

# “IMPLICATIONS OF ACTIVELY MANAGING MARKET RISK VIA VALUE AT RISK METHODOLOGY IN COMMERCIAL BANKS”

Saša Žiković dipl.oec.  
University of Rijeka - Faculty of Economics Rijeka  
Ivana Filipovića 4, 51000 RIJEKA, Croatia  
E-mail: szikovic@efri.hr

## Abstract

*An important aspect of business for every commercial bank is trading financial instruments in capital markets. Trading in various classes and types of securities exposes banks to new forms of risks that are not well understood in developing countries. Market risk represents the risk that the changes in market prices and rates will reduce the value of security or a portfolio. In trading activities, market risk arises from two sources: open or unhedged positions taken by a bank and from imperfect correlation between market positions. In this paper the author examines the implications for a commercial bank of using the standardized approach developed by Basel committee on Banking supervision for measuring market risk versus the internally developed rating systems for measuring market risk, such as VaR. Using internally developed models, such as VaR, can allow banks to lower their capital charge and free extra resources for conducting normal business activities. The concept of standardized measurement method for market risk together with its' pros and cons is presented and compared to the characteristics and general quantitative and qualitative standards required for internal models of measurement.*

## Povzetek

*Pomembno poslovanje za vsako komercijalno banko je trgovina s finansijskimi instrumenti na trgu kapitala. Banka pri trgovini z različnimi vrsti in tipi vrednostnih papirjev je izpostavljena novim oblikam tveganj ki niso razumljiva v dezelah v razvoju. Tržno tveganje predstavlja tveganje da bodo spremembe v cenah na trgu in obrestnih merah zmanjšale vrednost vrednostnega papirja ali portfelja. V aktivnostih trgovine, tržno tveganje izhaja iz dva izvira: odprtih ali nezaščitenih (unhedged) pozicij s strani banke in iz nepopolne korelacije med tržnimi pozicijami. V tem članku avtor raziskuje posledice za komercijalno banko kadr uporablja standarizirani pristop razvit pri Bazelskemu komitetu za supervizijo bank pri merjenju tržnega tveganja, v nasprotju z interno razvitimi sistemi vrednotenja pri merjenju tržnega tveganja, kot je VaR. Uporaba interno razvitih modelov, kot je VaR, omogoča banki znižati svoje nadomestilo za kapital in osvoboditi dodatna sredstva za obnašanje redne poslovne aktivnosti. Izlaga se koncept standarizirane metode za merjenje tržnega tveganja skupaj z njegovimi pozitivnimi in negativnimi vplivi na banko in se primjerja z karakteristikami ter splošnimi kvalitativnimi in kvantitativnimi standardi ki so zahtevani pri internih modelih merjenja.*

## 1. INTRODUCTION

Banks are depository financial institutions that collect deposits and place the collected sources into a wide range of investments. Banks usually invest in credit lines to public and private sector. Banks in transitional countries such as Croatia, until recently, performed almost exclusively only the classical banking activity of transforming received deposits into credit. With the privatization and the selling of Croatian banking sector to foreign banks and the development of domestic capital market, Croatian banks started to widen their product range. Investing in securities is becoming an ever growing aspect of banking business in Croatia.

Banking sector present the backbone of every economy and as such, it is only natural that the sector is heavily regulated. The interest of the state in the banking sector is even greater since national government acts as a guarantor for deposits of up to 100.000 kunas at commercial banks and the Croatian national bank (central bank of Croatia) acts as a lender of last resort to the banks. National government have a huge interest in ensuring that banks remain capable of meeting their obligations, to ensure that the taxpayers do not carry the burden of paying for secured deposits if a bank falls into trouble (18). Reserves that the banks are required to set aside play two very important roles (6):

- bank reserves serve as a buffer against unexpected losses, and as such diminish the burden that would otherwise be carried solely by the state and the taxpayer,
- bank reserves serve as a confidence building mechanism, since depositors and clients in general are becoming more aware and interested in the way that their banks conduct business.

Another reason why regulators are forcing banks to be adequately capitalized is the fear of “domino effect”. “Domino effect” represents a situation where a failure of a single bank causes a significant problem to the entire banking sector of a country or a region (19).

Without the necessary bank reserves and with the fixed rate deposit insurance system in place the entire risk of changes in market circumstances would be transferred from the banks to the state. The fixed rate deposit insurance (100.000 kunas per depositor in Croatia) that is in place in almost all of the developed and developing countries creates the problems of “moral hazard” and “adverse selection” (11). Moral hazard lies in the fact that under current regulation the banks have an incentive to enter into riskier investments than they normally would, if they were uninsured. Insurance with a premium that does not depend on the risk undertaken, but is fixed instead, resembles a put option issued from the national government to the bank. The value of that put option increases as the bank enters into riskier investments. The adverse selection problem was observed in Croatia quite clearly during the past decade, when the individuals deposited their savings with whichever bank was paying the highest interests, without paying attention to the bank’s credit rating, since their deposits were insured by the state.

The increased trading activity of financial institutions has put a focus on market risk, especially after the fall of Herstatt Bank in Germany, due to the speculation in foreign exchange market in 1974., and a more recent case of Barings Bank in Great Britain that represents a bank failure due to a combination of operational and market risk (5). Because of the growing concern among regulators and academicians, from the beginning of 1998. under the Basel Committee revision of original Basel Accord to incorporate market risk, banks are required to measure and apply capital charges concerning their market risk (4).

## **2. MARKET RISK**

Market risk arises from movements in the level or volatility of market prices (9). Market risk can take two forms (12): relative market risk – risk measured relative to a specific benchmark index resulting in a tracking error (deviation from the benchmark index) and absolute risk – risk measured in a chosen currency, reflecting the volatility of total returns. Market risk arises from movement in the underlying risk factors of a particular security, such as: equity prices, interest rates, exchange rates and commodity prices (20). A single factor or a combination of these risk factors affects the value of the bank’s portfolio. Bank’s portfolio market risk exposure is determined by both the volatility of the underlying risk factors and the sensitivity of the bank’s portfolio to movements of these risk factors. Since the trading and investment activities are becoming a significant source of profit for the banks, they are constantly searching for new and efficient ways to measure and manage the associated risks. Bank supervisors all over the world are taking steps to ensure that the banks have adequate quantitative models for monitoring and managing the risks as well as the needed capital to cover the potential losses. The most important step of all in the management of market risk was the introduction of the new Basel Accord “Basel II” in the spring of 2004. which differs from the “Basel I” capital accord in two important aspects (4). First, the regulator allows that the capital charge for the market risk be based on bank’s internal model for measuring market risk. Second, the capital requirements include besides the quantitative, the qualitative standards for bank’s risk measurement system. The new Basel Accord as well the 1996. Amendment to “Basel I”, requires financial institutions to measure and manage their market risk and hold enough capital to cover their exposures in equity and debt positions on their trading books. These exposures include all positions in financial instruments that are marked to market. Market risk must be measured for both on and off balance sheet traded instruments. On balance sheet instruments are subject to market risk capital charge only, while the off balance sheet derivatives, such as options and swaps are subject to both the market risk charge and to the credit risk capital charges (13). Banks that have an independent risk management function are permitted to choose between their own internal risk measurement model and the standardized model developed by the Basel Committee, to calculate the regulatory capital needed for the market risk.

Allowing for the internal risk measurement model to be accepted as a valid method of calculating market risk capital charge should lead to capital charges that reflect more accurately the risk exposure of the individual bank. The estimates produced by the internal risk measurement system must be closely integrated with the risk management process. For example, management can, based on the daily risk forecasts, assess and if necessary change its' current strategy, or a system of trading exposure limits could be set according to the risk estimates.

### 3. STANDARDIZED APPROACH TO MEASURING CAPITAL CHARGE FOR MARKET RISK

The standardized approach for measuring market risk uses a “building block” approach for calculating the market risk capital charge. The capital charge for each risk category (interest rate, FX, equities and commodities) is first calculated separately and then simply added together to obtain the bank’s overall market risk capital charge (8).

The interest rate capital charge under the standardized approach represents a sum of two components of market risk, each of which is separately calculated. Specific risk charge applies to the net open position for each particular instrument. General market risk refers to the general movement of interest rates in the market and for the purpose of calculating capital charge, long and short positions in different securities can be partially offset, which is not the case when calculating specific risk capital charge.

The capital charge for the specific risk is designed to protect the bank from adverse movements in the price of a security that is due to the change in the creditworthiness of its issuer. For this reason, offsetting is allowed only between matched positions in the security issued by the same issuer. Because the change in the creditworthiness of the issuer may have a different impact on the value of a different securities that were issued by the same issuer, two securities can not be even partially offset when they differ in: maturity, coupon, call features etc (4). The capital charge applies whether the bank has a net long or a net short position in a particular security. Specific risk charges for various types of bank’s debt positions are presented in table 1.

Table 1 – Specific risk charges for bank’s debt positions

Debt category*	Maturity	Capital charge(%)
Government	Any	0,00
Qualifying	6 month or less	0,25
	6 – 24 months	1,00
	over 24 months	1,60
Other	Any	8,00

\*Weighting factors apply to the market values of the debt instrument not its notional amount  
 Source: Basel Committee on Banking Supervision: International Convergence of Capital Measurement and Capital Standards – A revised framework, Bank for International settlements, Jun 2004

The government category in table 1 includes all debt instruments issued by OECD central governments and non-OECD central governments provided that established prerequisites are satisfied. The qualifying category includes debt instruments issued by OECD public sector entities and investment-grade rated instruments.

In measuring general market risk banks may choose between two methods of calculation: maturity ladder and duration ladder. The duration ladder method present a better alternative but in its concept is very similar to maturity ladder method. Duration method uses a series of duration bands that are divided into duration zones. Duration bands and zones are set to take into account the differences in price sensitivities and interest rate volatilities across different duration periods. Calculating required capital consists of two steps:

- The first step consists of allocating the marked to market value of a particular instrument to a corresponding duration band. Fixed rate instruments are allocated according to the residual duration, floating rate instruments are allocated according to the remaining duration until their next repricing date.

- The second step consists of risk weighing instruments in each duration band according to the prescribed sensitivities.

Capital charge under the standardized approach for equity positions is set to 8% of each net position. The capital charge for any specific risk is 8%, except in cases when the bank's portfolio is both well diversified and liquid, in which case the capital charge is 4%.

Calculating the capital charge for foreign exchange risk under the standardized approach consists of two steps. First, the exposure in each currency is measured, and then the net long or short positions are translated into an overall capital charge. The measurement of currency exposures consists of net spot positions, net forward positions and delta equivalent for options. The capital charge is set at 8% of the greater of the net open long positions and the net open short positions in all currencies, plus 8% of the value of net open position in gold.

#### **4. INTERNAL MODEL APPROACH TO MEASURING CAPITAL CHARGE FOR MARKET RISK**

Same as in the standard approach, the market risk in internal model approach is divided into four major categories: interest rate risk, equity risk, exchange rate risk and commodity risk (4):

Interest rate risk applies only to the instruments in bank's trading book. The base yield curve in each currency should be modeled with a minimum of six time buckets, for example, time buckets of three months, six months, one year etc. The other relevant yield curves such as the yield curve of the corporate debt are modeled according to the base curve by the addition of a spread over or under the base curve.

Modeling of equity prices has to incorporate the risk factors corresponding to each of the equity markets in which the bank holds considerable positions. The simplest form of a model, capturing market movements in equity prices is CAPM (17). More advanced models would model risk factors that correspond to each asset in bank's portfolio. Risk modeling for the exchange rates should include risk factors that govern the behavior of individual currencies that the bank is exposed to (1).

The qualitative standards prescribed by the Basel Committee are designed to incorporate the basic principles of sound risk management into the capital charge requirements. Every bank that is required to calculate its' market risk capital charge must be able to show that it has set up a sound and integrated system for the purpose of risk measurement and management. To ensure the robustness of their internal models, banks must conduct periodic (usually quarterly) stress testing of its portfolio to observe the impact of extreme market events on the value of their assets (3). Further, the bank must have a risk management function that is completely independent from the business units that generate position exposures. Finally, the bank must conduct internal and external audits on a regular basis to ensure the proper functioning and the soundness of bank's risk measurement and management process.

Quantitative capital requirements for the use of internal models divide the market risk into two categories: general market risk and specific risk (8). General market risk arises from the movement in the general level of underlying risk factors, such as: equity prices, interest rates, exchange rates and commodity prices. Specific risk arises from the adverse movement in the prices of individual financial instruments as a consequence of changes in creditworthiness of the issuer. Specific risk is intended to cover variability in daily price fluctuations as well as the losses from surprise events, such as a bond default. Under the new Basel Accord, long and short positions in debt and equity instruments are covered by the market risk capital requirement for specific risk (4). Banks that use VaR models that incorporate specific risk can use their internal specific risk estimates. Banks whose VaR models do not incorporate specific risk, must treat their debt and equity positions according to the set of standardized specific risk charges.

The capital charge for market risk is based on banks internal measurement model, which in fact is a Value-at-Risk (VaR) model. VaR represents a method of assessing risk that uses standard statistical techniques which are commonly used in other technical fields. VaR measures the worst expected loss over a given horizon under normal market conditions at a given confidence level (12). Due to the approval by the Basel Committee of using VaR model for the purpose of measuring market

risk, a large number of different approaches for calculating VaR figures has developed. The three main approaches of calculating VaR estimates are (17):

- Parametric approach
- Historical simulation and
- Monte Carlo simulation

Each of these approaches has its' own advantages and disadvantages, and none of them performs superiorly to others in all of the circumstances and markets. The simplest form for calculating VaR with the parametric approach is given by the following equation (9):

$$\text{VaR}_P(N,cl) = \alpha_{cl} \sqrt{N} \sigma_r$$

N - holding period

cl - confidence level

$\alpha_{cl}$  - number of standard deviations corresponding to the area under Gaussian probability density function for a given confidence level

$\sigma_r$  - standard deviation of portfolio

Even though every bank has a large degree of discretion in the choice of the risk factors and VaR model, they both should be selected with great care to ensure the robustness of the model and its' forecasts. Oversimplification and the failure to select the correct risk factors may result in VaR figures that are not reflecting the real level of risk the bank is exposed to. Such mistakes will be revealed in the backtesting of the internal model, and will result in penalties for bank in form of higher scaling factor. Basel Committee requires that the VaR estimates be calibrated to 99% confidence level and a 10 day holding period (4). The Committee allows the 10 day VaR to be approximated by multiplying the daily VaR with the square root of time, in this case  $\sqrt{10}$  (3). This common regulatory standard is imposed to ensure that the capital charge results in a satisfactory level of reserves to serve as a buffer against losses (10). VaR estimates must be calculated daily with a minimum historical observation period of one year (250 trading days).

In today's competitive world the ability of a financial institution to be profitable lies in part on the skill of its risk managers and market analysts to develop adequate measuring and managing models. Internally developed models and the accompanying infrastructure provides financial institutions with a competitive edge. The regulators are aware that different financial institutions will use different theoretical assumptions and modeling techniques in their risk evaluation. To take into perspective these different approaches, the regulators require the banks to scale up their VaR forecasts by the scaling factor. The scaling factor also known as the hysteria factor can be view as a insurance against model risk, poor assessment of specific risk and general risk and a safety buffer against extreme market events (1).

The scaling factor has been largely criticized as an unnecessary regulatory adjustment that undercuts the benefits of basing a capital charge on bank's internal measuring system (6). Because the main advantage of using an internal measuring system for calculating capital charge is that it provides a more accurate measure of individual bank's risk exposure than does the standardized approach, multiplication by a scaling factor is seen as a return to the standardized approach. Usually the internal measure will result in a much lower capital charges for market risk (8). Setting the minimum scaling factor to 3 is seen by many as being overly conservative and could in fact deter the banks from developing their own internal models, at least for the purpose of calculating the capital charge for its' market risk.

The purpose of the scaling factor is to secure the desired degree of coverage for the market risk capital charge. The market risk charge is intended to secure the bank from adverse movements in the financial markets and the subsequent fall of value in the bank's portfolio. But even a correctly measured 99% - 10 day holding period VaR does not provide the sufficient coverage in many cases. A perfectly calculated VaR figure would still mean that the bank is expected to lose an amount greater than its' reserves one ten-day period in a hundred, which means that such an extreme event is expected to occur once every four years. Occurrence of such losses, so frequently can not be tolerated by the regulators, especially because there exists a real threat that such a loss could occur for multiple banks simultaneously. The extreme losses could occur simultaneously because banks use similar forecasting models and similar trading strategies. Such a scenario could result in a "domino effect" on the grand scale. It can be argued that in comparison to the other solutions, such as setting

an even higher confidence level or a longer holding period, the scaling factor provides a simple solution that is easy to implement. Higher confidence levels than 99% are very difficult to calculate and even harder to backtest since such events happen so rarely.

The use of scaling factor by the regulators can also be justified by the very nature of VaR models. Each of the approaches used for calculating VaR figures has its' own disadvantages and faults that can result in erroneous VaR forecasts. VaR models based on historical simulation are subject to the threat that historical observation period they are using does not entail extreme market events and for that reason they can be unsuitable for VaR estimates in case of sudden market crashes or regime shifts. Monte Carlo based VaR figures same as the parametric approach suffer from assuming that the distribution of the returns in the market is known, and these models usually assume that the distribution of returns is Gaussian or logGaussian. Gaussian distribution is adequate for forecasting the central part of a distribution, but not its' tail parts. Parametric VaR suffers from another drawback, and that is the assumption that the correlation between individual securities is constant. It has been empirically proven that in times of financial crisis correlation coefficients converge to 1, thus nullifying the diversification effect (7).

The daily capital charge for general market risk is calculated as a maximum of previous day VaR ( $VaR_{t-1}$ ) and the average of daily VaR for the last 60 trading days scaled by the scaling factor. For now the exact value of scaling factor is determined by regulators in each country i.e. central banks, with the only condition that it can not be lower than 3.

$$\text{Market risk capital charge (t)} = \max \left( k \frac{1}{60} \sum_{i=1}^{60} VaR_{t-1}, VaR_{t-1} \right) + SRC_t$$

SRC – specific risk capital charge

The equation is set in such a way that usually the capital charge for market risk will correspond to the average value of VaR for the last 60 trading days. For the previous day VaR figure to be the basis of calculating capital charge the bank's portfolio would have to experience a significant increase in risk exposure or/and increase of volatility.

The regulatory capital charge under the internal model approach for both general market risk and specific (credit) risk is calculated according to the following formula (8):

$$[\text{Mult1} \times (\text{10 day 99\% market risk VaR}) + \text{Mult2} \times (\text{10 day 99\% specific risk VaR})] \times \frac{\text{trigger}}{8}$$

Mult1 – general market risk scaling factor is set in the range of 3 to 4 depending on the quality of risk measurement model that the bank is using

Mult2 – specific risk scaling factor is set in the range of 4 to 5 depending on the quality of risk measurement model that the bank is using

Trigger – is related to the quality of the control process in the individual bank (usually in the ranges between 8 and 25)

For additional protection when using the internal model approach, market risk capital charge incorporates another feature intended to reward the satisfactory measuring models and punish the ones that are systematically underestimating the risk exposure of the bank's portfolio. This additional requirement is called the backtesting requirement. Backtesting is a simple process of testing the accuracy of VaR models. A very simple statistical test also known as the Kupiec test is used to count the number of times during the year that the trading losses exceeded the VaR estimate (2).

Bank using a model that experience more exceptions then allowed, is subject to a higher scaling factor. Imposing the higher scaling factor for banks using models that experience five or more exceptions during the last 250 business days is based on a simple statistical technique using binomial distribution, that calculates the probability that an accurate VaR model would generate a certain number of exceptions during a year. The backtesting is set in such a way to minimize the risk of an accurate model being dismissed as faulty and the setting of higher scaling factor for the bank that has an accurate internal measurement model in place. The number of exception experienced during a year using a 99% confidence level and the accompanying scaling factors are presented in table 2 (2).

Table 2 - Number of exception experienced during a year and the accompanying scaling factors

Number of exceptions in 250 trading days	Scaling factor	Cumulative* probability (%)
0 - 4	3,00	10,78
5	3,40	4,12
6	3,50	1,37
7	3,65	0,40
8	3,75	0,11
9	3,85	0,03
10 and more	4,00	<0,01

\*Cumulative probability indicates the probability that an accurate model generates more than the number of exceptions reported in the first column. Probabilities are calculated using a binomial distribution with a sample size of 250 days. For the purpose of backtesting, an accurate model will produce more than five exception over a 250 day period 4,12 % of the time.

Source: Basel Committee on Banking Supervision: Supervisory framework for the use of “backtesting” in conjunction with the internal models approach to market risk capital requirements. Bank for International settlements, Jan. 1996.

Banks that can not meet all the requirements needed for the implementation of internal model approach are allowed to use the combination of the standard model and internal model. The combining of approaches is not allowed within the individual risk category, but among different categories of risk. Once calculated the capital charge for the specific risk obtained through the standardized approach is simply added to the general market risk capital charge obtained by the internal model. If a combination of approaches is used, total capital charge is obtained as a simple sum of the two, and in that way, it ignores any diversification effects that are present in the portfolio.

## 5. ADVANTAGES AND DISADVANTAGES OF STANDARDIZED AND INTERNAL MODEL APPROACH

Because it applies the same capital charge to the whole range of different financial instruments and does not take into account any portfolio effects on the risk level of the bank's portfolio, the standardized approach has been heavily criticized. According to many the measures are too broadly based, unreactive to changes in the market and do not depict the true risk character of the bank. In the time of low volatility in the market, capital charge is unnecessary high and restrictive, and in the times of high volatility there exists the risk of these charges not being high enough to cover potential losses incurred by the banks. The multipliers used in the standard approach may even discourage banks from developing advanced internal measuring models.

The internal model approach was developed as an answer to the presented objections. Capital requirements based on the internal model approach should result in the capital charges that match more closely the true risk exposure of the bank. This closer match is not only important for determining the risks facing a bank at a certain moment, but also for tracing the evolution of that risk through time (11). VaR estimates are very useful for assessing the level of risk a bank is exposed to at a given moment. The information provided by VaR estimates can also be used for understanding the changes in risk exposure of a bank over a period of time. Capital charge based on internal models can provide the regulators with a consistent framework for making comparison between various institutions.

The objections that regard the internal approach concern the bank's ability to accurately measure the true level of risk it is facing. Even if a bank would develop such a sophisticated measuring system, the question arises if the bank has the will and the resources (human and capital) to set up the adequate infrastructure needed for internally measuring and managing market risk. Another danger of introducing internal models is the “model risk” – risk that the model used for measuring market risk is wrongly calibrated or even completely inappropriate for the risks the bank is facing. The risk of arbitrage between capital charges or distorted allocation of capital present a great concern for regulators. The new regulatory framework may reduce the amount of regulatory capital without the reduction in the level of risk, in the same way that the expensive capital charge for on

balance sheet traded securities from “Basel I” was substituted by a more flexible capital charge for specific risk. Among other loud spoken concerns is the argument that the market risk is being overshadowed by other types of risk that are even more difficult to measure and manage such as legal risk, liquidity risk and operational risk.

To correct some of the weaknesses of both the standardized approach and the internal model approach a new precommitment approach (PCA) has been proposed (14). The basic idea behind PCA is to require from the banks to precommit to a maximum loss exposure in their trading activity during a preset period of time. The maximum loss that the bank would precommit to, would determine the capital charge. In case that the bank experiences losses that exceed its risk precommitment, the bank would be subjected to penalties (16). The main advantage of PCA is that the bank can, on its own, determine the level of risk it is willing to bear and this risk level would be determined by internal measurement models as well as management subjective judgment. PCA is revolutionary in its initiative to replace the capital charges that are calculated on forecasts of risk, with the system that is set endogenously, through the commitment of banks to the regulators concerning their risk exposure. PCA like the fixed rate insurance acts as a put option for the bank issued by the regulator, but in the case of PCA the regulator, through the system of penalties, has at his disposal a corrective mechanism that offsets the value of the bank's put option (15). The value of the put option increases for the bank as the bank is exposed to more risk, but the value of the option is proportionally decreasing as the penalty rate imposed by the regulator increases.

Under PCA each bank would have to determine an optimal tradeoff between the level of risk it is willing to bear and the level of precommitment capital that it has to set aside. Through the balancing between these two opposites the objective of the bank would be to maximize the shareholders value and minimize the exposure of the deposit insurance system (10). Risk management consists of much more than the quantitative risk forecast obtained through some internal model. Efficient risk management combines top management experience, control and judgment with the statistical models to give a more realistic picture of the level of risk the bank is exposed to. Because of this characteristics of risk management, the concept of PCA is appealing to many regulators and it could represent the next big step in efficient risk management.

## **6. CONCLUSION**

The new Basel Accord for capital requirement presents a big step forward in efficient risk management. By allowing the banks to use their internal risk measurement models for the purpose of calculating market risk capital charge, supervisors are setting up a regulatory system that should lead to capital charges that reflect more accurately the individual risk exposure of the banks. The benefits of VaR estimates depend on the quality and accuracy of the models that the estimates are based on. The VaR estimates that are unsatisfactory from the regulator's point of view may undercut the main benefit of internal models approach: the closer tie between capital requirements and the bank's risk exposure. The internal model approach is set up in such a way that usually the capital charge for market risk will correspond to the average value of VaR for the last 60 trading days multiplied by the scaling factor. For the previous day VaR figure to be the basis of calculating capital charge the bank's portfolio would have to experience a significant increase in risk exposure or/and increase of volatility

The main critique coming from the bankers concerning the new internal model approach to calculating market risk capital charge concerns the use of the scaling factor. The use of scaling factor by the regulators can be justified by the very nature of VaR models. Each of the approaches used for calculating VaR figures has its own disadvantages and faults that can result in erroneous VaR forecasts. Even perfectly correct VaR figure would still mean that the bank is expected to lose an amount greater than its reserves one ten-day period in a hundred, which means that such an extreme event is expected to occur once every four years. Occurrence of such losses, so frequently can not be tolerated by the regulators, especially because there exists a real threat that such a loss could occur for multiple banks simultaneously. To correct some of the weaknesses of both the standardized approach and the internal model approach, new methods of measurement and regulatory control are being developed creating a process that will lead to better risk management.

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