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P R I S T I N E

Foundation of Risk Management

RISK and its Sources

- Risk denotes the Variability in Returns
- Sources of Risk
 - Business risk: Specific for the business house
 - Example: Increase in the prices of cement for a grocery shop
 - Financial Risk: result of a firm's financial market activities; volatility in various market related instruments
 - Example: The recent market crash

Types of Financial Risk

- Market Risk: risk of value decrease due to change in prices of assets in the market
 - Absolute and relative
 - Directional and non-directional
 - Basis risk: Risk that the price of the asset and the hedged instrument are not perfectly correlated
 - Volatility risk: Risk of loss from changes in implied volatility of the market
- Liquidity Risk: risk of not being able to quickly liquidate a position at a fair price
 - Asset Liquidity: Large positions affecting asset prices
 - Funding liquidity: Inability to honor margin calls, capital withdrawals. Ex: Lehman
- Credit risk: risk of loss due to counterparty default
 - Sovereign Risk: Willingness and ability to repay
 - Settlement Risk: Failure of counterparty to deliver its obligation
 - Exposure and recovery rate: Calculated on the happening of a credit event
- Operation risk: risk due to inadequate monitoring, systems failure, management failure, human error
 - Model risk, people risk, legal and compliance risk

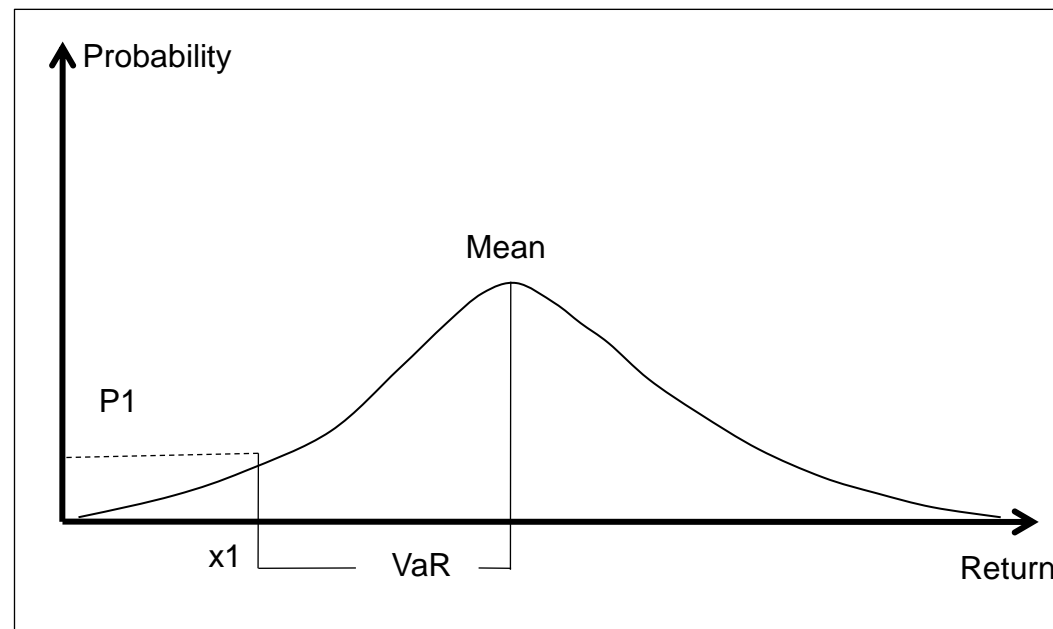
Growth of RM Industry

- Following global events contributed to the growth of risk management industry
 - Breakdown of fixed exchange rate system in 1971
 - Oil Prices shock of 1973
 - US stock market collapse of 1983
 - Japanese stock market collapse of 1989 and further (from 39,000 to 17,000)
 - Asian Currency crisis of 1997
 - Russian default and subsequent failure of LTCM in 1998
 - Dot com bust of 2000
 - 2001 attack on WTC, US
 - Sub prime crisis and subsequent failures of Bear Stern, Lehman and other financial institutions in 2008-2009
- Deregulation and Globalization: lower entry barriers > increasing competition > firms are more competitive > exposure to global macroeconomic factors > linked systematically > increased risk

Tools for Risk Management

- Derivatives is the most popular tool used by Risk Managers for RM
- RM tools include:
 - Stop-loss limit: Limit on the amount of losses in a position
 - Notional Limit: Maximum amount to be invested in a asset
 - Exposure limit: Exposure to risk factors like duration for debt instruments and Beta for Equity Investments
 - VaR: maximum loss at given confidence level

Example: One month VaR of a portfolio at 95% confidence is \$1,000,000



- Valuation versus VaR

By Handling Bankruptcy Costs

$$\Delta(\text{EV of firm}) = \Delta(\text{PV of firm}) + \Delta(\text{PV of bankruptcy costs}) - \text{Risk management cost}$$

PV (before hedging)	Probability
\$200	0.10
\$300	0.20
\$400	0.30
\$500	0.40
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Debt	\$300
Bankruptcy Cost	\$75

PV (after hedging)	Probability
\$200	0.00
\$300	0.25
\$400	0.30
\$500	0.45

- Debt value = probability * expected payment to debt i.e. $10\% * 125 + 90\% * 300 = 282.5$
 - Equity value = probability * expected payment to equity i.e. $30\% * 100 + 40\% * 200 = 110$
- Thus $EV = 392.5$
- If Hedging cost is 10 and after hedging PV are also shown ...as above
 - Debt value = probability * expected payment to debt i.e. $100\% * 300 = 300$
 - Equity value = probability * expected payment to equity i.e. $30\% * 100 + 45\% * 200 = 120$
- Thus $EV = 420 - 10 = 410$
- Incremental benefit = $410 - 392.5 = 17.5$

By moving Income Across Time and Reducing Taxes

- Firms can use risk management to move their income across time horizon and reduce tax burden
- Increase in expected payments in investors' hands will increase the firm value
 - Example: If a crude exploration company foresee lower tax rate in 2 years from now, then it would delay selling crude oil. Risk of crude oil prices going down will be hedged by 2 year crude futures/forward contracts. Even then tax payment in absolute amount might remain same, but present value of tax outflow will be lesser and thus shareholders' value will be higher comparatively
- Reducing WACC: Also we can reduce the tax outgo by increasing interest outgo, but as explained earlier expected financial distress / bankruptcy costs hamper the firm value beyond a level
 - Thus a optimal capital can balance the tax benefits of debt and bankruptcy cost

By Benefiting a Large Shareholder

- A large shareholder in the company may bring in business specific expertise
- He would also closely monitor management activities to align them with shareholder expectations to reduce AGENCY COSTS
- Smaller shareholders indirectly get benefited
- An investor may be ready to hold a large position in a firm if it has low firm specific risk. This can be ensured by proper risk management

- As we know Agency cost of management discretion can decrease firm value
- Management should be motivated towards maximizing firm's value by compensating management based on the stock price performance
- But as stock prices are also affected by factors that are not under control of the management. Risk Management that relates the management performance more to factors under their control will help increase firm value
- Improved performance of the firm
 - Encourages suppliers to invest in new technology and benefits passed onto the firm.
Example: Tata Nano
 - Improves the confidence of the customers in the company products.
Example: A Maruti versus a Fiat product

By Reducing The Probability of Debt Overhang

- Debt Overhang refers to situation where the amount of debt the firm is carrying prevents the shareholders from investing in positive NPV projects
 - A firm with poor operating results
 - A firm with excessive debt and positive NPV projects
 - RM helps avoid Debt Overhang
- Effective risk management can restrict the firm to take more than required debt and a situation of debt overhang can be avoided

By Reducing The Problem of Information Asymmetry

- Investors have to rely on management estimates for profitability of new projects
- Extent to which the performance is due to management decisions or external factors
- Due to information asymmetry, outside investors find it difficult to verify the management estimates regarding the particular project. Thus they would demand additional premium for funding
- Risk management can preserve firm value since investors demand lesser risk premium from such firm. Risk management practice reduce the impact of information asymmetry for the investors