

Flashcards

for

Enterprise Risk Management

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The Major Categories of Risk

A. External risks

1. Financial Market Risk
2. Political and Regulatory Risk
3. Macro-economic Risk
4. Environmental Risk

B. Internal risks

1. Operational Risk – relating to company operations
2. Strategic Risk – relating to the strategic direction of the company
3. Reputational Risk – losses arising out of damage to the company reputation

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External Risk – Financial Market Risks

1. **Stock market risk** – may arise from fluctuations in market prices or volatility
2. **Interest rate risk** – fluctuations in the value of assets or liabilities arising from changes in interest rates
3. **Exchange rate risk** – arising from the relative movement of currencies
4. **Credit risk** – arising from financial market credit events or changes in the creditworthiness of a debtor or counterparty
5. **Spread risk** – arising from changes in the relative returns of assets of different durations or credit worthiness
6. **Systemic risk** – IMF definition: *Risk of disruption to financial services caused by an impairment of all or parts of the financial system and that has the potential to cause serious negative consequences for the real economy*
7. **Liquidity risk** – arises if assets are not sufficiently liquid to meet cash obligations

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Financial Risks - Credit Risk Classifications

C. Credit risk

1. Default risk – risk of a debtor being unable to meet interest or principal obligations
2. Credit downgrade risk – loss of value due to a reduced credit rating of the debtor by rating agencies
3. Sovereign risk – risk of a full or partial default by a country. May arise from general economic stress, regime change or regulatory actions of the foreign jurisdictions
4. Counterparty risk – risk that a counterparty is unable to fulfill its contractual (non-debt) obligations
5. Concentration risk – occurs when a firm is dependent on a single or a series of mutually dependent counterparties

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Financial Risks – Exchange Rate & Macro Economic Risk Classifications

1. Exchange rate risk – arising from the relative movement of currencies
 - a. Transaction risk resulting from movements occurring between entering and settling financial obligations
 - b. Economic risk arising from the effect of exchange rates on prices of goods and services
 - c. Translation risk occurring when assets and liabilities are denominated in different currencies
2. External – Macro Economic Risks
 - a. Business cycles – and associated shifts in interest rates, yield curves, equity prices, exchange rates, etc.
 - b. Inflation – reduces the purchasing power of cash and the value of long duration fixed cash flow instruments
 - i. Differential rates of inflation between two economies impact the relative exchange rates of their currencies

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Other External Risks - Classifications

1. Political and Regulatory Risk

- a. Political risk – risk of political changes adverse to the operations or interests of a firm
 - i. May arise due to political instability, adverse regime changes, regulatory changes, nationalization, etc.
- b. Regulatory risk – risk of adverse changes to laws or regulatory practice affecting the firm's operations
 - i. E.g., restrictive labor laws or licensing requirements and restrictions on repatriation of funds
 - ii. Firms in controversial businesses (e.g. tobacco), or using controversial business practices will be more vulnerable
 - iii. Major political and macro-economic events (like the 2008 economic crisis) can also spur a regulatory change

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Other External Risks - Classifications

1. External – Environmental

- a. Environmental changes (weather, soil, sea levels, etc.) can adversely impact many businesses, especially in the agricultural and leisure sectors
- b. Manufacturers are exposed to environmental liability risk if hazardous waste is not safely disposed or if an accidental spill causes environmental damage
- c. Political response to environmental changes may lead to adverse regulatory action

Internal Operational Risks - Classifications

1. People risk – risk that employees or external contractors fail to follow company policies, processes or procedures or failure of human resource management
2. IT Risk – risks arising from technology and service failures, flawed programs, accidental loss, theft or corruption of data, and cybersecurity risk
3. Project risks – risk of project failure resulting in loss of investment or reputation
4. Legal risk – risk of loss from lawsuits against the firm or from unsuccessful pursuit of lawsuits initiated by the firm
 - a. Includes inability to enforce the terms of contracts and failure to protect assets, including intellectual property assets.
5. Pricing risk – Causes by inappropriate assumptions, inadequate models for pricing, changes in exchange or interest rates, adverse selection not prevented in underwriting, or simply chance variation in emerging experience
6. Process risk – failure of business processes, or failure to establish appropriate processes

Risk Identification Techniques

1. **Brainstorming** – unrestrained/unstructured group discussion
2. **Independent group analysis** – avoids group think
3. **Surveys by email or snail mail** – ensures wide participation
4. **Gap analysis** – another type of survey
5. **Delphi technique** – iterative surveying and discussing results with the participants until a consensus emerges
6. **Interviews** – advantage of structure and independence, but also clarity as issues can be cleared up immediately
7. **Working groups** – Usually to investigate more thoroughly the nature of particular risks

Things to Include in a Risk Register

1. Unique identifier
2. Category
3. Date assessed
4. Clear description
5. Nature – quantifiable vs. unquantifiable
6. Likelihood
7. Severity
8. Period of exposure
9. Current status
10. Details of scenarios where risk is likely to occur
11. Details of risks linked to this one
12. Risk responses implemented
13. Cost of responses
14. Details of residual risks
15. Timetable and process for review of the risk
16. Risk owner
17. Author of entry

The Two Types of Liquidity Risk

1. **Asset Liquidity Risk** – Risk that liquidation value differs from current mark-to-market generally due to:
 - a. Thin markets, large bid-asked spreads
 - b. Low trading volumes
 - c. Large positions relative to market size

2. **Funding Liquidity Risk** - the inability to meet payment obligations, which could force unwanted liquidation of the portfolio. Generally attributable to:
 - a. Inadequate cash positions
 - b. Surplus assets pledged as collateral for borrowing
 - c. Margin requirements for derivative assets
 - d. Call provisions and covenants in debt instruments
 - e. Asset/liability imbalances
 - f. Changes in policyholder behavior

**Describe the Types of Actions an Insurer Can Take
in Dealing with Risks**

1. Risk reduction

- i. Diversification – combine risk with other uncorrelated risks
- ii. Actively hedge risk exposures
- iii. Create more robust systems/processes to reduce/eliminate risk

2. Risk removal

- i. E.g.: to eliminate counterparty risk, engage in exchange-traded derivatives instead of OTC swaps

3. Risk transfer

- i. Non-capital market transfer
 - a. E.g.: Insurance – pay premium to transfer risk
- ii. Capital market risk transfer
 - a. E.g.: Securitization turns risk exposure into an investment

4. Risk acceptance

- i. It implies risk/reward trade-off is acceptable

VAR Tools – Marginal VAR

1. Measures the change in portfolio VAR from adding an additional dollar of exposure to a given component; also the partial derivative with respect to the component
2. Can differ significantly from the individual asset VAR because of diversification effects
3. Taking the derivative of the volatility and converting to a VAR number, marginal VAR

- i.
$$\Delta VAR_i = \frac{\partial VAR}{\partial x_i} = \frac{\Delta VAR}{\partial w_i W} = \alpha \frac{\partial \sigma_p}{\partial w_i} = \alpha \frac{\text{cov}(R_i, R_p)}{\sigma_p}$$

- ii. Closely related to beta – the systematic risk – the contribution of one security to total portfolio risk

4.
$$\Delta VAR_i = \frac{\partial VAR}{\partial x_i} = \frac{\Delta VAR}{\partial w_i W} = \alpha(\beta_i \times \sigma_p) = \frac{VAR}{W} \times \beta_i$$

VAR Tools – Incremental VAR

1. The change in VAR owing to a new position – different than marginal VAR in that the amount added or subtracted can be large, so VAR changes non-linearly

$$\text{Incremental VAR} = \text{VAR}_{p+a} - \text{VAR}_p$$

2. Drawback is that portfolio VAR must be recalculated – which can be cumbersome – so approximate from first terms of series

$$\text{Incremental VAR} \approx (\Delta \text{VAR})' \times a$$

3. Special case: when the change is in only one asset – variance of returns is then

$$\sigma_{p+a}^2 W_{p+a}^2 = \sigma_p^2 W^2 + 2\alpha W \sigma_{ip} + \alpha^2 \sigma_i^2$$

- a. Useful to find the amount of the new asset that leads to the lowest risk
- b. Differentiating wrt alpha and setting = 0, we get the variance minimizing position, or best hedge

$$\alpha^* = -W \frac{\sigma_{ip}}{\sigma_i^2} = -W \beta_i \frac{\sigma_p^2}{\sigma_i^2}$$

“Best hedge” = Additional asset needed to minimize the overall portfolio risk

VAR Tools = Component VAR

1. Finds the risk decomposition of the portfolio – component VAR – a partition of portfolio VAR that indicates how much the portfolio VAR would change approximately if the given component was deleted – sum of all component VARs is portfolio VAR
2. The marginal VAR multiplied by the dollar value in an asset
3. Quality of this linear approximation improves if the VAR components are small
4. This tool is useful for drill-down exercises that enable managers to control overall VAR

Techniques for Modeling Time-varying Risk

1. Moving Averages
 - a. A crude measure – but popular – is to use a moving window of fixed length – 20 or 60 trading days – to derive a moving average
2. GARCH Estimation – Generalized Autoregressive Conditional Heteroskedastic
 - a. First model to put more weight on recent events (heteroskedastic means variances are changing). Assumes variances follow a predictable process
3. Long Horizon Forecasts
 - a. Can use GARCH to extrapolate volatility forward by breaking periodic returns into daily returns and using tomorrow's forecast to derive the day after and so on
4. The RiskMetrics Approach
 - a. Variances are modeled using an exponentially weighted moving average (EWMA) forecast
 - b. Easy to implement with only one parameter, the decay factor

Modeling Correlations

1. Correlation is more important than variance in analyzing portfolio risk
2. Can use the same approaches above as for estimating variances
3. Multivariate volatility models provide internally consistent risk estimates for a portfolio of assets
4. Crashes and Correlations
Low correlations reduce risk, but correlations increase in troubled times, overcoming diversification efforts
 - a. This would result in VAR estimates seriously understating risk of failure
 - b. Some say a copula should be used instead of a multivariate distribution
 - c. However, increasing correlations hurt long positions and help short positions and vice versa
 - d. This is why regulators often assign multipliers to VAR estimates and require stress testing