'Interest Risk Management with Var Preview'

By

Pongsak Hoontrakul, DBA

Sasin - GIBA of Chulalongkorn University,
An Advisor to The House Committee for Economic Affair,
And
An Advisor to the Management Board o f Siam Commercial Bank Pcl., Thailand.

Email : Pongsak@Hoontraku.com

for
MS in Finance - Faculty of Commerce and Accoutancy
Chulalongkorn University, Thailand
January 1999.

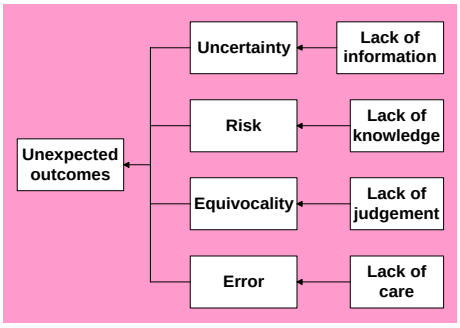
Outline – The Big Picture

Risk Introduction

1. **Definition and Sources of Risk**
2. **Risk Management**

- **Evolution of Risk Management Technique**
  1. **Management of Earnings (1970's) :**
  2. **Management of Value (1980's) :**
  3. **Multi-dimensional Risk Management**
  a) **Value at Risk (Var) –** The Preview
  - **The Key Concept and Issues**
  - **Historical /Simulation/Analytic Method**
  - **VAR Pro and Con**
  b) **Asset Liability Management/Optimization**

Figure 1 : Drivers of unexpected outcomes



Sources of Risks

•What is (financial) risk ?

Risk is defined as the uncertainty of future outcomes which come primarily from three fundamental forces :

1) Product market (inherent) risk: Unsys. Rate Risk ?

2) Strategic Risk : Budget for Risk Appetite

3) **Financial (market) Risk : Sys. Int. Rate Risk**

Financial (market) risk associated with an economic undertaking is the possibility of suffering a significant economic loss in the future.

Sources of Risks -(Cont.)

- **Risk and Return – Ex Ante**

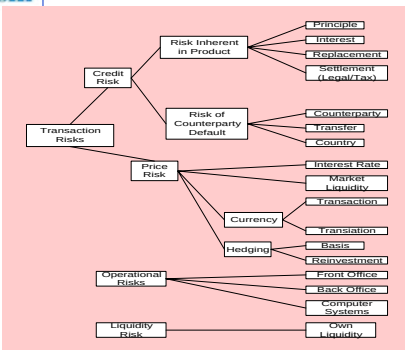
The analysis of risk and return of fixed-income securities depends extensively on the concept of **discounting** and the concept of **time value of money**.

The key is to find an *'appropriate'* discount rate for each and single period under uncertainty world.

- **Sources of Risk**

Question : What are the risk factors for two years US government note to a Thai investor ?

FIGURE 2 : Analysis of Risk Categories



Source :-Price Waterhouse : Financial Times Conference Organization , London 1992

Risks Associated with Investing in Fixed Income Securities (a)

- Market, or Interest Rate Risk
- Reinvestment Risk
- Timing, or Call Risk Credit, or Default Risk
- Yield-curve, or maturity Risk
- Inflation, or purchasing power Risk
- Marketability, or Liquidity Risk

Risks Associated with Investing in Fixed Income Securities (b)

- Exchange rate, or Currency Risk
- Volatility Risk
- Political or Legal Risk
- Event Risk
- Sector Risk
- Systemic/Correlation Risk
- Model Risk

Non-trivial Categories of Risk

1) Credit risk : is possibly the most predominant risk of most commercial banks since unlike security firm, banks are **asset sensitve** due to imbedded options.

2) Market Risk : or a systematic risk is the portion of a security's total risk that is related to moves in the market portfolio and ,hence, cannot be diversified away.

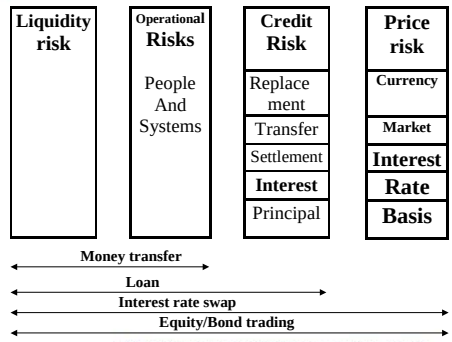
3) Liquidity Risk : is, *for the market*, the price adversely response when the financial product is being liquidated.

For the own risk, the maximum of cumulative margin calls requiring cash payout in the time horizon (daily/intra day).

4) Systemic Risk : is the interaction between different sources of risk. It is often called *Correlation* Risk.

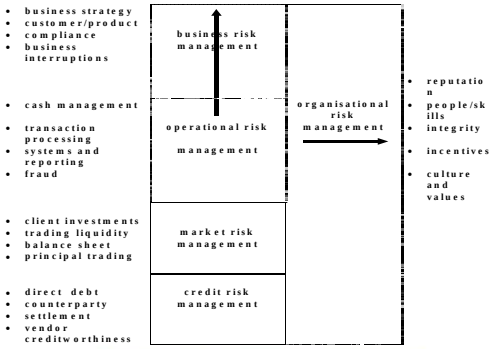
Note there is potential survivorship bias in estimating this risk.

Figure 3 : Banking risks aggregated by product category



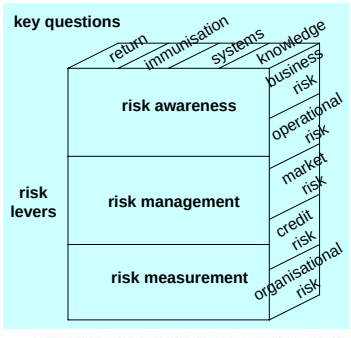
SASIN : Graduate Institute of Business Administration of Chulalongkorn University

Figure 4 : The Expanding the Scope



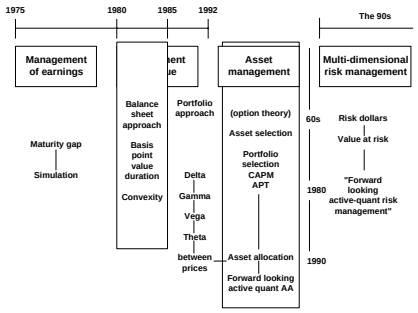
SASIN : Graduate Institute of Business Administration of Chulalongkorn University

Figure 5 : The Risk Framework



SASIN : Graduate Institute of Business Administration of Chulalongkorn University

Figure 3 : Evolution of Risk Management Technique



Evolution of Risk Management

I) Management of Earnings : (prior and in 1970's)

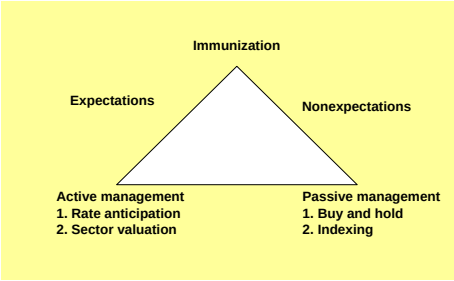
a) Maturity Gap : In *relatively stable* and *simple* balance sheet world, bank's liquidity or funding risk has been managed by using **accounting concept** - measuring the maturity mismatch, or gap, between asset and liabilities, but this provided *in*adequate measure of interest rate exposure.

In theory, a bank with a matched (Macaulay's) duration, or **zero gap**, between asset and liability portfolio will not experience a change in th market value of its asset/liability portfolio following an (incremental) interest rate change.

b) Simple 'Scenario'/Simulation Analysis : This is a *forward looking* approach where the analyst examines how net income will *vary* in different interest rate and business activity environment under different shapes of the yield curve/spread.

c) **Immunization Technique :** In early 1950's, Redington developed immunisation tech. as a strategy by which one constructs and manages a portofolio of (component) bonds such that its value is always as close as possible to the value of another asset (the target). Note that the sources of total return depend on two things : 1) interest rate and 2) passage of time.

Figure 6 : Traditional Fixed Income Security Investment/Risk Management Immunization



Risk Mgt. : Immunization Example

Suppose that the liabilities consist of a cash outflow of $100 for each of the next five years. The asset portfolio is to be contructed from two bonds: one-year bond with a 6% coupon and a four year bond with an 8% coupon, The current interest rate is 10%

i) Liabilities

Time	Cash Flow	Discount	PV		PV*Time	
1.	100			0.9091	90.91	90.91
2.	100			0.8264	82.64	165.29
3.	100			0.7513	75.13	225.39
4.	100			0.6830	68.30	273.21
5.	100			0.6209	62.09	310.46
379.07	1,065.26					

Duration = 1065.26 / 379.07 = 2.81 years. Present Value (PV) = 379.07

ii) **Asset/Bond One : One Year Bond with 6% Coupon**

Time	Cash Flow	Discount	PV		PV*Time	
1.	106			0.9091	96.36	96.36

Duration = 1 year. PV = 96.36

)**Asset/Bond Two : Four Year Bond with 8% Coupon**

Time	Cash Flow	Discount	PV		PV*Time		
1.	8			0.9091	7.27		7.27
2.	8			0.8264	6.61		13.22
3.	8			0.7513	6.01		18.03
4.	100			0.6830	73.77	295.58	
93.66	333.58						

Duration = 333.58 / 93.66 = 3.56 years. Present Value (PV) = 93.66

Risk Mgt : Immunization Example (cont.)

iv) Computation of Portfolio Proportion : W_1 and W_2

$W_1 + W_2 = 1$

$W_1 + 3.56\ W_2 = 2.81$

Solution : $W_1 = 0.293$, $W_2 = 0.707$

The amounts invested are 0.293 * 379.07 = $111.21 in bond one and 0.707 * 379.07 = $267.86 in bond two.

What if the interest rate move by +/- 0.5% ?

)**Number of Bonds Held (at 10% discount rate)**

(I)		(II)		III=I/II
Bond	Amount Invested	Price/$100	Unit Held	
1-Year	111.21	96.36		1.154
4-Year	267.86	93.66		2.860

)**Present Value**

At 9.5%	**At 10.5%**		
Liability Stream	383.97	374.29	
1- Year Bond		96.80	95.93
4- Year Bond		95.19	92.16

)**Present Value of Asset Portfolio and Liability Stream**

Discount Rate	Asset Port.	Liab. Stream
9.5 %	383.97	383.97
10%	374.29	374.29

[See Schaefer [1994] for Multi-Factor Immunisation]
Supplement reading : Peter E. Christensen, Frank J. Fabozzi and Anthony LoFaso [1996, chapter 42]

Risk Management – (Time) Duration

)**Time Duration –** One Step Beyond in Theory

Duration : $D^B = -\frac{1}{B}\frac{\delta B}{\delta r}$ where B = Price of Bond (1), r = interest rate

Port. Duration : $P = \Sigma\ W^B_i B_i$ where W^B_i = the w of bond i, B_i = price of bond I

$\frac{\delta P}{\delta r} = \Sigma\ W^B_i \frac{\delta B_i}{\delta r}$ P = portfolio value

$D^P = \frac{1}{P}\frac{\delta P}{\delta r} = -\frac{1}{P\ \delta r}\{\Sigma\ W^B_i \frac{\delta B_i}{\delta r}\}$ (2)

Hence, $D^P = +\frac{1}{\Sigma\ W^B_i B_i}\{\Sigma\ W^B_i\ B_i\ D^B_i\}$

e) Swap Duration : The market value for a swap is

$W^S S = W^B B + W^F F$ where $W^B B$ = Value of Bond (4), $W^F F$ = Mkt. Value of FRN

$W^S \frac{\delta S}{\delta r} = W^B \frac{\delta B}{\delta r} + W^F \frac{\delta F}{\delta r}$

$W^S D^S = W^B D^B + W^F D^F \frac{F}{B}$ where $D^S = -\frac{1}{B}\frac{\delta S}{\delta r}$ (5)

Risk Management – (Time) Duration

e) Swap + Bond Duration : The combination portfolio is

$$D^P = \frac{1}{\{\Sigma W^B_i B_i + \Sigma W^S_j S_j\}} * \{\Sigma W^B_i B_i D^B_i + \Sigma W^S_j B_j D^S_j\} \quad (6)$$

f) Option Duration :

$$\frac{\delta O}{\delta r} = \frac{\delta O}{\delta B}\frac{\delta B}{\delta r}$$ where O = call option on bond, B = Market Price of the bond

Delta : $\Delta = \frac{\delta O}{\delta B}$ by definition, so $\frac{\delta O}{\delta r} = \Delta \frac{\delta B}{\delta r}$ (7)

From the definition of bond duration, (1) we rewrite

$$\frac{\delta O}{\delta r} = -\Delta B D^B \quad \text{then} \quad \mathbf{D^O} = \Delta \mathbf{D^B} \quad (8)$$

That is the duration of the option is simply the hedging **delta ratio**. (i.e the delta mulitplied by the modified duration of the liability). Or we can rewrite

$D^O = -\frac{1}{B}\frac{\delta O}{\delta r}$ where D^O = Option Duration (9)

The portfolio duration for bond and option is

$$D^P = \frac{1}{\{\Sigma W^B_i B_i + \Sigma W^O_j O_j\}} * \{\Sigma W^B_i B_i D^B_i + \Sigma W^O_j B_j D^O_j\}$$

More Details and Derivation See Green [1996]

Risk Management – All that Greeks

II) Balance Sheet and Option Approach : (In 1980's)

a)***Dollar*** **Duration or Delta :** is the potential vola-tility of the return from holding a particular bond.

$$-\Delta_s = \frac{\Phi B}{\Phi r} = \frac{\text{change in bond price}}{\text{change in int. rate in \%}}$$

b) **Convexity or Gama :** is the curvature of the performance profile at the current rate or price of the security.

$$\Gamma_s = \frac{\Phi^2 B}{\Phi r^2} = \frac{-\Delta_s}{\text{increase in the interest rate}}$$

c) Theta : provides a measure of the effect of the passage of time on the price of a particular bond.

$$\theta = \frac{\phi B}{\phi t} = \frac{\text{change in bond price}}{\text{change in time}}$$

d) Vega : $\Lambda = \frac{\phi B}{\phi \sigma_r} = \frac{\text{change in bond price}}{\text{change in r volatility}}$

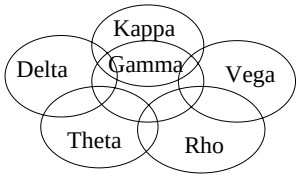
Two General Comments :

.All these Greeks are interrelated.

.Binomial Approach is commonly used for fixed income securities pricing and risk management.

[See more Vasicek 1977, Nelson and Ramaswammy 1990]

Figure 7 : Simultaneous Management of Risk Parameter – All that 'Greeks'



Risk Management : Portfolio Approach

II) Portfolio Approach : (In 1980's) - Macro/Micro Econ

1. Captial Asset Pricing Model by Sharpe [1964, JF]

CAPM\SML : $E(R_j) = R_f + [E(R_m) - R_f]\beta_j$

Questions : What is it about the benchmark rate ?

a)What is the risk free rate, R_f ?
b)What is the Thai (sovereign) risk free rate, R^t_f ?
c)What is the Thai (Baht) risk free rate, R^b_f ?
d)What is the expected return of Thai Security, $E(R^t_j)$?
e)What is the interest rate for Thai Corporate Bond, r^t ?
f)What is Raroc ?

2. Option Pricing Model by Black and Scholes 1973 JPE : For the Equity and Bond Holder : As a *Financial Contract* ,

Equity is a *residual* claim on firm's value with limited liability. The shareholders' wealth, S is

$S = \text{Max.}[0, V - D]$

Bond is a *fixed* claim on firm's value. The bondholders recieve
$B - P = \text{Min.}[V, D]$ for *Risky* Bond

SASIN : Graduate Institute of Business Administration of Chulalongkorn University

Risk Management – Portfolio Approach

- 3. Contemporaneous vs Intertemporal Risk Diversification

$\sigma^2_j = b^2_j \sigma^2_m + \sigma^2_\varepsilon$ where $\beta_j = b_j = \sigma_{jm} / \sigma^2_m$

Total risk = systematic risk + unsystematic risk

In theory, all unsystematic risks should be diverfiable.

What is about in practice in a incomplete (Arrow and Debreu sense) and imperfect world (MM spirit) ?

- Default Risk
- Bankruptcy cost
- Tax MM [1958,62]
- Legal Risk – Priority Claim ?
- Market Failures
- Agency Problem …

4. Bond Covenants :
Sources of the Bondholder-Stockholder conflict :
- Restriction on Dividend Payment (23%)
- Restriction of Issuing New Debt (90%)
- Restriction on Merger Activity (39%)
- Restriction on the Disposition of the firm's Asset

5. Bond Rating Agencies

SASIN : Graduate Institute of Business Administration of Chulalongkorn University

Risk Management – VaR Preview

II) Value at Risk (VaR) : (In 1990's)

a)**VaR Key Concept**

- VaR stands for ***Value at Risk***.

- VaR is obtained by translating the market riskiness of any financial instruments into a common standard **pontential loss**. (one dimensional framework ?)

- VaR poses the primary question : How much money might we lose over the period of time ?

- VaR is a *statistical* estimate of how many dollars or bahts a firm risks losing over a specified period of time due to market price, a given a level of probability.
(Critically assuming a normal distribution.)

- VaR is a method for measuring ***volatility-correlation*** sensitivity to factors affects the current position based on recent market volatility.

- VaR incorporates two main elements of risk
1)Exposure amount of assets and liabilities in the portfolio.
2)Sensitivity of the portfolio value due to the change of the underlying risk factors

- VaR's Main Applications : Info. Report, Resource Allocation, Performance Evaluation and Regulation.

SASIN : Graduate Institute of Business Administration of Chulalongkorn University

Risk Management – VaR Preview

b) The key issue : Integrating 'All' Risks.

A basic idea of VaR is to integrate all form of risk into a single summary number.

Because risk is a mutli-dimensional entity, and several forms of nonlinearity and incompatibility exist, these conditions make risk integration quite difficult.

However, if we restrict our consideration to ***market price risk*** and suppose that such prices have a ***multivariate log/normal distribution***, integration become analytically tractable.

More Generally , the Potential Loss =
Volatility * Exposure * Timing * Correlation

J.P. Morgan – The 'Weatherstone Mandate – 4:15 Report' :

"At 4:15 p.m. every afternoon, I wish to receive a single number which summarizes the institution's total financial risk."

Risk Management – VaR Concept

c) The VaR Concept : at Work

1. Value the current portfolio using today's price list. The components of this list will be called 'market factors'.
2. Revalue the current portfolio using an '*alternative* price list' and calculate the change in the portfolio value.
3. Calculate the maximum the institution can lose over a specified 'time horizon' at a specified probability level.

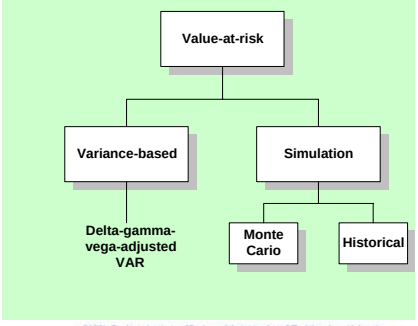
The main problem is to find a series of vectors of '*alternative* price list or market factors' to calculate VaR.

Three methods are used to calculated VaR :

1. Historical method – fine with stationary world
2. Simulation method – good with potential event risks.
3. Analytic method – best for portfolios without options

Not surprisingly, the three methods deliver different VaR measures, particularly with the portfolio with options. Any Implications ?

Figure 8 : Methods of estimating VaR



Sasin

VaR Preview : Historical method

Calculating VaR by the Historical Method – Backward Looking

1. Gather historical ***volatilities*** and ***correlation*** for financial variables. (Characterization!)
2. Specify a ***model*** for financial market. (Assumption !)
3. Using (1) and (2), construct a probability distribution for the loss/gain on the portfolio.
4. Your risk measure is then a single statistic that describes that distribution : Mean, Std. Deviation, confidence interval, etc.

Sasin

VaR Preview : Historical method (Cont.)

Example : Suppose that two asset portfolio is composed of
a)20 bonds with face value of $1,000 and price at $980 and
b)500 shares of a stock XYZ currently price at $40.

The portfolio is at present worth $ 39,600.

Suppose expected price change of the bond is 20 and of the stock is 5. The standard deviation of bond price change is 8.4 and of stock change is 82.30. The correlation is 0.2. Then,

$E(\Delta V) = 20\ E(\Delta B) + 500\ E(\Delta S) = 20(20) + 500(5) = 2{,}900$

$(\sigma_V)^2 = (20)^2(82.3)^2 + (500)^2(8.4)^2 + 2(20)(500)(8.4)(82.3)(.2)$

$\sigma_V = 4{,}808$

The VaR at the 95% level is $5,033 = 1.65 (4,808) – 2,900

Similarly for a portfolio with K assets :

$E(\Delta V) = \Sigma_k A_k E(P\Delta_k)$; $(\sigma_v)^2 = \Sigma_k \Sigma A_k A_j \sigma_{PkP}\sigma_j \rho_{k,j}$

VaR = Loss at acceptable risk level (σ_v) – Expected (ΔV)

Sasin

Panel I : Historical Simulation VaR

Step 1: Revaluation of holdings for each day of preceding 250-day period on basis of historical prices (prices and values in dollars)

	Asset 1 (100,000 units)		Asset 2 (100,000 units)		Portfolio value
	Price	Value	Price	Value	
Day 1	41	4.1m	30.2	3.02m	7.12m
Day 2	42	4.2m	30.8	3.08m	7.28m
Day 250	39.5	3.95m	30.0	3.0m	6.95m

Step 2: Sort values in ascending order

		Portfolio value
1	Day 20	6.63m
2	Day 21	6.72m
3	Day 197	6.72m
12	Day 29	6.81m
249	Day 2	7.28m
250	Day 172	7.30m

Step 3: Choosing a confidence level of 5%, VAR is calculated by subtracting the 12th observation from the initial value of the portfolio ($7m) :

VAR = $7m - $6.81m = $0.19m

VaR Preview : Simulation method

Calculating VaR by the Simulation method – Forward Looking

a) Define the parameters of the distributions for the changes in market factors, including correlations among market factors.

b) Specified distribution function (e.g. Normal, lognormal, etc.)

c) Use the distributions in a Monte Carlo simulation to obtain possible market price outcomes and to observe changes in the marke factors over the time horizon to be used.

VaR Preview : Simulation method

$\Delta NPV_t = \Delta NPV_{t+n} - \Delta NPV_t$ where t = begin date

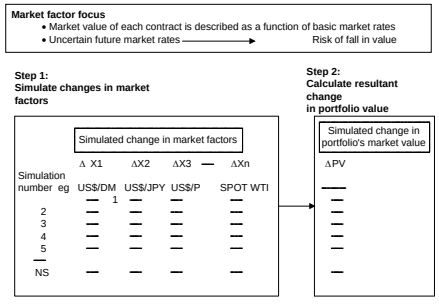
Note that Monte Carlo Simulation method – Direct Simulation of future distribution – *forward* looking.

But so-called 'Historical Simulation' methods – Correlation Matrix is a *backward* looking and (near) stationary assumpt.

Example : Risk of Portfolio is determined by Agg. Dist.

	--Bond Position--		--FX Position--		--Port.—			
Date	$ Value	Dist.		$ Value	Dist.	Dist.		
Day 1	300				504			
Day 2	297		+3		506	-2	3-	
2= +1								
Day 3	302		-5		506	0		
-5								
Day 4	302		0		502	+4		
+4								
Day 101	290		-6		456	-8		
-14								
Risk Dollar	10.5				12			
	18							

Multifactor VAR



Panel IV : Monte Carlo Simulation VaR – Scenario Analysis

Step 1 : Do, say, 200 simulations

Scenario 1	$6.9m
Scenario 2	$7.10m
Scenario 3	$7.17m

Scenario 200	$7.02m

Step 2 : Sort values in ascending order

1 Scenario 25	$6.83m
2 Scenario 98	$6.84m
----	
10 Scenario 121	$6.85m
----	
200 Scenario 3	$7.17m

Step 3 :Choosing a confidence level of 5%,VAR is calculated by subtracting 10th observation from initial portfolio value:
VAR = $7m-$6.85=$0.15m

Notes On Volatility estimators

Moving average models

1. Simple standard deviation
2. Simple exponential*
3. Fractional exponential*
4. Moving average
5. Historical mean
6. Tick-by-tick
7. Random walk (used in combination with one of the other methods)

Statistical models

8. Simple regression
9. Garch family
10. Stochastic volatilities

Non-parametric methods

11. Neural networks

Market-expectation based models

12. Implied volatilities

*The simple and fractional exponential estimators are weighted standard deviations.

VaR Preview : Analytic (Σ) method

Calculating VaR by theAnalytic or Var-Cov. matrix method

a)Decompose financial instruments – 'mapping' process

b)Specify distribution : JP Morgan's RiskMetrics or Variance/Covariance Matrix assume normal distribution.

All the historical information is summarized in the means, variances and covariances of the market factors.

c)Calculated portfolio variance and VaR

VaR Preview : Analytic (Σ) method

Example : Suppose that a US portfolio manager holds a two-year, Deutschmark Bund with a face value of DM5,000 coupon, paid annually. Suppose further that the one-year and two year DM zero-coupon rates are 4.45% and 5.60% respectively, and the spot rate is DM1.45.

Mapping or Stripping a German Bund Cashflow

PV in DM DM263 DM4,730
PV in USD $182 $3,262

	Forex DM/$	DM 1.0 yr		DM 2.0 yr
DM Bund	$3,444	$182		$3,262

Given the Var-Cov Matrix for the three Bund Market Factor

	$/DM	1yr DM zero	2yr DM zero
Dollar/D-Mark	1.85 E -5	-6.78 E -6	-3.50 E -6
One-yr D-Mark zero	-6.78 E -6	2.50 E –5	1.61 E -5
Two-yr D-Mark zero	-3.50E –6	1.61 E – 5	1.85 E – 5

For the Deutschmark Bund, the portfolio variance is 348.57.
The standard devation of the portfolio will be $18.76.
A 95%, one day VaR will be 1.65 ($18.67) = $30.81

VaR Preview : Pro and Con (14)

Advantage of VaR

1)Robust – summarizes broad spectrum risk with single number
2)Captures correlations and volatilities – hedging and diversification
3)Intuitively meaningful output :
The greater the risk, the higher VaR

Disadvantage of VaR

1)Does address only 'Busines-as-usual' Risk
2)Assumes historical correlation will persist
3)Simple VaR models ignore Gamma/ Convexity Risk
4)All VaR models ignore out of the money gamma risk – Catastrophic Event Risk (*Non*-Statistical Solution : Stress Testing, Back testing, What-if testing, Analze crisis risk, Role of Liquidity, Price Discountinuity, etc.)

Capital Adequacy Ration (CAR) and Var

The Building Block Approach

In April 1995, the Basle Committee on Banking Supervision, Bank of International Settlement (BIS) established the fundamental concept of CAR to distinguishes between banking and trading books and to be effective in Jan. 96. One altenative to accept CAR for market risk is called an ***internal model based*** approach as quantitative standards by using Var as follows :

Market Risk Regulatory Capital =
Max [VaR_{BIS} (today), K * VaR_{BIS} (60 day average)]

a) Compiling daily
b) Using a 99th percentile
c) One-tailed confidence internal
d) min. holing period 10 days
e) Using obervation of minimum one year
f) An ave. of the daily VaR based on each of the preceding 60 business days.
g) K = Mutliplication factor. Normally set to 3.0.
[The actual K can be ranged from 3 to 4 based on 'back testing']

The capital at risk reserve will then become the higher of the previous day's Var multiplied by a factor (e.g. specific and general risks) assesed by each national supervisor.

For interest rate risk :
Specific Risk weighting rises from 0% for government debt in domestic currencies to 8% for non-qualifying items,

General Risk weighting ranging from 0 to 12.5% is based on a maturity or duration basis. The matched and unmatched positions are then multiplied by varying percentages to give the capital requirement.

See more Details on BIS [1993, 1996]

Table 2 : Comparing The Key Concepts (a)

	1 Gap	2 Simulation	3 Duration	4 VAR
Conceptual foundations	Accounting Concepts	Scenario Analysis	Present value and Option Theory Price elasticity Concepts And Arbitage Concept	Statistical concepts of distribution and confidence levels
Critical assumptions	Run off Assumptions for non-specific Maturity items	Business plans, Volumes, Product mix, and prices	Cashflows, Discount factors	Correlations, volatilities
Most useful for	Simple, relatively Stable balance Sheets	Banking book/ Trading book With complex Options	1. Investment portfolios 2. Duration of equity 3. Continuous trading 4. No Price Discontinuity	1. Primarily for Trading book, can Also be used for Banking book 2. BIS requirement

Table 2 : Comparing The Key Concepts (b)

Criteria	Gap	Simulation	Duration	VAR
Simplicity	1	2	3	4
Flexibility in display of results	3	1	4	2
Ability to perform risk measurement of individual accounts	3	2	1	1
Ability to Measure related variables including basis risk	3	2	1	1
Data Requirements	1	3	2	4
Familiarity	1	2	3	4
Forward-Looking	3	1	2	2

Note: 1 most appropriate; 4 least appropriate

Table 2 : Comparing The Key Concepts (c)

Technique	Existing business	Planned business	Short term	Long term
Gap	√		√	
Simulation	√	√	√	1*
Duration	√		2*	√
VAR	√	3*	√	4*

Notes:
1* Generally, simulation is used for estimating net interest income volatility; however, it can also be used for estimating the market value volatility;

2* Duration is generally used for measuring the volatility of market values; however, it can also be used for measuring the volatility of Ntt, through the concept of duration gap of income;

3* Typically for existing business; can also be used to measure the risk of planned business;

4* Can be done for long term investments; even though generally used for trading activities

Source : Srinivasulu (1997, Balance Sheet)

Table 2 : Comparing of the Key Concept (d1)

Quantitative Applications	
Active Management	
Return simulation	Predicts bond and portfolio behavior given alternative interest-rate scenario projections.
Immunization	
Immunization model	Creates and maintains a portfolio that will have an ensured return over a specified horizon, irrespective of interest-rate change.
Passive Management	
Indexing system	Creates and maintains a portfolio that will track the performance of a given bond index with a manageable set of securities.
Individual Security Analysis	
Swap systems	Allows for comparison of individual securities, with the objective of identifying historical price (or basis point spread) relationships.

Table 2 : Comparing of the Key Concept (d2)

Term-structure analysis	Evaluates the current level of yields by producing spot, discount, and forward-rate structures. Also values Treasury securities.
Bond valuation model	Develops a normative value for corporate and mortgage-backed securities, based on the evaluation of those characteristics of the security that contribute to overall price.
Contingent-claims model	Evaluates the embedded option in a security without forecasting interest rates.
Other	
Performance attibution system	Calculates the total return for a bond portfolio and attributes the return to its components.
Risk analysis report	Calculates option-adjusted average duration, convexity, and yield for a portfolio.

Figure 10 : Price Waterhouse risk management methodology

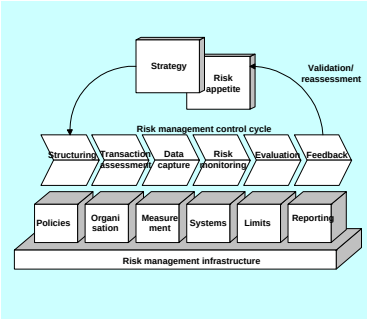
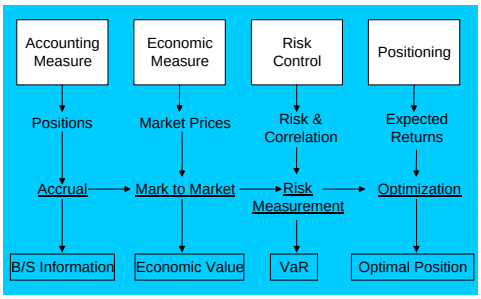


Figure 11 : Asset/Liability Management



Source : Dr. Pakorn Peetathawatchai [1997],
Treasury Department, Siam Commercial Bank Plc.

Case Study : Siemens AG – Germany(1)

1. Siemens' derivatives use (DM million)

	National amount		Fair value	
	Sep 30, 1996	Sep 30, 1995	Sep 30, 1996	Sep 30, 1995
Forward exchange contracts	29,096	23,947	(116)	357
Interest rate swaps and combined interest rate/ foreign exchange swaps	16,539	6,125	(35)	52
Options	727	3,146	9	(18)
Others forward contracts	12,480	9,737	(6)	(7)
Total	**58,842**	**42,955**	**(148)**	**384**

Source : Siemens annual report, 1996.

Case Study : Siemens AG – Germany(2)

2. Currencies included in JP Morgan's RiskMetrics

First wave: October 1994	Second wave: May 1995	Thrid wave: December 1996
Australian dollar	Austrian schilling	Argentine peso
Belgian franc	Finnish markka	Mexican peso
Canadian dollar	Irish pound	Indonesian rupiah
Danish krone	Norwegian krone	Korean won
French franc	Portuguese escudo	Malaysian ringgit
Deutschmark	Hong Kong dollar	Philippine peso
Italian lira	New Zealand dollar	Thai baht
Japanese yen	Singapore dollar	Taiwanese dollar
Dutch guilder	Swiss franc	South African rand
Spanish peseta		
Swedish krona		
Sterling		
US dollar		
European Currency Unit		

THAI BAHT CRIRIS IN JULY 97

Methodology on modelling data for "basket-pegged" emerging currencies - including the Hungarian forint, Polish zloty, Slovakian koruna and Czech koruna, are published in JP Morgan's RiskMetrics Monitor Q3

Sasin

END

see you next time

[I love emails.

Please, send me comments or advises to pongsak@hoontrakul.com]

SASIN : Graduate Institute of Business Administration of Chulalongkorn University