*, and *Istisnã* financial contracts. In general, the more complex the synthesis of the portfolio or balance sheet accounts constructed by Islamic products, the higher the number of risk factors involved and the higher the amount of data needed from the associated databases. In the selection of market data, financial institutions have multiple access to different systems and types of databases. Any inability to extract information data that refers to market risk factors could make the market risk valuation and management process weak without providing and adding any value to the management of the bank's portfolios or the accounts on its balance sheet.

In market risk analysis, the volatility of the risk factors is transformed into market risk by either linear or non-linear means that is encompassed into a unique measure, called market sensitivity. Sensitivity is a significant factor that plays a critical role in market risk analysis. Sensitivity to market risk in Islamic products reflects the relationship between the cause from a financial risk factor and its adverse impact on the financial institution's earnings from these contracts.

The evaluation of market risk is translated in terms of how much money the bank had the possibility of losing by assuming that it retained the previous day's portfolio. In financial analysis, the most prominent techniques to valuate the market risks are the value-at-risk (VaR). In order to evaluate the overall VaR, three alternative quantitative methods have been developed, which are the Variance–Co-variance (VC), the Historical-Simulation (HS), and the Monte Carlo (MC) approaches. These three approaches can be used to quantify the Islamic financial products by deriving the distribution of the changes caused in the value of a portfolio at the end of the holding period.

For the implementation of the Value-at-Risk (VaR) model, there are two classes of data that should be carefully used and assessed: *position data* and *market data*. It is impossible to estimate the VaR without position data and the necessary market data. The latter are defined by using interpolation techniques, including linear interpolation, the exponential and cubic spine interpolation that can be applied according to the data availability and the level of approximation. Position risk or exposure risk is the risk attributed to

a specific position due to the exposure in one or more risk factors. In constructing the portfolio, risk managers must be aware that during their VaR analysis the portfolio should remain steady.

The different methodologies for applying VaR models to portfolios that contain Islamic financial products should be tested by the financial institutions to evaluate their efficiency and applicability. There are two known ways of conducting such tests. The back-test is applied to determine whether the VaR predictions correspond to observed market changes; whereas the stress-test is used for assessing the event and consequences of risks that may appear under extreme circumstances. Supervisory authorities have introduced stress-testing as a complementary, but obligatory, test to VaR estimations, in order to assess the vulnerability of financial institutions to exceptionally unexpected, but plausible, financial events.

Islamic financial institutions should have in place an appropriate framework for market risk management (including reporting) in respect of all assets held, including those that do not have a ready market and/or are exposed to high price volatility. Adopting and applying the Basel II principles is the way forward, as described in chapter 3.

NOTES

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CHAPTER 6

Operational Risk in Islamic Finance

INTRODUCTION

According to the guidelines of the Islamic Financial Services Board (IFSB),[1] financial institutions are exposed to operational risks when losses occur due to failures in their internal controls involving processes, people, and systems. In addition, institutions should also incorporate possible causes of losses resulting from *Shariah* non-compliance and the failure in their fiduciary responsibilities. A special characteristic in applying Islamic financial contracts is the strong engagement between the institution and the counterparties. In addition, when applying partnership agreements (i.e. in *Mushãrakah* and *Mudãrabah*), both sides may share profits and losses. There is, therefore, an involvement from all parties (banks, buyers, renters, business partners, etc.) in the cause of the operational risk.

This chapter presents all the main elements of operational risk analysis. It shows the three different approaches for operational risk identification analysis, including the self-assessment analysis, the quantitative operational risk indicators, and the operational risk losses. The latter two approaches are extensively discussed as they are mostly used in quantitative operational risk assessment and identification analysis. The definition of the identification factors and the design of the operational risk mapping are also discussed. The detection of causes, events, and consequences and their interactions are presented, illustrating cases of different types of risks that may appear within this chain. A particular emphasis in operational risks arising from the employees and/or IT systems is also given. Two techniques for measuring operational risks via the key risk indicators and the actual losses are also discussed. Specifically, for the former technique, the identification and data accessing issues are highlighted; whereas, for the latter technique, the internal operational risk loss event data, the external operational risk loss event data, and the losses based on scenario-simulation analysis are

covered. Finally, the key issues in the evaluation and management of operational risks are also examined in this chapter.

MAIN ELEMENTS IN OPERATIONAL RISK ANALYSIS

The main drivers in market risk analysis are the commodity price risk, the equity price risk, the FX rate risk, and the mark-up risk market risk factors. Any change in these factors has a computed impact on the value of the bank's trading portfolio. On the other hand, the actual losses (their probability and coverage) resulting from the defaults of the counterparties are considered as the main drivers in credit risk evaluation analysis. Operational risk analysis, however, can be based on risk factors that affect the institution's business performances and objectives; it can also be based on the actual operational risk losses (Figure 6.1). Identification and measurement of the actual risks and their resulting losses is a process that requires a special framework and effort from the institution.

There are three different approaches (see Figure 6.2) for operational risk identification analysis:

1. Self assessment analysis

2. Quantitative operational risk indicators

3. Operational risk losses.

The self-assessment approach is mainly based on internal assessment that involves people's contribution (i.e. the employees of the institution) for reporting any possible risks and resulting losses within the actual business

Figure 6.1 Operational risk analysis based on operational risks and losses

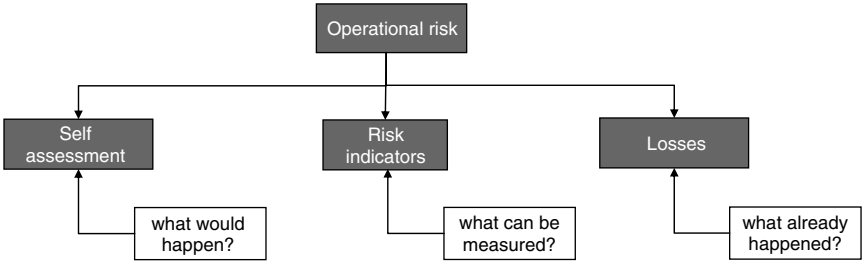

Figure 6.2 Main approaches in operational risk identification analysis

operations. Such an approach uses interviews and questionnaires to identify what could happen in regards to operational risks. A main drawback of this approach is that the collected information may be biased in nature. Therefore, although nowadays some financial institutions are assessing and managing their operational risks via self-assessment approaches, they are based on subjective information that may minimise their real applicability and usage. In this book, we will focus on the second and third approaches, as they are based on more objective quantitative approaches. The quantitative operational risk analysis is driven by risk indicators as well as by the actual resulting losses. The latter approach is based on historical information, whereas the former is based on the actual risk measurements within the operations. In regards to the advance measurement approach (see chapter 3), operational risk indicators could be used in the scorecard analysis, whereas the operational risk losses may be used in internal measurement approaches.

Financial institutions should apply the appropriate approach according to their needs and abilities to implement them. Some key points that should be considered are:

- *Data availability and integrity*: approaches based on risk indicators and losses are data-intensive. The quantitative parameters of the indicators must be clearly measured, mainly via an ongoing data collection process. Moreover, the data referring to losses must be well defined and updated according to the appearance of the loss events. Although in the analysis of the Islamic financial products there may be a lack of information referring to what operational risk is and the resulting losses, financial institutions should be able to have enough data in order to implement quantitative-based approaches.
- *Commitment to implement an operational risk framework and develop a risk management culture*: This requires that the institution will invest in technologies to support the risk management system. Moreover, the institution should develop an operational risk management culture as it

involves nearly every employee in the institution. It should also ensure that it has an up-to-date knowledge of the risk analysis and management process; also, an appropriate budget is provided accordingly.

- *Size of the institution*: the size of the institution is usually an indicator of the investment in more advanced and quantitative risk management systems, analysis, and process. On the other hand, smaller institutions are more flexible in the implementation process and have less complexity in their products, services, and operational systems.
- *Level of complexity*: Institutions with complex Islamic financial products, services, and operations have a higher degree of exposure to more extreme events (tail risks). Quantitative approaches will provide more insight into the true risk profile.
- *Degree of sophistication*: Institutions with a high degree of sophistication in their process and systems need to use management approaches that are more risk-sensitive.

The first step in the analysis of the operational risk is the identification phase, which entails the mapping of the business lines and operational processes, the mapping of the operational risks, and the capturing of the strategic business objectives. A good approach for mapping the institution's business lines is based on those identified by Basel II.[2] The mapping of the operations within the business lines, together with the operational risks associated to the causes, events, and consequences, is also an important step in the risk identification and evaluation process. The measurement phase includes the identification of qualitative and the definition of the quantitative parameters. These are used to define and measure the risk indicators and the resulted operational risk losses. Based on this risk measurement the evaluation process is the next step of the analysis.

IDENTIFICATION OF OPERATIONAL RISK

Identification factors and operational risk mapping

A main part in designing an effective operational risk management system is the identification of both internal and external operational risks. In Islamic finance, such identification should also refer to the operational risks for the insufficient compliance with *Shariah* rules and principles. Financial institutions should identify and assess the operational risk inherently in all products, activities, processes, and systems. Moreover, based on Basel II and IFSB directives, further states that risk identification is essential for the consequent development of a practical operational risk monitoring and control system. However, the key factors that negatively affect the financial

institution in terms of reaching their business objectives should be identified first.

Effective risk identification considers both internal and external factors that could negatively affect the process of reaching the financial institution's objectives. Some important internal factors are:

- the structures of the institution's accounts;
- the corresponding contracts;
- the nature of the institution's activities;
- the quality of the institution's human resources;
- the organisational changes and employee turnover.

Moreover, some external factors are:

- the changes in the industry; and
- the technological advances.

It should be standard practice for a financial institution's management to implement policies and procedures to manage risks arising from their operational activities. The institution should maintain written policies and procedures that identify the risk tolerances approved by the board of directors and should clearly define lines of authority and responsibility for managing the risks. The institution's employees should be fully aware of all policies and procedures that relate to their specific duties.

The above factors should also be considered in the process for mapping the business operations and the risks that influence them. The mapping of the operations' processes is used to define the key business operations, the various business units, the organisational functions, and process flows as well as their direct or indirect links to business targets and objectives. Note that operations used in the Islamic financial contracts must also be linked to *Shariah* compliance. For instance, the commodities, assets, or constructions agreed in the *Istisnã* and *Salam* contracts should always be linked to the *Shariah* principles. Moreover, the operations that refer to the process of producing and delivering products and services should be well defined and monitored in regards to risk of not complying with *Shariah* principles. In addition, when the financial institution agree on a partnership type of agreement, such as the *Mushãrakah* and *Mudãrabah* Islamic financial contracts, additional

mappings of the operational processes that are linked to these contracts should also be designed.

The operational process mapping exercise is used to identify key operations and design a roadmap of the combined key operations by defining inputs and outputs and linkage between them. In the risk-mapping process, all possible risks that might affect the operational processes are identified and linked to the operations process map. The operational risk mapping is used as the basis to identify the types of operational risks' causes and their existence in Islamic financial contracts.

Identification of causes, events, and consequences

Having performed the operational risk mapping, financial institutions should be able to identify what are the causes of the risks, what are the events, and what are the downstream effects and consequences. It is sometimes difficult, however, to identify the differences between causes, events, and consequences. In general, operational risk analysts and managers should have in their minds that:

- what is characterised as a 'cause' should result in one or more events;
- what is characterised as an 'event' should have at least one cause and it must result in one or more consequences; and finally
- what is characterised as a 'consequence' must result from one or more events and may result in new cause(s).

Note that any changes from the initial definition must be documented, and all those that are involved in the operational risk management process and systems must be informed.

Table 6.1 illustrates certain types of causes, events, and consequences.

Operational risk causes, events, and consequences are usually associated with internal control weaknesses or lack of compliance with existing internal procedures as well as with the *Shariah* principles. They are found in all areas of an institution and are mainly caused by the combined actions of people, technological systems, processes, and some unpredictable external events.

People are the area of greatest variability and, as a result, the sources of the majority of operational risks. It is recommended that the organisation look for root causes as opposed to effect. When a risk event is formulating, the causes or originating source of it must be identified as well as what consequences it will have and the resulting effect it will have on other risks. The resulting consequences if the risk is to be 'accepted', 'avoided', or 'mitigated' must also be understood. It is important that this categorisation relies

Table 6.1 Examples of types of operational causes, events and, consequences

Cause types	*Event types*	*Consequence types*
■ Deception of Individual's Behaviour. ■ Organisational and Corporate Behaviour. ■ Faults due to Information Technology. ■ External Political and Financial Uncertainties. ■ Inefficient Agreements with the Counter-parties / Partners due to inefficient operational evaluation of processes. ■ Non Financial External Uncertainties. ■ Mismatching Specification in Commodities, Assets. ■ Uncertainties in Manufacturing and Construction Process. ■ External Partnership Business Risk. ■ Unclear definitions in Business activities for the Partnership Agreements that may be against the *Shariah* principles.	■ Internal fraud. ■ External Fraud. ■ Employment Practices and Workplace Safety. ■ Business Disruption. Systems Failures. ■ Damage to Physical assets. ■ Clients, Products, and Business Practices. ■ Execution, Delivery, and Process Management. ■ Default of keeping the Promise to Buy the Commodity (i.e. in *Murābaha* contract). ■ Defaults of the Commodity's Delivery (i.e. in *Salam* and *Istisnā* Contracts). ■ Failures on Deliveries by the Partnership Obligations (i.e. in *Mushārakah* and *Mudārabah* Contracts). ■ Default in following the principles of *Shariah*.	■ Regulatory and Compliance. ■ Legal Liability. ■ Loss/Damage to Assets ■ Third Party Losses and Damages to Assets (i.e. in *Ijārah* Contracts). ■ Loss of Reputation. ■ Restitution. ■ Loss of Resources. ■ Loss of Opportunities. ■ Loss of Market Share. ■ Exposure to Market and Credit Risks. ■ Losses from Covering Business Failures (*Mushārakah* and *Mudārabah* business agreements). ■ Non-compliance with *Shariah* principles.

on a root cause analysis; that is, causes of operational risk loss events, which are captured in the loss event database.

Identifying root causes can help to identify additional, related risks. By linking causation to relevant business activities, through correlation analysis,[3] this structure is intended to be used as a tool with which to act upon operational risks. This provides management with an effective operational risk management framework. The structure also lends itself to quantification of operational risks by drawing on data sources relevant for modelling.

Realistically, some operational risks must be accepted. How much is accepted, or not accepted, mainly depends on the operational risk impact and internal policies of the organisation. Operational risks with a high degree of impact should not be accepted, even if their probability is low.

The decision to accept operational risk is affected by many inputs and policies. When a manager decides to accept operational risks, the decision should be co-ordinated whenever practical with the affected personnel and organisations, and then documented so that in the future everyone will know and understand the elements of the decision and why it was made.

Types of operational risk causes

Mapping the operational risk during the identification process allows financial institutions to define and measure the risks within the business and better understand their operational risk loss profile. Each financial institution has its own, individual and unique operational settings. Thus, to be able to manage operational risk might require tailoring its definition to the institution's specific settings. In operational risk identification analysis, all major business disruptions that result in operational risk losses initiated from People, Systems and Technology, Policies, Processes and Delivery Failures, Transactions, and/or Internal and External Events should be considered.

1. *People* – Humans are one of the main sources of operational risks and play a major role in Islamic financial contracts (see Table 6.2).

2. *Transactions* – Failures in financial transactions are illustrated in Table 6.2.

3. *Systems and Technology* – Failures referring to systems and technology that are initiated by internal and external events such as those listed in Table 6.2 may also be sources of the institution's operational risk losses.

4. *Process and Delivery Failures* – Such disruption may refer to Process execution and Delivery and are present in most Islamic financial contracts, as shown in Table 6.2.

5. *Internal and External Events* – These are events that cause losses to the financial institutions due to external events, political uncertainties, natural disasters, and the actual implementation of the Islamic contracts.

6. *Policies* – Policies may refer to incomplete/missing legal documentations which affect the compliance to the *Shariah* principles. Furthermore, it includes unapproved access given to client accounts, or even to employment practices and workplace safety.

Table 6.2 Sources of operational risks

Sources of operational risks	*Types of risks*	*Some key risks indicators*
People	Unauthorised usage of internal control, corporate governance breakdown, mistakes, and incompetence in operational processes, incomplete or miss-checking the creditability of the counterparty, authorisation and approvals given to contracts that are not *Shariah*-compliant. Internal fraud: Intentional misreporting of repayments and deliveries from the counterparty and business partner, employee theft and smuggling, insider and outsider trading, cheque kiting, bribes, etc. External fraud: Robbery, Forgery, Damage from computer hacking, etc. People's risks in reference to Islamic contracts: Failure to keep the promise of buying the commodity, i.e. in the *Murãbaha* contract. In the *Ijãrah* contract, the ownership of the asset remains with the lessor and thus any misconducts by the lessee (during the lifetime of the contract or at the maturity day) are initiating losses accordingly. In the *Mushãrakah* contract, the inability to buy the equities, due to business failures or the partner.	■ Staff turnover rates ■ Staff training and experience levels ■ Number of people that have unauthorised access to third party accounts ■ Number of approvals that are not compliant to *Shariah* rules and principles

Continued

Table 6.2 Continued

Sources of operational risks	*Types of risks*	*Some key risks indicators*
Transactions	Transactions: Clients, Products and Business Transactions, Data entry errors, Product complexity, Document/ contract error, Privacy Breaches, Misuse of confidential customer information, Improper trading activities on the bank's account, Money laundering, producing and sale of unauthorised products that is against the *Shariah* principles.	■ Transaction and trades volume ■ Income instability ■ Number of entry errors ■ Frequency and/or severity of transactions errors and omissions
Technological Systems	System failures caused by internal and external events: Internal: Programming errors, IT crash caused by new applications, loss of Information data, incompatibility with existing systems, internal telecommunication failures, failure of system to meet business requirements, etc. External: Utility outages such as power cut, business disruption caused by system failures, telecommunication problems, information risks and losses, external security breaches, etc. Specification Mismatching Specification mismatching in commodities' or asset's productions that were	■ Number of instances of network or systems downtime ■ Maintenance fail over rate, ■ Systems' failure rate ■ Data integrity after outage ■ System failure retrieval time ■ Backup failure rate ■ Number of failed operations

Continued

Table 6.2 Continued

Sources of operational risks	*Types of risks*	*Some key risks indicators*
	agreed in the *Salam* and *Istisnã* contracts.	
Processes and Delivery Failures	Process execution: Delivery and process management, product and service complexity, management failures, security failures, incomplete/missing legal documentation, unapproved access given to client accounts, delivery failure and vendor disputes, payment/settlement delivery risk, employment practices and workplace safety, workers' compensation claims, violation of employee health and safety rules, organised labour activities (strikes, etc.), discrimination claims and general liability. Delivery on contracts' agreement: Defaults on the commodity's delivery in *Salam* contracts and defaults in manufacturing and construction in *Istisnã* contracts, whereas in *Mushãrakah* and *Mudãrabah* contracts the inabilities of the partner to further operate the business.	■ Number of contracts non-compliant with organisation's policy ■ Settlement failure rate ■ Accounting losses' rate ■ Number of issues raised by regulators/auditors ■ Payment failure rate ■ Number of defaults ■ Number of Islamic contracts that are not *Shariah* compliant
External events	External events: Utility outages, power cut, telecommunication problem. Political uncertainties: War (global effect), damage to physical assets, fires,viruses/	Amount of Physical losses (financial, people, systems) Loss data rate

Continued

Table 6.2 Continued

Sources of operational risks	*Types of risks*	*Some key risks indicators*
	mass diseases, terrorism, vandalism, etc.	
	Natural disasters: Earthquakes, Fires, Viruses, Terrorism, Vandalism, Floods, Hurricanes, Volcanoes, Damage To Physical Assets, etc.	
	Breach of environmental management, bankruptcy of supplier, transportation failures, etc.	
	Events to contracts: In the *Ijārah* Islamic contract, catastrophic events may cause damages to the assets (such as properties) which consequently result in major losses.	
	In *Mushārakah* and *Mudārabah* contracts, where the financial institution has a partnership in the business, any external event or in general any inadequate activities or failures due to business risks may cause operational risks losses.	
	In the *Mudārabah* contract, high disruption on business development that results loss is fully covered by the financial institution.	

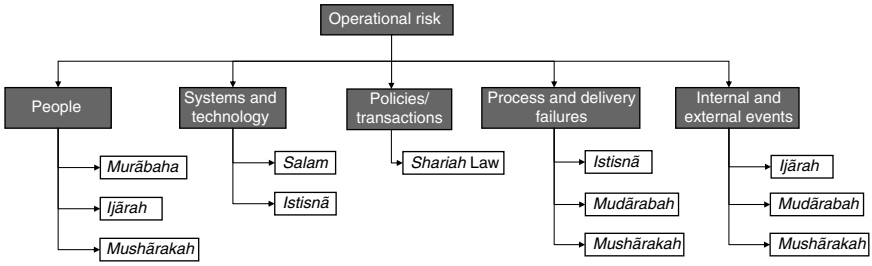

Figure 6.3 Sources of operational risks and where they affect Islamic financial contracts

Figure 6.3 illustrates the different sources of operational risks and where they affect Islamic financial contracts.

The greatest losses among all operational risks are the ones that are initiated from the employees' activities and the failures, inefficient, or inappropriate use of IT systems/technology. Financial institutions therefore should pay particular attention to these areas and be able to identify and manage such sources of operational risks.

Employees' risks in financial institutions

The risk of a loss intentionally or unintentionally caused by an employee, such as employee error and employee misdeeds, or involving employees such as in the area of employment disputes, is the risk class that covers internal organisational problems, fraud, and losses. Unfortunately, the largest amount of losses results from intentional activities such as fraud and unauthorised trading. It is people, not businesses or systems, who commit fraud or mistakes and such risks increase dramatically every day. Fraud invades every area of businesses and is committed when a motive coincides with an opportunity.

Financial organisations should establish and maintain appropriate systems and controls for the management of operational risks that may arise from employees. Moreover, they should ensure that all employees are aware of their operational risk management responsibilities, including by establishing and maintaining:

- A selection of employees that respect and follow the *Shariah* principles
- A separation of the employees' duties
- An internal supervision of the employees' performances

- A monitoring of the employees' behaviour
- Well-established policies that are complying with the *Shariah* principles and are well known by all employees.
- Training processes to direct the employees in the process of the risk management.
- Well-defined employment termination policies and procedures.

Using qualitative criteria the identification and assessment of the risks that result from people is defined and measured via parameters that describe how people's risks affect operational performances, which are directly or indirectly linked to business targets and objectives. The organisation's process map highlights the links between operational processes that can identify and measure operational risks, performances, and business objectives. The identification process defines the key operational risks and performance indicators that measure quantitatively both risks and performances, respectively. Therefore, when it is feasible, the qualitative 'measurements' should be transferred to quantitative ones.

IT systems/technology risks

Nowadays, information technology plays a primary role in financial institutions, bringing, however, the potential to transform operational risks from manual processing errors to system failure risks. The growth of the electronic banking, electronic payments, and transactions has resulted in the risk of electronic frauds and system security issues that are not yet fully understood. The pressure from all the quarters to invest continuously and dramatically in modern processes and technologies is enormous. Internet-related technologies enable much higher and more sophisticated levels of co-ordination, globality, efficiency, and flexibility. However, they open the door for chaos and operational risks if they are not consistent, structured, co-ordinated, and stable over time. Systems that are related to IT failures are significantly increasing in number and severity as most of the business transactions and processes are fully dependent on IT, and thus failures in IT are more likely to impact the business, and that impact is more likely to be severe.

IT security issue

The growing complexity of the IT environment – that is, the underlying backbone to modern financial institutions, and the potential for substantial

monetary losses – has increased the importance of IT security. As financial institutions continuously improve their technological capabilities, the complexity of maintaining a secure IT environment will certainly increase accordingly. At the same time, attacks on IT systems are increasing and exposure to security breaches has also increased during the past few years. As a result, financial institutions should establish and maintain appropriate systems and controls to manage their information security risks via: appropriately trained staff and users, integrity in regards to the accuracy and completeness of information, setting back-up systems, ensuring that there is isolation of networks, using firewalls, ensuring confidentiality of the information, defining non-denial and accountability where the person or system that processed the information cannot deny their actions, updating the virus/worm protections, using data encryption, applying continuous vulnerability assessments, using intrusion detection systems and external monitoring systems.

Effect of IT operational risk on credit risk

There are cases where the IT systems/technology risks have a significant impact on credit risk events. Thus, credit-related operational risk may occur through the following:

- *Processes*: when failures in collateral management occur via, for instance, an inappropriate or missing documentation, incorrect assignment to trading portfolio, inaccurate valuation.
- *People*: if there is a violation of competence and evaluation rules in credit-approval processes.
- *Systems*: when there is unavailability of system support for credit-approval processes.
- *External events*: credit fraud in case, for instance, the credit being granted is based on forged balance sheets.

Interactions between the causes of operational risks

Between the individual operational risks types, mentioned above, there is a certain amount of overlap or interaction (Figure 6.4). The intertwined relationship among them can be very complex. This interactive relationship must somehow be understood. From an internal and external perspective, people and systems and technology interact to produce a successful process

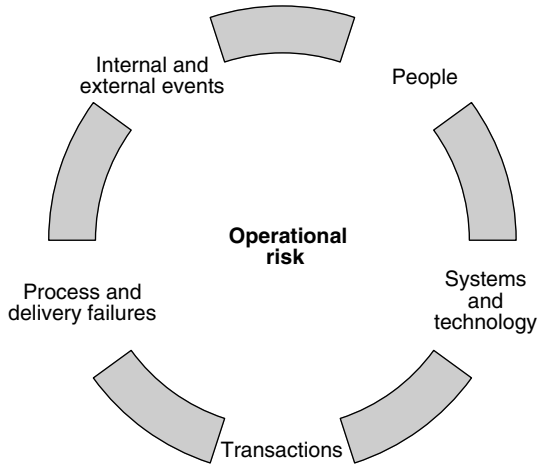

Figure 6.4 Interactions among the different causes of operational risks

as well as comply with the obligations underlined in the different types of Islamic financial contracts. When an operation referring to internal processes or to external activities via the business partnership contracts such as *Mushãrakah* and *Mudãrabah* fails, an incident occurs that may result in losses. Thus, the operational risk management system must be analysed and the inputs and interaction among the elements must be thoroughly reassessed. The organisation is often the controlling factor in operational success or failure.

MEASURING OPERATIONAL RISKS

During the identification analysis there are cases where the definitions of operational risks are initially described qualitatively; however, a process to transfer these definitions to quantitative values is desirable to convert all these operational risks into measurable ones. These quantitative values are defined as *Key Risk Indicators (KRIs)* and should be established for operational risk analysis to ensure the escalation of significant risk issues to appropriate management levels. Operational risks affect to certain degrees, directly or indirectly, some of the operational business performances. Thus, these performances are required to be defined, and their variations should be measured quantitatively.

Identifying operational key risk indicators

The identification and measurement of operational risks via KRIs is becoming an important tool in the framework of operational risk management

systems. Financial institutions include risk indicators into their measurement approach to clearly identify, measure, and alert when, for instance, the level of an operational risk is above a set threshold. Using KRIs is one of the most regular ways to link the quantitative data with the actual values of risk causes, events, and their consequences. KRIs are mathematical functions that describe the operational discrepancies of specific operations within specific business lines. The main challenge in identifying KRIs is to quantify the qualified risks' parameters by determining their mathematical functions. One of the most common and efficient ways to define the KRIs is by measuring the variation (differentiation Δ) and volatility of the operational systems', processes', and people's performances $KRIs = \Delta(OP)_{sy,\ pr,\ pe}$ and the deterioration of the business targets when an operational risk occurs. The variation/volatility in operational performances within the business lines can be characterised as a risk event or a cause to a new event or even to a consequence.

Some key points that financial institutions should consider during the design and implementation phases of the KRIs' approach are listed as follows:

- In most cases the parameters of the KRIs are linked to the information that is frequently being updated. The frequency of updates describes the number of times a risk of a given size occurs within a given time period or a given organisational unit. All this information must be accessible and easily collected.
- Information may be sensible in regards to confidentiality. Therefore, the institutions should identify and ensure that such data can be used in operational risks analysis.
- A simple but very important rule is to keep the identification and design of the KRI functions simple and transparent by not including large numbers of parameters. It is preferable to have a larger number of simple and easy-to-understand KRIs than a smaller number of complex functions.
- It is inefficient to have duplicated KRIs where the same measurements of operational risk use slightly different functions.
- The correlation between the indicators should be identified and analysed to evaluate the degree of their significance. High correlation (negative or positive) indicates high degree of significance.
- A complete index that describes and explains all parameters used in the KRI functions must be in place so that future users and operational risk analysts can understand where data is coming from.

Akkizidis and Bouchereau (2006)[3] proposed techniques for constructing KRIs for operational risks as well as on how to estimate their significance values.

Accessing information used for KRIs

As mentioned above, the access to information data and metrics referring to the key risk indicators should be available at any requested time. In operational risk management systems, an important issue is to set the measurements on different types of frequency for collecting such information data. Thus, there are three ways of accessing them:

- *On-going access*: Information referring to operational risks may need to be monitored constantly in real-time or near-real-time or at least many times within a short period (i.e. each day). KRIs with high degree of significance may need constant monitoring to give an insight into the operational risks using the parameters that are associated with them.
- *Periodic access*: Operational risks that frequently resulting significant losses should be monitored on a periodical basis using KRIs. Moreover, periodical monitoring should also be applied to external operational risks that refer to the partnership Islamic financial contracts.
- *Access as on demand*: Any major operational risk occurrence must be tracked and recorded in terms of the time of appearance and its value. Additionally, financial institutions should be able to access and record any particular operational risk measurements when they are requested.

Note, finally, that, based only on past data, we may not always have a good indication for the future occurrences in regards to risks in operations. This is the main reason why accessing the measurement and analysing the most recent information is very useful. KRIs can be used as predictive indicators of arising risks, risk events, and potential losses.

LOSS EVENTS

A fundamental principle in Islamic finance is the profit and loss sharing, where both institutions and counterparties are committed to it. As illustrated in chapter 2, operational losses arise by applying all types of Islamic financial contracts, including the *Murãbaha*, *Ijãrah*, *Salam*, *Istisnã*. Operational losses also appear in the *Mushãrakah* and *Mudãrabah* contracts, where the institution has a close business relation with the counterparties that are called partners. In such contract agreements, the institution can be exposed to a great degree of operational risk as it has the full responsibility for covering the entire amount of associated losses. The collection, measurement, and evaluation of all these losses are the key issues in the area of operational risk management and in the development of regulatory capital requirements.

As mentioned earlier in this chapter, the loss data collection is an elementary approach for the assessment of operational risks. The resulting loss event database should include all these losses that are initiated from the causes of risks, risk events, and downstream effects. Apart from information on the gross loss amount, the institution should collect information about the date of the event and any recoveries. A methodological approach for identifying and collecting this information is to link the losses with the internal operational risks. However, in cases where there is a lack (or missing) of sufficient information, it can be supplemented by external loss event data, assuming that the provided data are relevant to the institution. Financial institutions and supervisors are nowadays recognising the sharing of loss data, based, however, on consistent definitions and metrics. When there is a lack of both internal and external data, scenario analysis could also be used as a vital tool.

Internal operational risk loss event data

The institution may implement an internal operational risk loss event database when it has collected loss information for several years (at least three). The loss data is obtained across the institution's business lines, events, product types, and geographic locations. On the other hand, they can be obtained via the relevant business activities, such as manufacturing, construction or services, products, events, and locations that refer to the contracts with their counterparties (i.e. *Ijãrah* contract) and business partners (i.e. *Mushãrakah* and *Mudãrabah* agreements). The institutions must make sure that operational risk loss event information associated to their direct internal business as well as to their external businesses that influence their contracts should be reported uniformly and accurately. This can be achieved by having a system that has the ability to automatically track the losses or where different people are responsible to report them.

The reporting and loss collection process should be driven by the financial institution's policies that identifies when an operational risk loss becomes a loss event and it must be added to the loss event database. Policies and procedures should be communicated to the relevant staff to ensure that there is a satisfactory understanding of operational risk and the data-capture requirements under the AMA operational risk management framework. In addition, the institution must set up appropriate operational risk data thresholds. These thresholds can be used as a loss indication and even in the prevention and corrective actions processes.

External operational risk loss event data

In the case where there are limitations to obtain the above-mentioned internal operational risk loss event data, financial institutions could use an

external data. Such data can then be used for defining the institution's level of operational risk exposure as long as the data are relevant. This means losses that are coming from similar institutions and providing similar types of contracts (especially in regards to the counterparties and business partners) in the same or similar markets, with similar types of operational risks. Note that operations and people's behaviours vary in different geographical areas and markets. Even institutions that are exclusively providing Islamic products or mixed products (Islamic and Westernised) may have different processes in operations and thus in their associated risks. Moreover, Islamic products that are referring to clients in Europe are exposed to a different degree and type of operational risk than the ones referring to the Middle East and Far East regions. External data enables institutions to comprehend industry experience and, in turn, present a way for assessing the adequacy of its internal data.

External loss data can be obtained via any reasonable manner, including external databases or direct links to other institutions with similar business processes and activities. The financial institution may use data gained through membership of industry groups and others use data obtained from vendor databases or public sources. It is important to note, however, that the institution should have policies and procedures for the use of external loss data in the operational risk framework. This is to make sure that they get what they should and thus feel confident that the information used and reported is relevant and relatively accurate. Institutions using the advance measurement approach must use sophisticated data management practices to produce realistic and dependable operational risk estimates for calculating their capital requirements. Finally, note that external data may also be used as a driver to build up scenario analysis; additionally, they can be used as a benchmark for the existing (but limited) data or to the overall operational risk exposure results.

Losses based on scenario simulation analysis

The scenario simulation analysis is based on systems that integrate past experiences and professional expertise of the designer. Past experiences on failures and operational risks with the resulting losses are useful in risk management analysis, but in many cases not enough to give a realistic estimation of the exposure to future losses. Financial institutions, and especially the ones that provide Islamic financial contracts, are moving fast in their Islamic financial product implementation and so are the technology and operational processes that support them. The know-how and the processes are rapidly updating until Islamic financial systems will become mature and the exposure of the institution will be stabilised accordingly. Scenario analysis is very useful for institutions that provide Islamic financial contracts where the risk and loss analysis based only on past data may

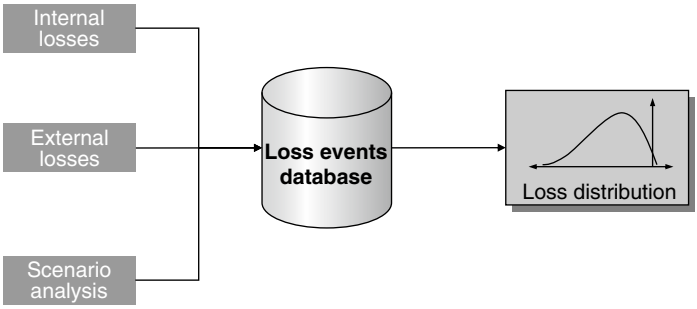

Figure 6.5 The three approaches used to cultivate and populate the loss event databases

give a false warning of the present and future operational risks. Moreover, scenarios are very useful when used to evaluate high-severity events.

Business managers and risk management experts could have a good indication of the future losses and thus they can build scenarios that define such cases. However, institutions must have policies and procedures that describe scenario analysis and identify its role in the operational risk framework. These policies should refer to all fundamental information for the scenario analysis, including details of the structure of the scenario, the time and the reasons why they have been created, the updates and the corresponding extents, the losses that are being looking for, etc.

The distribution of the losses is defined based on the three approaches used to evaluate and manage the operational risks, as shown in Figure 6.5.

Operational risk profile based on loss distribution

The operational risk profile is based on the distribution of the above-mentioned operational losses within the space of the axes that define the risk probability, impact, and exposure values. The first dimension of this distribution is the likelihood or probability of operational risks occurring and leading to an undesirable event. The second one is about the resulting impact of operational risks to the institution before and after undertaking risk control actions, and the third dimension refers to the overall exposure areas of the operations to all types of operational risks. Figure 6.6 illustrates the distribution of the operational risk losses within the probability and impact space.

The space that is defined by the first two dimensions (probability and impact) can be divided into four subspaces: (a) Low impact and low probability, (b) Low impact and high probability, (c) High impact and high probability, and (d) High impact and low probability. The first two cases indicate trivial operational risks in the institution's and/or its partnership businesses (referring to Islamic contracts) and a low degree of the corresponding

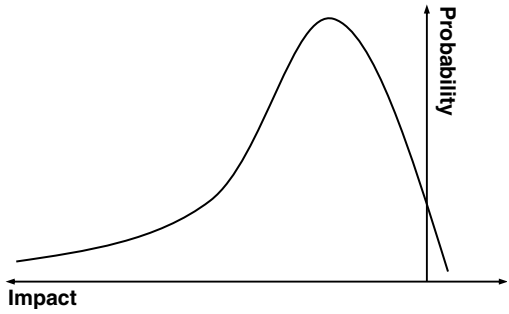

Figure 6.6 Loss distribution for operational risk

implications. The third case is out of the operational risk pragmatic state of existence, which means such risks exist in the normal course of doing business. The fourth case is where the probability of the operational risks appearances is 'low', whereas their impact is 'high' and must receive significant attention during the operational risk profiling analysis. All financial institutions at unexpected times have experienced such cases where the impacts of business disruptions and losses are very significant. Note, finally, that the distribution starts from the positive impact due to the fact that in some cases operational risk events may even have a positive impact on the institution.

The degree of operational risk exposure that defines the third dimension of the risk profiling axes can be based on the loss distribution within the probability and impact axes. The operational risk exposure can be defined based on the methodology called clustering operational risk profile (ClORiP)[2] that is used to identify clusters within the loss distribution. According to this approach, the co-ordinates defined by the probability, impact, and significance degrees create groups of loss position within the axes. These groups of losses that have different density within the axes, called clusters, are analysed and evaluated based on a methodology called operational risk mountain surface.[2]

The operational risk profiling, as well as the measurements of the key risks within the operations, are the two main elements for operational risk evaluation. These are performed by applying operational VaR analysis as discussed in the following sections.

EVALUATING OPERATIONAL RISK BASED ON VAR ANALYSIS

There are mainly two ways for evaluating and managing operational risks in operational risk analysis: one is by considering the risks and the operations

that refer to the different business lines of the institution; and the other is by analysing the actual operational risk losses, i.e. internal, external, and those that are initiated from the partnership in Islamic-based agreements. The latter is a top-down approach, whereas the former is a bottom-up approach. The main advantage in the top-down approach is its simplicity in terms of loss data considerations. Top-down approaches in operational risk measurement frameworks are appropriate for the determination of overall economic capital levels for financial institutions. However, it is a rather straightforward way to determine a capital amount for increasing operational losses that may not be covered by insurance. Bottom-up approaches, on the other hand, engage in the mapping of workflows where failures may occur. It analyses the operational risks from the point of view of individual business activities within the business lines. The operational risks are modelled based on risk parameters that construct the KRIs used in the risk quantification process. These approaches can make use of operational VaR, as discussed later.

In terms of management using the top-down approach, financial institutions may be able to drill-down in operational procedures that are linked to these losses, but it is difficult to discover the related operational risks that are causing them and are exposing the particular area(s) of the institution. Thus, such an approach is mostly unable to inform management about particular weaknesses in the operational processes and therefore they cannot exhibit fine-tuning capabilities for the implementation of operational risk controls. The operational risk losses are difficult to be incorporated and characterise dynamic changes in the operational risk environment that might affect the operational loss distribution over time. In contrast, the bottom-up approach is more analytical and sophisticated, as it is based on the analysis of the actual operational risk events. Such approaches are more transparent and forward looking, providing the ability to the institutions for drilling-down into the business processes, systems, and people's actions to explore their performances and risk status. Thus, bottom-up solutions involve many parties within the institution from the risk analysts and business-line managers to the internal risk auditors and regulators.

By using bottom-up approaches, however, a great number of information data that refer to operational risks are required in order to perform the evaluation and management analysis. Such analysis may prove difficult and time-consuming, as it should take into account the interdependencies/correlations across business lines and operations. It may, therefore, give too much in-depth and sometimes irrelevant details about the institution's operational structures and related risks. Bottom-up models are more accurate and targeted to the measurement of specific operational risk problems, but at the same time are more complicated and difficult to characterise and analyse than top-down models.

Both approaches may also be employed in parallel to increase the degree of confidence in terms of evaluating and managing operational risks. Thus, the institution may try to detect sources of operational risk and identify the resulting exposure within the business lines; on the other hand, it may use the past, current, and future (simulated) losses to evaluate the position in terms of financial capital. Note that ideally the capital requirements defined for both approaches should converge to the same estimation values.

Operational VaR analysis

Using the above analysis (top-down and bottom-up) and the measuring of operational risks as well as the resulting losses, the evaluation of operational risk based on VaR analysis can be implemented. As already presented in the market risk chapter of this book, the market VaR analysis is based on the changes in risk factors (rate of return rates, price volatility, shares, and FX rates), whereas the credit VaR, presented in the credit risk chapter, is driven by the credit risk losses. Operational VaR analysis is based on the actual operational risks within the business lines or, in other words, the measurement of risk factors using KRIs. On the other hand, the estimation of the operational VaR can also be based on the actual operational risk losses as distributed in the probability and impact risk profile space. As in the other types of risks, there are three methods for estimating the operational VaR. These are Historic, Variance–Co-variance, and Monte Carlo methods. The non-parametric Historic method is the easiest for calculating VaR, as it is based on actual results; however, it requires a large database and is difficult to drill-down in the results. Similarly to the historical method, the Variance–Co-variance also uses historical data. This method is based on the Variance–Co-variance matrix and the calculation complexity is low with the capability of drilling-down the calculation process and the results. The above two methods cannot really consider any non-linear behaviour. Such consideration can be fully supported by applying the Monte Carlo method, but it requires a high degree of computational process as it is based on algorithmic steps and loops. This method allows shocking or stressing the risks that affect the operations within the business lines or even the actual operations that are at risk to any required limits and thus evaluating their VaR up to its extreme points. It is the most recommended method to be implemented in the financial industry as the random values used to shock the underlying business operations represent, in a way, the reality of unexpected operational risks and the consequence of losses. Detailed information about operational VaR analysis can be found in Kalyvas & Akkizidis, 2006.[4]

Based on the evaluation results, risk analysts are able to construct the framework of risk management from defining and constructing the risk

policies and thus to correct the weaknesses of the institution in regards to operational risk and the corresponding exposure.

ELEMENTS IN THE FRAMEWORK OF THE OPERATIONAL RISK MANAGEMENT

All financial institutions, including also those providing Islamic financial products, should define a framework for their operational risk management. The main principles are common in both Westernised and Islamic banking, with the latter having an additional dimension to consider. This is the management of operational risk so that the institution's processes and people's activities comply with the *Shariah* principles. This dimension should be fully integrated with the whole operational risk management framework.

Financial institutions should first plan, schedule, and define the framework of the operational risk actions and policies. The main elements for constructing this framework are:

- Planning the activities for reducing the operational risk probability, impact, and exposure. Defining a business impact analysis.

- Scheduling the every-day actions and policies with regards to the involvement of people in the operational risk management process and in decision making, such as on whether and how to accept, avoid, transfer, or mitigate the operational risks and their resulted losses.

- Define the scenario driven by the strategies and policies of the institution which are mainly covering extreme events of operational risk emergence.

- Continuity or contingency planning and recoveries to ensure that the business is running (fully or even partially) when extreme events occur and that the business is also able to recover within a pre-defined set time.

- Defining the operational risk reporting that includes the results of the risk analyses referring to both the evaluation and management faces.

Institutions should also define internal control actions driven by the above-mentioned elements together with the *Shariah* principles.

A detailed description of the guides to operational risk management is beyond the scope of this book; however, for more explanations, refer to the list of references.

SUMMARY

This chapter has presented some of the initial main elements of operational risk analysis, which includes the identification, mapping, assessment, and measurement and evaluation. It particularly made references to Islamic financial products and particularly the compliance with the *Shariah* principles. It firstly shows that operational risk identification can be based on risk factors that affect the institution's business performances and objectives and also on the actual operational risk losses. Three different approaches for operational risk identification analysis were presented. Firstly, the self-assessment analysis uses interviews and questionnaires to identify what could happen internally in regards to operational risks. Secondly, the quantitative operational risk indicator approach defines and measures key risk indicators. And thirdly, the operational risk loss approach is based on historical information.

Financial institutions should apply the appropriate approach according to their needs and abilities to implement them. Some key points that should be considered were discussed and are availability and integrity of data, the commitment of staff to implement an operational risk framework and develop a risk management culture, the size of the institution, the level of complexity and the degree of sophistication of the institution.

The chapter further discussed the identification factors and operational risk mapping. A main part in designing an effective operational risk management system is the identification of both internal and external operational risks. In Islamic finance, such identification should also refer to the operational risks for the insufficient compliance with the *Shariah* principles. It showed that the mapping of the operations' processes is a useful tool to define the key business operations, the various business units, the organisational functions and links to business targets and objectives. It particularly dwelled into the identification of operational risk causes, events, and consequences. After performing the operational risk mapping, financial institutions should be able to identify what are the causes of their operational risks, what are the events, and what are the downstream effects and consequences. Operational risk causes, events, and consequences are usually associated with internal control weaknesses or lack of compliance with existing internal procedures, as well as with the *Shariah* principles. The chapter also talked about interactions between the causes of Operational Risks (i.e. between People, Systems and Technology, Transactions, Process and Delivery, Internal and External events) and operational risk as an initiator of market and credit risks.

It graphically illustrated the different sources of operational risks with regards to the different Islamic financial contracts and identified that the greatest losses among all operational risks are the ones that are initiated

from the employees' activities and failures and inefficient or inappropriate use of IT systems and technology. The chapter paid particular attention to employees' risks in financial institutions and IT systems and technological-related risks. It highlighted that the largest amount of losses results from intentional activities such as fraud and unauthorised trading caused by employees. Furthermore, the growth of electronic banking, electronic payments, and transactions has resulted in the risk of electronic frauds and system security issues. Although internet-related technologies have given much higher and more sophisticated levels of co-ordination, efficiency, and flexibility, they have at the same time increased the level of operational risks when they are not consistent, well-structured, and co-ordinated. The issue of IT security was particularly discussed because, if financial institutions continuously improve their technological capabilities, the complexity of maintaining a secure IT environment will certainly increase. It also highlighted that in some cases the operational risks related to IT systems/technology have a significant impact and can even lead to credit and market risk. This led on to talk about how operational risks have a complex interaction among each other and also with other types of risks.

The chapter further highlighted that during the identification analysis there are cases where the definitions of operational risks are initially described qualitatively, but a process to transfer these definitions to quantitative values is desirable to convert all these operational risks into measurable ones. These quantitative values are defined as Key Risk Indicators (KRIs). Financial institutions include key risk indicators into their measurement approach to clearly identify, measure, and alert when thresholds are reached. It was shown that the main challenge in identifying KRIs is to quantify the qualified risk parameters by determining their mathematical functions and also gave some key points that financial institutions should consider when using the KRI approach. It was noted that the availability of data as well as accessing this data when it is essential are some of the biggest challenges of this approach.

It was also discussed that a fundamental principle in Islamic finance is the profit and loss sharing, where both institutions and counterparties are committed. Operational losses appear in the *Mushãrakah* and *Mudãrabah* contracts, where the institution has a close business relation with the counterparties that are called partners. In such contract agreements, the institution can be exposed to a great degree of operational risk as it has the full responsibility for covering the entire amount of associated losses.

It talked about how the loss data collection is a primary approach for the assessment of operational risks. It further talked about how the resulting loss event database should include all the losses that are initiated from the causes of risks, risk events, and downstream effects. The institution may implement an internal operational risk loss event database when it has

collected loss information for a sufficient amount of years. If the internal data is insufficient or inadequate, it can be substituted with external data, but the data should come from the same type of institution, with trades from similar markets. External loss data can be obtained in any practical way, including using external databases or direct links to other institutions with similar business processes and activities.

The chapter then described how losses can be estimated based on Scenario Simulation Analysis. The scenario simulation analysis is based on systems that integrate past experiences and the professional expertise of the designer. This analysis is very useful for institutions that provide Islamic financial contracts where the risk and loss analysis based only on past data may not give appropriate indications of present and future operational risks. The distribution and estimation of operational losses is defined based on internal and external losses and scenario analysis to develop and populate the loss event database. The graphical representation of the loss distribution is based on the probability and impact of operational risks and their resulting losses.

In addition, the chapter described how operational risk evaluation is performed based on the Value-at-Risk (VaR) analysis. Operational risk profiling, as well as the measurements of the key risks within the operations, are the two main elements used for operational risk evaluation.

The chapter also dealt with the top-down approach as opposed to the bottom-up approach for measuring operational risks. Top-down approaches are appropriate for the determination of overall economic capital levels for financial institutions. Bottom-up approaches, on the other hand, engage in the mapping of workflows where failures may occur and get to the root causes of operational risks.

For the measuring of operational risks, as well as the resulting losses, the operational VaR analysis was discussed as a very useful tool. Operational VaR analysis is based on the actual operational risks within the business lines or, in other words, the measurement of risk factors using KRIs. It was shown that there are three methods for estimating the operational VaR. These are historic, variance–co-variance, and Monte Carlo methods. Each method is briefly explained, with their benefits and shortcomings.

The chapter further explains that all financial institutions, including also the ones providing Islamic financial products, should define a framework for their operational risk management. It adds that there is an additional element to consider for institutions providing Islamic financial products, which is the compliance with the *Shariah* principles. It finally lists some of the main elements for constructing an efficient operational risk management framework. Throughout the chapter, there are references to various useful methods and techniques for assessing and evaluating operation risks and their associated losses.

NOTES

1. Islamic Financial Services Board, Guiding Principles Of Risk Management For Institutions Offering Only Islamic Financial Services (December 2005).
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3. Akkizidis & Bouchereau, *Guide to Optimal Operational Risk and Basel II* (New York: Auerbach Publications, Taylor & Francis Group, 2005). ISBN: 0849338131.
4. Recommended study for GARP exams, FRM Study Guide, 2007, Chapter 5 / Operational Risk, from the book by L. Kalyvas, I. Akkizidis, I. Zourka, and V. Bouchereau, *Integrating Market, Credit and Operational Risk: A Complete Guide for Bankers and Risk Professionals* (London, Risk Books, 2006).

CHAPTER 7

Concluding Remarks

Wealth maximisation has been an important goal of the financial institutions for many decades. The quest for generating better revenues is ongoing. Conventional financial institutions have been playing the role of financial intermediation for several years. However, the finer details of this role have changed dramatically. From simple borrowing and lending institutions, they have emerged as giants who provide a wide range of financial services and have grown to a such a proportion that the stability of entire financial markets depends on the stability of these financial institutions. For efficient financial intermediation, several factors are critical for the organisation. First, the availability of a basic infrastructure which includes local payment networks, local money markets, a deep and wide financial market, and an adequate legal framework. Second, it requires products, people, systems, and processes. Third, organisation requires an integration of all its activities from a risk perspective. Finally, it needs a sound economy with vigilant supervision. The management of risks in financial institutions can be decisive for the efficient performance of the entire economy. The Islamic financial institutions re-emerged in the last three decades. They were informally existent in history. The structured Islamic financial industry started with the setting-up of IDB and DIB. The prime reasons for this were: disenchantment of the Muslim population with the conventional form of financing, a quest for a religious form of financing, the rapid economic growth of countries with significantly higher Muslim populations, changing political, legal, and economical situations all over the world, and improved wealth among the Muslims. Social dimension has an important position in Islamic finance. Equitable distribution of wealth and income and protection of poor are fundamental to Islamic finance. Thus, prohibition of *Riba*, avoidance of *Gharar*, payment of *Zakat*, and avoidance of *Haram* activities are the cornerstones of Islamic finance.

Keeping the social objectives in mind, the Islamic financial industry is attempting to evolve and develop. There have been serious efforts towards developing international accounting standards by the AAOIFI and an international risk management framework by the IFSB. The Islamic accounting is more or less based on conventional accounting. However, there are some fundamental differences in terms of representation of assets and liabilities, treatment of income and losses, as well as payment of *Zakat*. Islamic finance has always placed importance on participation in financed business activities. Based on this tenet, *Mushãrakah* and *Mudãrabah* were developed, which are two types of partnership contracts in Islamic financing. Islamic scholars have always insisted on using *Mushãrakah* and *Mudãrabah*, but this did not happen, due to several reasons. Critics of modern Islamic finance argue that using *Murãbaha*, which is the most popular type of Islamic contract in recent times, is not the long-term solution and should be used sparingly. Forward sale is prohibited in Islamic finance, with the exception of *Salam* and *Istisnã*. Both these Islamic financial contracts can be used for forward trade under specific circumstances. Leasing is recognised and is permitted through *Ijãrah* in Islamic finance. The use of all the above-mentioned products is always subject to specific conditions as instructed by *Shariah*. The *Shariah* interpretations vary and may create confusion for those who fail to look at the Islamic finance holistically. Extreme caution is thus needed before making any comments on any *Shariah* ruling.

Financial contracts in Islamic finance are archetypal. They are structured in a specific format and have special relationships between the contracting parties, which sometimes changes during the different stages of the contract. Moreover, the risks in Islamic finance are not distributed as conventional finance. The origin, intensity, and the spread of risks are unique for Islamic financial institutions. They are mainly concerned with the management of credit, operational, market, and liquidity risk, in addition to several others which are specific to the products, places, and processes. A combination of these two facts produces a treacherous situation for risk management. On one hand, the relationship is dynamic and on the other hand the risk profiles are also dynamic. Hence, risk management in Islamic financial institutions is far more of a serious issue when compared to conventional financial institutions. Investment contracts, *Mushãrakah* and *Mudãrabah*, exposes the institution to all four major risks; that is, credit, operational, market, and liquidity at different stages of the contract. *Murãbaha*, the most commonly used Islamic financial product, faces mainly credit, operational, and market risk during different time period of the contract. Commodity risk is highly prominent in *Salam* and *Istisnã* contracts, although they are also exposed to credit, operational, market, and liquidity risks. *Ijãrah* is considered to have larger risk exposures, primarily because of the long-term nature. It is exposed to all major risks at different stages of the contract.

The fundamental principle of having sufficient capital cushion for risk management remains the same for Islamic banks. Basel II guidelines, although primarily aimed at conventional banks, can be applied to Islamic banks. Several approaches provided under Pillar 1 can be applied to Islamic banks with the necessary modifications and adaptations. Pillars 2 and 3 are equally relevant for Islamic banks. The role of supervisors cannot be undermined in Islamic banking and market disclosure is in the larger interest of the financial industry, which is not specific to conventional banking alone. Hence, the common misnomer of Basel II being completely irrelevant for Islamic banks is not true. However, serious and sustained efforts are needed to find the applicability which is specific to countries and markets. The contribution of the IFSB is commendable in terms of risk management for Islamic financial institutions. The risk management principles as released by them are gladly received by the community and efforts are ongoing to apply them to banks. However, much is needed to be done. The risk management for the Islamic financial industry needs more effort.

Credit risk in Islamic financial institutions is corresponding to investment failures through *Mushãrakah* and *Mudãrabah*, lending through *Murãbaha*, forward sale complications through *Salam* and *Istisnã*, and leasing through *Ijãrah*. The book goes through methodological steps for estimations of credit risk using several options. The understanding of interrelationships between the counterparties, the Islamic financial contracts, and the guaranties and collaterals used for coverage is critical for credit risk exposure identification. There are various methods and techniques for the development of models for credit risk. Expert systems based on rules developed by the expert's judgement fall under the category of qualitative models, whereas quantitative models are based on statistical approaches. A hybrid model attempts to combine the best of both. The two types of losses that institutions are interesting to identify are expected and unexpected ones. The book explains the mathematical functions needed to compute PD, LGD, and EAD. Credit risk analysis will remain incomplete without a proper treatment for credit VaR. Estimation of credit VaR depends on the loss data distribution and which many times is not available. The alternative approach in the absence of loss data distribution is the Monte Carlo Simulation. The role of collaterals and guaranties is important in mitigation of credit risk. A reduction should be allowed in EAD and LGD when guaranties are used. Ratings also play an important role in the credit risk management. Several critical issues related to internal rating models are discussed in the book.

Market risk exposure in Islamic financial institutions is initiated through rate of return or benchmark rate risk, commodity price risk, FX risk, and equity price risk. The book explains the four main types of yield curves – the Normal yield curve, the Steep yield curve, the Flat and Humped yield

curve, and the Inverted yield curve – that are extensively used in market risk analysis. Commodity price risk is very high in *Murãbaha*, *Salam*, and *Istisnã*. The behaviour of commodities underlying these contracts is driven by several factors. For *Mushãrakah* and *Mudãrabah* contracts, the quantification and management of equity risk should be based on available market prices. A more complex synthesis of portfolio or balance sheet accounts represents a greater need for data related to market risk. Market sensitivity represents the volatility of the risk factors which is transformed into market risk. VaR is the most prominent technique used in the estimation of market risk. The book explains the three alternative quantitative methods for evaluating market VaR: the Variance–Co-variance, the Historical Simulation, and the Monte Carlo approaches. Such approaches are mainly driven by the position and market data referring to market risk factors. The Back-Testing and Stress-Testing are important to assess the efficiency and applicability of market VaR methodology.

The most difficult to measure and manage among all the risks nowadays is the operational risk. Probably very few may disagree with this. The two ways to connect to operational risk identification are factors affecting the institution's business performance and actual operational losses. Digging deep into the organisation and conducting a self-assessment analysis can provide important information regarding operational risk. Another approach to the information can be the quantitative operational risk indicator approach, which defines and measures key risk indicators. Alternatively, operational risk loss approach can be used, which is based on historical information. Management or operational risk goes beyond the mathematical models and capital adequacy. A cultural change in the organisation regarding the operational risk is needed in order to develop sound operational risk management practices. Developing a learning organisation is the way forward for better risk management. *Shariah* risk is a part of operational risk and should be estimated. Mapping the operational risk is an essential part of designing an effective operational risk management framework. Mapping helps the organisation in identification of causes of operational risk. Many causes of operational risk interact with each other and create a complicated maze of interconnected risks. People, process and delivery, systems and technology, transactions, internal and external events, etc., are all interrelated and affect each other. The highest amount of losses is caused by frauds and misappropriations by internal staff members. IT as a business enabler has played a dual role; it has helped business for better co-ordination, efficiency, and flexibility, but at the same time heightened the risk exposures due to weak IT security. The most difficult part in operational risk management is quantification of qualitative values. The KRIs are functions where their parameters are having quantitative values and thus are applicable for measuring quantitatively the operational risks. Some of the Islamic

financial contracts carry larger operational risk exposures. In the *Mushãrakah* and *Mudãrabah*, for example, the partnership contracts exhibit larger operational risk exposures due to the typical structure of such contracts. The loss data collection exercise is at the beginning of the development of an operational risk management framework. This data needs to be collected internally as well as externally. Where past data is not indicative of present or future operational risk, Scenario Simulation Analysis is a useful tool. The analysis integrates past experiences and the professional expertise of the designer. Operational VaR analysis can also be used for estimations of operational risk. Calculation of operational VaR using the three alternatives – the Variance–Co-variance, the Historical, and Monte Carlo – can be used suitably by institutions aiming to estimate their operational risk.

The Islamic financial industry is at the crossroad. The right direction can provide the required impetus for the sustained growth in the long run. The only alternative is through better risk management practices and systems. Integrated risk management is needed now and for the future. Furthermore, implementing enterprise-wide risk management is going to be one of the major steps towards building a risk-sensitive culture in the organisation. The focus is on risks as risks leads to misdirection, miscalculation, and misrepresentation. Investment in better risk management systems and tools solidifies the position of the institution, and thus should be viewed as a strategic opportunity rather than a situational necessity. Risk management is not a project – it is a process – an ongoing process.

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