

BASEL REGULATIONS, ECONOMIC CAPITAL AND THEIR IMPLICATIONS FOR THE TURKISH BANKING INDUSTRY*

BASEL KURALLARI, EKONOMİK SERMAYE VE BU KAVRAMLARIN TÜRK BANKACILIK SEKTÖRÜ İÇİN İŞARET ETTİĞİ HUSUSLAR

Göksel TİRYAKİ

*Banking Regulation and Supervision Agency of Turkey
gtiryaki@bddk.org.tr*

ABSTRACT: Capital is one of the crucial financial sources of fund for all economic agents. It is also a basic financial indicator that should be measured and managed, especially for banks. Basel Banking Committee has been publishing a number of standards for almost two decades in order to establish harmonized capital requirement for banks, which set basis for regulatory capital. On the other hand, economic capital, which is another concept in managing capital in banks, is a consequence of theoretical studies and risk management and capital requirement practices. It is defined as the optimum bank capital level measured by quantifying all relevant risks involved. In this paper, these capital regulations are explained and implications of Basel Rules and economic capital models for The Turkish Banking Industry are summarized.

Keywords: Basel Banking Rules ; Economic Capital ; Turkish Banking System
JEL Sınıflaması: G21

ÖZET: Sermaye tüm ekonomik birimlerin en hayati kaynak unsurlarındandır. Ayrıca, özellikle bankalar için hesaplanması ve yönetilmesi gereken temel finansal göstergelerden birisidir. Yasal sermaye olarak adlandırılan, bankalar için gerekli sermaye standartlarının oluşturulabilmesi amacıyla Basel Bankacılık Komitesi on yıllardır farklı prensipler üzerinde mutabakat sağlanması amacıyla çalışmalar yürütmektedir. Bankaların sermaye gereksinimi konusunda önem arz eden bir başka kavram olan ekonomik sermaye ise banka sermaye gerekliliği konusundaki tüm bu çalışmaların bir anlamda nihai ürünü olarak, taşınan risklerin rakamsal şekilde ölçülmesi vasıtasıyla banka sermayesinin optimum olarak hesaplanmasını ifade etmektedir. Bu çalışmada tüm bu süreç teorik olarak açıklanmaya çalışılmış ve bu durumun Türk Bankacılık Sektörü açısından işaret ettiği hususlar özetlenmiştir.

Anahtar Kelimeler: Basel Bankacılık İlkeleri ; Ekonomik Sermaye ; Türk Bankacılık Sistemi

JEL Classifications: G21

Introduction

Capital adequacy is one of the key issues of today's bank risk management and financial environment since sufficient capital level for a financial institution is considered to be the most effective way to sustain business activities without any serious default risk and other financial troubles. For this reason, many leading banks and other financial institutions have been trying to develop models in order to

* This article does not represent any institutional view of Banking Regulation and Supervision Agency of Turkey. It is completely individual view of the author.

calculate their optimum capital level for decades. Capital is a cushion for a company against all type of risks; therefore all risk management activities focus on capital level for individual transactions, business lines and the entire firm. Since early 1990s, risk management tools have been developed to measure different types of risk properly. Improvements in risk models have started to change the traditional methods of capital measurement dramatically. Traditional methods are not very risk sensitive, therefore they cannot capture the risks arising from market, business lines and customers properly.

At this point, economic capital models come to spotlight because of its effective performance measurement ability, risk sensitive approach and optimum capital level calculation functions. Especially in banking industry, risk management activities and calculation of sufficient capital level have been very popular issues for decades. Since many academic studies show that in financial institutions level of capital and default risk are negatively related, regulators around the world have started to pay a great deal of attention to capital level of banks. One of the first proposed capital regulations was the Basel Capital Accord (Basel I), published by Basel Committee on Banking Supervision in 1988. Although the scope of application of the Basel I was limited to the internationally active banks, many national regulatory authorities immediately applied the Basel Accord and introduced formal national regulatory capital requirements based on the Accord. Basel rules, the first international accord, became the best practice for capital adequacy for banks and it succeeded at raising capital levels in most countries that adopted the standard. After the introduction of Basel I rules, banks started to develop state-of-the-art economic capital allocation models and came a long way. Basel I has become almost obsolete in terms of risk sensitivity when it is compared with banks' highly sophisticated economic models for capital allocation and risk measurement.

Almost two decades after Basel I, a revised Basel Accord, known as Basel II, is published in June 2004. Basel II is an end result of efforts toward more risk sensitive capital adequacy measures in banking industry. In that sense, industry has always been one step ahead of regulators particularly in developed countries. Since late 1980s, banks have been investing heavily in sophisticated economic capital models, which have become best practice in capital allocation. Since regulators have been encouraging banks toward better risk management systems, economic capital models have become the most important topic in many countries.

In this paper, the concept of bank capital, assessment of capital adequacy in banks and Basel Committee regulations are explained in Part I. In the Part II, economic capital is described, including its conceptual meaning, components and functions. In Part III of the paper, economic capital applications in banking industry are evaluated and implications for specifically The Turkish Banking Industry are envisaged as main consequences of this paper.

1. Importance of Bank Capital

1.1. Theory of Bank Capital

One of the most important aspects of bank management is to decide the level of capital for bank to operate in a safe and sound way. Besides, regulators pay a great deal of attention to the level of capital in banks.

In finance theory, capital structure of companies is irrelevant under perfect market conditions; therefore there is no optimal capital structure. If capital allocation is pointless, are bank managers and regulators wasting their times? Not necessarily.

According to Modigliani and Miller, the value of a corporation is discounted value of its expected earnings, therefore, debt/equity ratio does not affect the amount of expected earnings, it just determines how to share it. However, Modigliani and Miller propositions are valid under perfect market conditions where there are no taxes, no information asymmetries, no bankruptcy costs and no conflicts between managers and owners. It can easily be said that perfect market assumption is not realistic, since there are taxes, bankruptcy costs, agency problems, and information asymmetries. As a matter of fact, financial institutions add value by reducing the effects of market imperfections like information asymmetries and bankruptcy costs. Besides, in regard to extending Modigliani and Miller proposition to capital level in banks, Bhala (1989) states that M-M proposition involves the effect of debt/equity ratio on the value of the corporation, however, regulators and bank managers do not necessarily concern with value of the bank when deciding optimal capital level for banks. Therefore, we can conclude that capital allocation is relevant for banks.

Generally, capital is defined as the value of the net assets of the owners of the firm, in our case the bank. Capital is initially a source of fund for the bank for buying real estate, fixed assets or making loans. After issued, the equity of the bank is the difference between the value of the total assets of the bank and the value of its liabilities. The capital is assigned two general functions in banks:

- 1) To measure the owners' stake in the bank. Stakeholders include anyone who has a claim on the current and future cash flows of a firm.
- 2) To act as a shield for stakeholders. The thicker is the owners' stake, the more protection it provides for guarantors, debt holders, and uninsured depositors. Capital achieves this by:
 - Protecting uninsured depositors in case of insolvency,
 - Covering unanticipated losses to maintain confidence in the bank,
 - Funding fixed investments and other non-financial investments of the bank
 - Limiting asset expansion beyond the means of the bank.

The capital level of banks is a concern for both general public and regulatory agencies. The thicker the capital base the lower the probability of insolvency of the bank. In case of insolvency, depositors may not get their deposit back in full amount. Therefore, the level of capital is an indicator of bank's soundness. When depositors are insured, the concern about bank safety and soundness is shifted to the insuring agency.

Because of the functions stated above, the capital level of banks becomes the center of attention for regulators and bank managers.

1.2. Assessment of Bank Capital Adequacy

How to calculate adequate capital or how to assess capital adequacy are widely discussed issues. For the last two decades, regulators and banks have been developing models to measure and/or assess capital adequacy.

Bank capital is deemed adequate when it reduces the chances of future insolvency of the bank to some predetermined minimum level. Alternatively, capital adequacy can be defined as the maintaining a level of capital so that the premium paid by the bank to an insurer fully covers the risks by the insurer (Maisel, 1981).

Therefore, in order to determine the adequate level of capital, correct measure of the risk of insolvency should be made, which is very important for bank managers, shareholders, regulators and insuring agency, and uninsured creditors. According to Maisel (1981), for the purposes of measuring adequate capital, a bank may be considered insolvent in two cases: first, when its liquidity is so low that it cannot pay its due debts; second when the market value of its assets is less than the value of its liabilities. Accordingly, Crouhy and Galai (1986) suggest that risk of solvency basically depends on:

- The risk that in the future bank has to incur a rate higher than the current yield on its assets,
- The risk of capital loss on bank's assets
- The risk that some loans cannot be collected,
- The initial amount of capital that can cover the adverse effect of the previous three risks.

Basically, capital adequacy can be viewed from two different perspectives: owners' and regulators'. Owners' primary concern when investing in a bank is to earn a fair risk-adjusted return. On the other hand, regulators aim to make sure that banks maintain a certain level of capital to protect (uninsured) depositors and other creditors, and to promote safe and sound functioning of both the individual bank and the financial system as a whole. Besides to these, there is also a market perspective. In order to fund its activities, like extending loans and investing in securities, a bank needs to be able attract deposits from the public. In order to collect deposits, public has to have confidence in the bank, which is affected by its capital level.

Although capital is very important for almost every aspect of banking, banks characteristically have low equity to assets ratio. In order to maintain a sound and safe functioning of banks, regulators have imposed minimum level of capital requirements in many countries because, theoretically, maintaining at least the minimum level of capital reduces the risk of default to a predetermined level. On the other hand, as Berg-Yuen (2005) states rising and holding capital is costly because of taxes, agency and information costs. Meaning that, increasing the level of capital decreases the rate of return on equity of owners. Therefore, in order to maintain a fair return on equity, banks have to reach an optimal level of capital minimizing its costs while ensuring solvency. For this reason, determining optimum level capital (high enough to reduce default risk and comply with regulations and low enough to reduce costs of holding capital and to provide a fair return on equity for owners) is one of the biggest challenges of banking.

1.3. Basel Committee Regulations

1.3.1. Basel I

In the late 1980s, Basel Committee on Banking Supervision, established within the Bank for International Settlements (BIS), took the lead to develop a risk based capital adequacy requirement that would level the play field for internationally

active banks. The Basel Committee consists of representatives from central banks and regulatory authorities of the G10 countries, plus Luxembourg and Spain. The committee does not have the authority to enforce recommendations, which are enforced through national laws and regulations. The main purpose of Basel Capital rules is to combine the several international supervisory regulations and reinforce the soundness and safety of international banking system.

First publication of Basel Committee about capital adequacy was known as 1988 Basel Capital Accord (or Basel I). The Basel Accord included a capital adequacy standard based on a definition of regulatory capital and risk-weighted composition of bank's assets and off balance sheet items. Although the scope of application of the Accord was limited to the internationally active banks, more than 100 countries adopted the Accord as a risk-based supervisory approach to capital adequacy. After the first introduction of Basel Capital Accord, the Committee issued several amendments to the Accord. The most important amendments are the one in 1995 that introduced the treatment of forward contracts, swaps, options, and other derivatives and the one in 1996, which brought the inclusion of market risk in the Accord.

After the introduction of Basel I rules, since the early 1990s, banks have started to invest heavily in systems designed to measure the risks associated with their lines of business and allocate capital accordingly across those business lines. The main purpose of such risk measurement systems is to provide bank managements with a more reliable way to determine the amount of capital necessary to support each of their major activities. As it is mentioned by James (1996), the interest in measuring risk is partly a response to the greater regulatory emphasis on capital adequacy that has come with implementation of the Basel Accord of 1988. However, banking industry has developed very sophisticated economic models to measure the risks associated with different business lines including non-traditional, fee based activities. Basel I has become almost obsolete in terms of risk sensitivity when it is compared with banks' highly sophisticated economic models for capital allocation and risk measurement.

1.3.2. Basel II

In order to solve the problems related to Basel I Accord and inspired by industry practices regarding economic modeling of capital allocation, in June 1999, the Basel Committee started consultations that will eventually lead to the issuance of a new capital accord. The Basel Committee has completed the new accord (Basel II) in 2004 and opened it for discussion and it is expected to be implemented at the end of 2007. The main focus and the concern of the New Basel Capital Accord or Basel II is the risk-adjustment of the assets (BCBS, June 2004). The New Basel Accord is designed to better align regulatory capital to the underlying risks by encouraging more and better systematic risk management practices, especially in the area of credit risk.

As Saidenberg and Schuerman (2003) mentioned, the New Accord introduces more risk sensitive capital ratio that is only one of the three pillars under the Accord. Revisions to the New Accord also introduce banks' internal assessments (subject to supervisory approval) of capital adequacy and market discipline (through transparency) as key components of prudential regulation. Therefore, the Accord is based on some formal economic modeling. Basel II tries to adopt the practices of

banks internal economic capital modeling as a formal regulation for capital adequacy.

The Basel II is developed in three pillars approach to capital adequacy:

- Pillar 1: Minimum capital requirements,
- Pillar 2: Supervisory review of internal bank assessments of capital relative to risk, and
- Pillar 3: Increased public disclosure of risk and capital information sufficient to provide meaningful market discipline.

The one important message of Basel II is that bank managers, supervisors, and other market participants must become better adjusted to risk and better able to act on according to risk assessments at the proper time. Bank supervisors must address the issues proactively rather than after the risks are realized (Saidenberg and Schuerman, 2003). Basel II aims to provide incentives to adopt more advanced risk-sensitive approaches toward capital adequacy through more risk-sensitive minimum capital requirements and increase the emphasis on assessments of credit and operational risk (not measured under Basel I) throughout financial institutions and across markets (BCBS, June 2004).

2. Economic Capital

2.1. What is Economic Capital?

Although the term economic capital is a new development, the concept has an origin dating back to the 1980s. As mentioned earlier, regulators have always been interested in the capital ratios of the financial institutions and they started to apply clear capital adequacy regulations since 1980s. For this purpose, regulators introduced some formulas to calculate a financial firm's required capital. Initially, these formulas were not always appropriate for internal goals of financial firms; that's why regulatory capital and economic capital are different from each other. The basic purpose of regulatory capital was to require financial firms to hold a minimum capital ratio, which is expected to reduce the risk of default to a pre-determined level. On the other hand, economic capital was used by financial institutions to sustain choices related to what kind of business lines or transactions to pursue. Therefore; the firms utilized economic capital concept within a risk-adjusted performance measurement (RAPMs). *"During the 1980s, Bankers Trust developed a firm wide RAPM that they called risk-adjusted return on capital (RAROC). A RAPM is a performance metric that is based on a standard accounting performance metric but with some adjustment to reflect "true" or "economic" risk."* (Riskglossary, 2007)

Basically, economic capital is a way to estimate the risk. It is not necessarily a standard capital ratio. Therefore, economic capital is different from classic accounting and regulatory capital measures. Economic capital is the quantity of money that is necessary as a cushion against the risk or potential loss connected with a transaction, a business unit or the entire firm. The end result of economic capital models is also different from other methods of capital adequacy. The consequences of models show the level of capital required in order to sufficiently support different types of risk exposure. While traditional measures of capital adequacy focus on some ratios such as, present capital levels to assets or some forms of adjusted balance sheet items, economic capital fundamentally concentrates on capital,

different types of risk and their connections, without considering the existence of assets and its basic structure. The concept behind economic capital models is that the return on a transaction or a business needs to be assessed by comparing it with the risk originating from that specific transaction or business. Economic capital is established on statistical assessment of possible losses. That's why it is more advanced way of assessing capital adequacy than traditional methods. Economic capital is evaluated as a buffer against unexpected future losses at a specific confidence level. Bank managers can be better equipped to foresee potential problems with advanced and well-established economic capital models (Burns, 2005).

Basically, the economic capital models are about determining and allocating capital in the most effective way possible in a business organization. Normally, any business organization can use economic capital models to recognize and measure all kinds of risks across all lines of business throughout the entire organization. Especially, they assist a business organization to decide whether or not entering into a transaction; portfolio or business line is valuable. This process involves gauging the return of those transactions, portfolios or business lines and comparing these returns with the risk embedded in those activities. The economic capital models supply a strong signal that reflects whether these returns are adequate to justify the risk involved or not. In that sense, the economic capital models are efficient risk management tools. They help the business organization in identifying their risk exposures and optimizing profitability in all of their business activities. Therefore, applying economic capital models are more than just evaluating the risk and compensating it with a particular capital amount in order to reduce risk of insolvency. In the light of this information, we are able to say that in a business organization, economic capital can be calculated;

- i. For a transaction or business unit: it is known as “contributory economic capital”, since it is the number of specifically allocated capital to a particular transaction or business.
- ii. For a portfolio or asset in a firm wide: it needs more sophisticated models and takes into account correlation (sometimes diversification benefits) among investment instruments, business divisions, default of customers, etc.

2.2. Components of Economic Capital

Economic capital models involves a comprehensive approach toward risk. Essentially, these models presume that any of the major risk types, credit risk, market risk, operational risk, can cause losses. Therefore, to aggregate all of the risks exposed by a business organization is very crucial. However, under economic capital concept, an organization has to calculate the possible losses for all risk types. The loss, signified in terms of economic capital, must be computed statistically over a specific time period and at a pre-determined confidence interval. Consequently, the economic capital for an institution is clearly total of VAR (Value at Risk) measurements for all risk types. The concept behind economic capital originally is very similar the value at risk models for market risk. In other words, economic capital can be described as a product of quantitative market risk research. In quantitative risk models **risk factors** and **parameters of models** are two main structural issues of capital.

2.2.1. The Risk Factors

There are several different risk factors associated with various risk types that banks or other financial institutions may be exposed. Basically, the risk factors are random changes over specific time. They bring about some uncertainties about financial and operational results on transactions or businesses. For instance in banking, the main risk factors are changes in interest and foreign exchange rates for market risk, and probabilities of default for credit risk. Even a small change in interest rates or foreign exchange rates can affect value of banks' assets, liabilities and capital valuation tremendously. Also, default of any significant bank costumers can result in severely negative asset quality and poor financial results. Therefore, a successful economic capital model must cover and measure these kinds of important risk factors in order to properly manage risk.

Generally, banks must deal with transactional and firm-wide credit, market, operational and other risk types. Therefore, economic capital models must cover at least all these major risk types. In a robust and sound economic capital model, analysis of credit risk must be assessed at two different levels: a single transaction and its counterpart and a whole portfolio of the bank. Market risk results from vulnerability of bank's financial condition to adverse movements in the level or volatility of market prices of interest rate instruments, equities, commodities and currencies. Market risk is usually measured by value-at-risk models (VaR) that are associated with given probability of a price movement over a specified time horizon for the potential gain/loss in a position/portfolio. Thus, economic capital models use the two most common approaches to market risk, these are VaR models and scenario-based models. Operational risk is defined as the risk of loss resulting from inadequate or failed internal processes, people and systems, or from external events. There is no determined factors for operational risk (like interest rates or exchange rates for market risk) that's why operational risk is a very difficult to quantify and gauge. In order to measure operational risk, some approaches are being developed and standardized.

Although credit, market and operational risks are major risk types for economic capital models, especially in the banking industry, there are several other types of risk, such as business, liquidity, legal and reputational risks. Some of these risks are relatively easy to calculate, while others are nearly not possible to quantify. For instance, business risk results from an insufficient business strategy or from an adverse shift in the assumptions, parameters, goals and other features that support a strategy. Liquidity risk is the incapability of an institution to raise funds in the market at an equal cost to similar institutions or the lack of ability of an institution to sell its assets in the market to meet its obligations. It is directly related to solvency of an institution and the quantification of this risk is a real challenge.

2.2.2. Parameters

Revaluation parameters examine the future returns and predicts the effects of changes in risk factors in a particular time period. Also, these parameters attempt to decide about influences of the risk factors over exposures in the organization/bank's transactions or portfolio. As mentioned earlier, *"Economic capital is typically defined as the difference between some given percentile of a loss distribution and the expected loss. It is sometimes referred to as "unexpected loss at the confidence level"* (Burns, 2005). Hence, some significant statistical concepts and parameters are needed to be understood in order to understand and implement economic capital models. Besides, the

parameters of economic capital can change in terms of the risk factors, transactions, business lines, portfolios and firm-wide applications.

Regarding credit risk, economic capital analysis is managed at two different points of view: these are a single transaction and counterparty and a total portfolio of exposures. The model that measures credit risk arising from an individual transaction and counterparty intends to identify the next parameters:

- Probability of Default (PD): It is the possibility that a loan will not be paid back. The credit history of the counterparty or portfolio and characteristics of the investment are taken into consideration in order to determine the probability of default.
- Loss Given Default (LGD): It is the amount of probable loss on the exposure. It is presented as a percentage of the exposure. LGD is ratio of exposure which is lost in a defaulted loan.
- Exposure at Default (EAD): It is an estimation of the amount that a bank may be exposed in the counterparty's default. It is a measure of probable calculated exposure (in currency) for a particular period or until maturity whichever is earlier.

When we disregard correlation between the variables, under an independence assumption, the formula for expected loss can be illustrated as (EL): $EL = PD \times LGD \times EAD$.

Expected loss occasionally refers to a proportion of EAD or $PD \times LGD$. For a business organization, we need to add all expected losses of the transactions in a portfolio in order to obtain the EL for portfolio. Acquiring the whole loss distribution for all transactions in the portfolio is necessary to decide what amount of economic capital is required to cushion unexpected losses. This means that the PD, EAD and LGD are not adequate by themselves. These parameters supply only the EL for the organization's exposures. An additional model is needed in order to get the rest of the loss distribution. For this purpose two basic approaches are frequently employed, these are structural approaches and reduced form models. These models are elaborated in the next section.

At this point, there are two important concepts for economic capital modeling process; these are loss distribution and unexpected loss (UL). Loss distributions are the main result of an economic capital measurement procedure. A loss distribution associates all possible future losses with their estimated probabilities and is typically displayed as analytical loss distributions or Monte Carlo simulations (frequency diagram). Analytical loss distributions can be expressed through "a closed-form description". Monte Carlo simulations are based on future loss scenarios that come from an underlying distributional and statistical assumption. On the other hand, UL can be accepted as a synonym for economic capital. UL is the standard deviation of the loss distribution and is a kind of required capital to neutralize such a loss. This capital can be described economic capital because it is produced directly to measure and absorb this kind of losses. The Figure 1 illustrates these concepts.

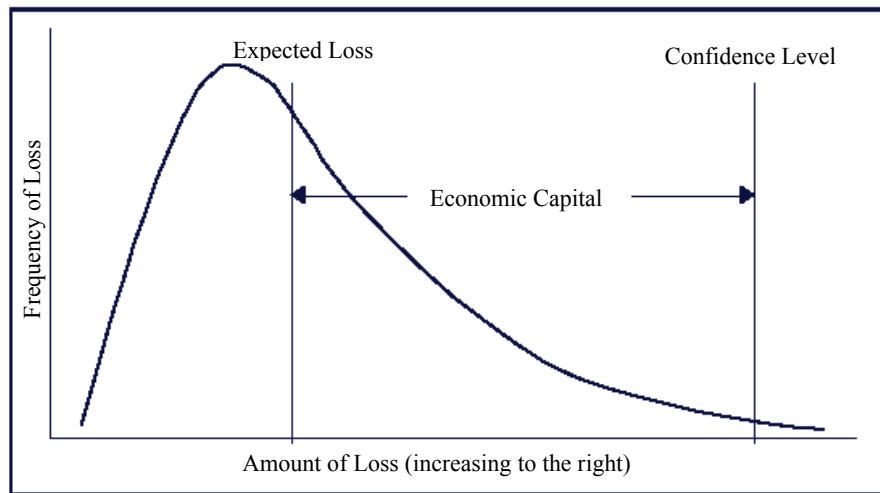


Figure 1. Relationship among EL, UL and Economic Capital (Burns, 2005)

In terms of market risk, there are the two general approaches used in economic capital models. These approaches are value-at-risk (VaR) and scenario-based methods. Scenario-based approaches are usually employed to complement VaR models. Gauging and managing of market risk is relatively easy to apply compared to other risk types since there are many sophisticated and advanced VaR models (historical, parametric and Monte Carlo approaches) to measure market risk properly. Market risk is measured on a daily basis by many institutions for several decades and it is very clear part of economic capital allocation procedure.

Measuring of operational risk is one of the most challenging issues of economic capital process. Although several financial institutions are developing methods regarding operational risk, there is limited amount of academic and professional research in this area because of insufficient data and vague definition about scope of operational risk. At this point, the Risk Management Group of the Basel Committee has an important role to harmonize and regulate operational risk in financial industry. After standardization of operational risk definition as "*the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events*", the committee provided a standardized framework in order to measure and manage operational risk. For this purpose, the committee offered eight business lines and seven loss types as a guide for classifying operational events (Fontnuovelle et al, 2003).

While measuring operational risk, bottom-up and top-down approaches are two common procedures for economic capital application. Bottom-up approach focuses on individual transactions in an organization to gauge risk level. On the other hand, top-down approach concentrates on the entire organization at the same time. Also, loss distribution and scorecard are two modeling approaches in order to calculate operational risk and its capital requirement. As every economic capital calculation process, loss distribution and its estimation (or data collection) are key elements of operational risk computation.

2.3. Using of Economic Capital

The main purpose of economic capital calculations is to provide valuable information for supporting banking activities and operations. This information allows management to determine which business lines or activities are the most profitable for the bank given their risk levels. Therefore, banks including economic capital calculations in decision making can take actions, such as, reducing activities that have an inferior risk-return profile, performing cost-benefit analysis for the development of new business areas or pricing banking services. For instance, when deciding whether to engage in an activity, such as extending a loan, banks use two types of information that are provided by economic capital models: how much capital would be needed for this particular activity and what is the price to hedge this activity in capital markets. Using this information, bank would decide whether to engage in this particular activity or not. This proactive strategy to risk management improves banks' overall performance.

Economic capital models have many strong and favorable consequences for any business organization. These are very crucial in order to pursue all business activities for any business organization properly. They can be summarized under three main topics.

- **As a Risk Management Tool:** Economic capital produces a quantitative amount (money) for the risk, which managers can use in their risk management efforts enabling the business organization to absorb unexpected losses in different business transactions and activities, portfolios, and firm-wide asset. Economic capital specifically enables managers of financial institutions and the legal authorities to assess overall capital adequacy regarding the risk profile of these institutions, because a low capital base increases the financial institution's fragility to adverse economic changes or large unexpected losses.

- **As an Indicator of Business Decision And Strategy:** The term economic capital includes explaining and quantifying the circumstances that a business organization assesses the risk-return results. When the risk/return analysis is performed systematically; a business organization is able to charge all costs connected to the risk for each transaction, portfolio or the entire asset. Therefore; economic capital can contribute to a more inclusive pricing method that covers expected losses. This kind of system allows a business organization or a bank to target a particular return on economic capital allocated to each transaction, portfolio or firm-wide activity. That is, economic capital models can calculate the profit margins for a transaction, portfolio or asset over the costs arising from business activities and market conditions.

- **As A Performance Measurement (RAROC):** In order to incorporate economic capital calculations into business decision mechanisms; risk adjusted performance measures called RAROC, RORAC, RARORAC are developed, which are three similar concepts. They enable that risk is considered as a factor when calculating and comparing returns. RAROC, the Risk-Adjusted Return on Capital, is the most general of these three risk sensitive methods. RORAC is Return on Risk-Adjusted Capital and RARORAC means Risk-Adjusted Return on Risk-Adjusted Capital. Basically, these three approaches are completely risk sensitive compared to the traditional performance measure of Return on Equity (ROE), because the capital element in each of these three methods is taken into account as "risk capital".

3. Conclusion and Implications for The Turkish Banking Industry

Banks are one of the most vital intermediaries in the global and local financial environments. A failing bank can scatter its effects beyond the bank, it affects its depositors, shareholders, domestic financial systems and produces domestically and possibly internationally “wave effects” in the markets. However, the basic financial concepts and the methods of regular financial analysis are not sufficient and efficient to evaluate the activities, operations and risks of banks. For instance, we can not analyze the bank which has asset total over 100 billion USD and operating in many countries with using current ratio, acid-test ratio, debt ratio, etc. Banks have very high leverage ratios since they collect deposit from public to fund their financial intermediary activities. They have different and vulnerable kinds of assets and liabilities compared to other corporations, and their functions are crucial for domestic and international economic environments. Therefore, the regulating and supervising banks are very important for financial stability worldwide. Regulators have been trying to develop rules to ensure that banks maintain adequate capital to cover all risks. For this reason, in the mid-1980s, the Basel Committee launched a project to accomplish better international convergence of supervisory standards for the capital adequacy of internationally active banks. Development of this project in terms of different perspectives and its application practices worldwide have been continuing for the last three decades. Today, the best known of all the international banking regulations is the “Basel Capital Adequacy Ratios” which are called Basel I and II principles. Although many banking authorities worldwide recognize them, these regulations, by themselves, cannot impede failures of banks. However, the implementation of sound risk management standards together with economic capital models can significantly lower the chance of such incidents.

Safe and sound risk management practices are one of the key issues in today’s rapidly changing sophisticated financial environment. For this purpose, financial institutions have developed many sophisticated and outstanding risk management approaches and models for the last 30 years in order to measure, to manage and to mitigate every kind of business and financial risks. Particularly, the banking industry has developed sophisticated Value-at-Risk models that can gauge market risk to a predetermined level for the last 20 years, especially after the first Basel Capital Accord (1988). All these developments in risk management activities combined with the implementation of the new bank capital adequacy standards (Basel II) introduced last decade created a great momentum and provided a significant regulation framework about risk management practices in banking industry. All these risk management efforts require the business organizations and the banking industry to measure and to manage risks on a firm-wide basis. At this point, economic capital models have emerged from this.

Consequently, economic capital models can be used in a bank as an efficient risk management tool, as a sufficient indicator of the business decision and strategy and as a strong performance measurement method.

On the other hand, for emerging countries and their banking industries, such as The Turkish Banking Industry, economic capital models and Basel II practices and their consequences bring some significant implications.

After the two serious financial and economic crises in November 2000 and February 2001, the Turkish economy and Banking industry have been passing through some significant structural transformation. So far, Turkish Governments and the International Monetary Fund (IMF) consented for four different stand-by arrangements (the last one: May 2005- May 2008) in the last decade in order to provide a stable macroeconomic disinflation environment and sustained economic growth, to uphold safe and sound the banking system, and to improve the social security and national tax systems. In this period, many positive developments and restoring improvements have been realized in the Turkish economic and financial environment. To understand this “healing” period, some economic indicators are illustrated in Table 1:

Table 1. Key Economic Indicators of Turkey

	2006	2005	2004	2003	2002	2001
GDP (Billion \$)	399.7	360.8	299.4	239.2	180.8	148.2
Growth Rate (%)	6	7.6	9.9	5.9	7.9	-9.4
GDP Per Capita (\$)	5,477	5,008	4,172	3,383	2,598	2,123
Average Inflation Rate (%)	9.3	5.89	11.1	25.6	50.1	61.6
Unemployment Rate (%)	9.9	10.3	10.3	10.5	10.3	8.4
Exporting (Billion \$)	88,5	73.1	63.1	47.2	40.1	34.4
Importing (Billion \$)	135,5	116	97.5	69.3	48.4	38.5
Current Deficit (Billion \$)	-31.7	-22.6	-15.6	-8	-1.5	3.4
Foreign Direct Investments (Billion \$)	20.2	9.8	2.9	1.8	1.3	3.4

Source: The Turkey Undersecretary of Treasury. The Turkey Finance Ministry

As easily seen except unemployment rate and current deficit, the Turkish economic program backed by IMF is seemed as pretty victorious after two grave financial crises in November 2000 and February 2001. The Turkish Banking Industry is very significant factor in this macroeconomic picture, because one of the main causes of these two severe financial crises was weak and fragile banking industry. Inadequate capital level of banks was the most serious problem. The other problems were high non-performing loan ratios, low asset quality, serious maturity mismatch between assets and liabilities, small market capacity and high market concentration, managers' and owners' abuses. As a result of all these comprehensive troubles, during and after these two crises ownership of 22 banks were transferred to deposit insurance agency because of failures in their operations, one financial institution went to bankruptcy, several banks were voluntarily merged with larger banks, private ownership of some banks were changed. This situation initiated some structural transformation in banking industry in terms of regulation and supervision, capital requirements and banking activities. Establishment of independent Banking Regulation and Supervision Agency, recapitalization of banks, rehabilitation of bank assets, and implementation of new regulation framework, especially regarding risk management, were new healing movements for The Turkish Banking Industry. All these healing activities together with positive macroeconomic environment summarized above, special international interest for the Turkish banks and high volume of foreign direct and portfolio investments (because of high domestic real interest) changed the atmosphere of The Turkish Banking Industry dramatically. To explain this significant structural transformation, some financial data and ratios of The Turkish Banking Industry are shown in Table 2 over the last 6 years:

Table 2. Some important financial data and ratios of the The Turkish Banking Industry

(in billion USD)	2006	2005	2004	2003	2002	2001
Total Assets	341.6	295.8	229.3	179.3	129.7	117.0
Loans	153.7	114.1	77.3	50.2	34.4	25.6
Total Deposits	220.4	189.0	147.7	115.4	86.8	80.6
Capital	40.9	40.0	34.4	25.5	15.7	10.2
Net Profit	7.7	4.3	4.8	4.0	1.8	-7.8
Loans/Total Assets	45.0%	38.6%	33.7%	28.0%	26.5%	21.9%
Loans/Deposits	69.7%	60.4%	52.3%	43.5%	39.6%	31.8%
Deposits/Total Assets	64.5%	63.9%	64.4%	64.4%	67.0%	68.9%
Capital/Total Assets	12.0%	13.5%	15.0%	14.2%	12.1%	8.7%
Net Profit/Total Assets	2.3%	1.4%	2.1%	2.2%	1.4%	-6.6%

Source: Turkey Banking Regulation and Supervision Agency

Above figures clearly reflect that after two grave financial crises; The Turkish Banking Industry has improved its financial strength substantially parallel to progress of the macroeconomic performance. At this point, the implementation of advanced economic capital models in The Turkish Banking Industry is an important issue as an example of efforts toward measuring and managing all types of risk and its financial performance, applying better risk management practices and establishing proper capital buffer against another possible financial and economic crisis.

On the other hand, economic capital models have some structural drawbacks since the common measurement tool of economic capital models is VaR methods that have some severe difficulties. Statistically, VaR methodologies are mainly dependent upon historical data. VaR procedures may under or overestimate the risk because of the inadequate and limited past data. Also, the correlations between different financial prices and rates should be sufficiently stable to be relied upon when quantifying risk. To find the best model for the behavior of volatility in market prices can be a real challenge. Besides, VaR figure does not provide any expectation regarding the magnitude of losses that may result if prices move by an amount beyond the amount dictated by the chosen confidence level. Basically, the VaR methods are solely efficient under typical and stable market conditions in many cases. In periods of high and changing volatility, the VaR methods will not be adequate. To overcome all these questions, there are some tools, such as periodically back-testing and stress testing, and using the different types of VaR models together to calculate the risk.

In spite of all these supporting tools, to implement economic capital models in an emerging country, like Turkey, brings some critical issues due to characteristics of economy in general and banking industry in particular. Therefore, process of implementing economic capital models (or advanced Basel II Principles) in The Turkish Banking Industry requires taking into consideration several issues:

-The Role of Treasury Bills in the Money Market: The Turkish Treasury Bills and other government notes is the most common investment tool in the the Turkish Banking Industry. Although Turkey, an OECD country, currently has B rating level, these bills and notes are evaluated as a bill of typical OECD country. In Basel II framework or economic capital models, banks would need to take into account B rating in terms of credit risk calculation. However, in this case, banks may become

reluctant to invest in government securities since it increases the required capital for credit risk, and this situation is quite unfavorable for the Turkish Treasury.

- High Volatility in the Money Markets: As an emerging country, Turkey's money market is very volatile because of its sensitive economic and financial conditions. Therefore, using market prices of Turkey's Money Market is pretty unstable and tough in terms of market risk.

- Serious Failures of Authentic Balance Sheet and Income Statement in The Turkish Business World: The financial statements of private companies have some serious disclosure issues because of the lack of comprehensive regulations and enforcement practices about financial reports in real sector. For instance, financial statements of many small and medium sized enterprises (SMEs) may not include all of their incomes or fair value of their assets and liabilities. Therefore, evaluation of creditworthiness of these companies based on their financial statements does not reflect the real condition of the firms and any economic capital model taking these financial statements, as input will produce misleading risk measurements. This is another problematic area for credit risk calculation and management, and operational risk management.

- The Unrecorded Economic Transactions in the the Turkish Business World and Economy: Another common problem of the Turkish Business World is off-the-record business transactions for economic units. Not recording some of their sales revenue or income source in books is almost a standard practice in some industries due to some tax considerations. This situation makes difficult to watch and quantify the real dimensions of economic activities in business world. As a result, measuring and managing credit and operational risk become, if not impossible, very difficult.

- Inadequate Credit Rating Agencies in Turkey: There is no local credit rating agency operating in Turkey and very few Turkish companies have external credit rating. Since in determining probability of default, most economic capital models use external credit ratings (together with internal ratings), without external credit ratings it will be very difficult to assess default probabilities, which is very important aspect of credit risk modeling.

- Small Business Units: Compared to industrialized countries, Turkish business units are very small and operating under capacity. Estimating the creditworthiness of these firms is a real challenge for the banks to control their credit risk.

- Assets Size of the The Turkish Banking Industry: State-of-the-art economic capital models can be quite expensive to construct and implement. They require investing millions of dollars in a non-revenue generating area. Due to relatively small asset size of the Turkish banks, the cost of establishing an economic capital model may not be justified by the benefit this model provides. Therefore, for most of the banks operating in Turkey, economic capital models are too expensive to implement.

- The Insufficient Data for the Models: As mentioned several times earlier, performance of economic capital models largely depends on availability and quality of data. Since quantitative risk measurement is fairly new concept for the Turkish banks compared to leading international banks, collection of loss data especially for operational and credit risk is not complete for many banks.

All these issues create additional difficulty for The Turkish Banking Industry in order to adopt economic capital models. Hence, the application of advanced Basel II framework and economic capital models in The Turkish Banking Industry can not be a compulsory regulation in the short-run. However, advanced economic capital models and sophisticated Basel II Principles should be seen as best practices and guidelines for regulatory authorities and banks. Large leading banks in the industry may be encouraged to adopt economic capital models or advanced Basel II Principles. Besides, for particular risk types, like market risk, where abundant data is available to make sound and robust estimates of risk, advanced Basel II principles can become regulatory rules. Other than that, Basel II rules should be seen best-practice and broad guidelines rather than supervisory regulations especially for emerging countries.

References

- Basel Committee on Banking Supervision (June 2004). International Convergence of Capital Measurement and Capital Standards: A Revised Framework. Bank for International Settlements. Basel. [Available from]: <http://www.bis.org/publ/bcbs107.htm>, [Access Date: 20.07.2007].
- BHALA, R. (1989). *Perspectives on risk-based capital: a guide to the new risk-based capital adequacy rules*. Illinois: Bank Administration Institute.
- MAISEL, S.J. (1981). *Risk and capital adequacy in commercial banks*. Chicago: University of Chicago Press.
- BERG-YUEN PIA, E.K., ELENA, A.M. (2005). Economic capital gauged. *Journal of Banking Regulation*, 6 (4), pp.353-378.
- BURNS, R.L. (2005). Economic capital and the assessment of capital adequacy. *The RMA Journal*, 87 (7), p.54.
- CROUHY, M., GALAI, D. (1986). An economic assessment of capital requirements in the banking industry. *Journal of Banking and Finance* 10, pp.231-241.
- FONTNUOVELLE, P., DEJESUS-RUEFF, V., JORDAN, J., ROSENGREN, E. (2003). Using Loss Data to Quantify Operational Risk. *Working Paper, Federal Reserve Bank of Boston*, April.
- JAMES, C.M. (1996). RAROC based capital budgeting and performance evaluation: A case study of bank capital allocation. *Working Paper, Wharton, Financial Institutions Center*, pp. 96-40.
- Republic of Turkey Banking Regulation and Supervision Agency, (2007). [Available from]: http://www.bddk.org.tr/turkce/Istatistiki_Veriler/Istatistiki_Veriler.aspx, [Access Date: 30.07.2007].
- Republic of Turkey Ministry of Finance, (2007). [Available from]: <http://www.muhasabat.gov.tr/ekogosterge/index.php>, [Access date: 30.07.2007].
- Republic of Turkey Prime Ministry Undersecretary of Treasury, (2007). [Available from]: <http://www.hazine.gov.tr/stat/e-gosterge.htm>, [Access date: 30.07.2007].
- Risk Glossary, (2007). [Available from]: http://www.riskglossary.com/link/economic_capital.htm, [Access date: 15.07.2007].
- SAIDENBERG, M., SCHUERMAN, T. (2003). The new Basel capital accord and questions for research. *Working Paper, Wharton, Financial Institutions Center*, 03-14.