Economic Capital Modelling and Basel II Compliance in the Banking Industry

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1 Introduction

It would be a mistake to conclude that the only way to succeed in banking is through ever-greater size and diversity. Indeed, better risk management may be the only truly necessary element of success in banking.


Risk is an inevitable part of every financial institution, above all banks and insurance companies. Risks are implicitly accepted when such institutions provide their financial services to customers and explicitly when they take risk positions that offer profitable, above-average returns. There is no unique view on risk and usually it is considered in certain sub-classes such as market risk, credit risk and operational risk, also interest rate risk and liquidity risk. Market risk is associated with trading activities; it is defined as the potential loss arising from adverse price changes of a bank’s positions in financial markets and encompasses interest rate, foreign exchange, equity and credit-spread risk. Credit risk is defined as potential losses arising from a customer’s default or loss of credit rating. Such risks usually include loan default risk, counterparty risk, issuer risk and country risk. Finally, operational risk is due to losses resulting from inadequate or failed internal processes, human errors, technological breakdowns, or from external events.

Moreover, risk can be distinguished by the negative effects and potential hazards it has on different kinds of stakeholders, e.g. risks may seriously threaten the firm’s market value (shareholders’ perspective), create losses to their lenders (debtholders’ perspective), or jeopardizing the stability of the financial system (regulators’ perspective). Though the individual interests of these groups may be rather diverse, all parties are interested in an continued existence of the institution. Hence, a bank needs a certain amount of capital relative to its risk as a buffer against future potential losses. This capital
The growing awareness of risk inherent in banking industry is partially owing to spectacular crunches like the Saving & Loans crisis in the 1970s or the Japanese banking crisis in the 1990s and led to an increasing demand for banking supervision at the international level, finally resulting in the Basel Committee of Banking Supervision under the auspices of the Bank for International Settlement (BIS) in Basel. The basic idea underlying modern banking regulation is pretty simple, namely that banks should quantify their risks and then are required to keep a certain amount of equity capital (the so-called “capital charge”) as a buffer against it. For instance, the minimum capital ratio according to the “Basel Accord” should be 8% of the so-called “risk-weighted assets”, although some regulators set different target levels for individual banks, which may be substantially higher than 8%.

The first important proposal of the Committee was the “1988 Accord”, and even though it was primarily dealing with rather crude methods for assessing credit risk, “Basel I” was a major step towards a common framework for calculating minimum capital standards for international banks. In 1996 the Committee then released an amendment to the Basel I Accord where banks were allowed to build sophisticated internal models for calculating capital charges for their market risk exposures.

The new Basel Accord “Basel II” [BII04], which should be fully implemented by year-end 2007, describes a more comprehensive risk measure and minimum standard for capital adequacy and is structured in three Pillars. Pillar I imposes new methodologies of calculating regulatory capital, thereby mainly focusing on credit risk and operational risk. For the latter, banks can then use – similar as it is already the case for market risk – their own internal modelling techniques (commonly referred to as advanced measurement approaches (AMA)) to determine capital charges, and we consider this subject again in Sect. 2.

Pillar II then introduces the so-called Internal Capital Adequacy Assessment Process (ICAAP) and contains guidance to supervisors on how they should review an institution’s ICAAP. Besides the treatment of so-called “other” risks that are not covered under Pillar I such as interest rate risk or credit concentration risk, it deals with an institution’s overall risk exposure. According to the Committee of European Banking Supervisors [CEBS], banks should calculate an “overall capital number” as an integral part of their ICAAP. This single-number metric should encompass all risks related to different businesses and risk types. Above all, regulators want to understand the extent to which the institution has introduced diversification and correlation effects when aggregating different risk types. A particularly important example of this issue is considered in Sect. 3 where the inter-risk correlation between credit and market risk is investigated.

A milestone in mathematical finance was the idea of dynamic replication introduced in 1973 by Fischer Black, Myron Scholes and Robert C.