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A study on financial risk assessment with special reference to IDBI Federal Life Insurance Company Ltd

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Abstract

In finance, risk is associated with the possibility of an adverse event that could cause a loss to the participants of the markets. Insurance industry because of its growing frequent uncertainty leads supervisors and companies to look for higher levels of safety through new approaches to solvency, supervision and Risk Management procedures. This complex scenario has made us an attempt to study the Financial Risk assessment in IDBI Federal Life Insurance. Time period of study is from March 2015 to Feb 2016 constituting 248 trading days. Among the funds available Nifty index fund and Equity growth fund is taken up for study and the required data is obtained from websites of NSE India and IDBI federal. Sources VaR indicates the maximum loss which can incur on a particular time horizon with a defined level of confidence. Findings of the study reveal stock of HCL Technology, Tata Motors, Tech Mahindra Ltd, Kotak Mahindra Bank has high risk and low return. Monte Carlo simulation and stress testing was also used to assess the financial risk of IDBI Federal Life Insurance.

Keywords: Value at Risk, Monte Carlo simulation, Stress test, Hypothetical scenario.

Introduction

"Every Risk is worth taking as long as it's for good cause, and contributes to a good life"

Risk is the chance of something happening that will have an impact upon objectives, and is measured in terms of consequences and likelihood. In finance, this concept is associated with the possibility of an adverse event that could cause a loss to the participants of the markets. Financial risk is a consequence of the uncertainty in the future value of the financial assets, due to changes in the factors that have an impact in their valuation. Therefore, a higher uncertainty also means higher financial risks. Insurance companies are in the business of taking risks. Worldwide these companies write policies that deal with specific risks, and in many cases, even underwrite exotic risks. As a direct corollary, therefore, insurance companies should be good at managing their own risks. The results of the capital investments influence the competitiveness and growth of financial institutions in the future. Market risk refers to the risk of losses in the trading book due to changes in equity prices, interest rates, credit spreads, foreign-exchange rates, commodity prices, and other indicators whose values are set in a public market. To manage market risk, banks deploy a number of highly sophisticated mathematical and statistical techniques. Chief among these is value-at-risk (VaR) analysis. VaR is the loss level that will not be exceeded with a specified probability. For investors, risk is about the odds of losing money, and VaR is based on that common-sense fact. By assuming investors care about the odds of a really big loss, VaR answers the question, "What is my worst-case scenario?" or "How much could I lose in a really bad month?". Stress-Testing is a useful tool for financial risk managers because it gives us a clear idea of the vulnerability of a defined portfolio. Stress-testing techniques measure the potential loss we could suffer in a hypothetical scenario of crisis. One of the most important functions of Stress-testing is to identify hidden vulnerabilities, often the result of hidden assumptions, and make clear to trading managers and senior management the consequences of being wrong in their assumptions. The august 24, 2015 market crash is chosen as scenario of stress testing.

Motivation of the study

Risk is the chance of something happening that will have an impact upon objectives, and is measured in terms of consequences and likelihood. Managing financial risk is essential for every organization to make better investment decision and to take necessary decision based on the result of the highly sophisticated mathematical and statistical techniques.

Literature Survey

Jose Manuel Feria Domínguez1 (2004) in his study on **"**Applying Stress-Testing on Value at Risk (VaR) Methodologies". In this paper, Jose develop an empirical Stress-Testing exercise by using two historical scenarios of crisis. In particular, they analyze the impact of the 11-S attacks (2001) and the Latin America crisis (2002) on the level of risk, previously calculated by different statistical methods. Consequently, they have selected a Spanish stock portfolio in order to focus on market risk. From the research they conclude that the impact of Brazilian crisis (scenario II) in portfolio is greater than that of the 11-S terrorist attacks.

Chinmoy Majumdar (2008) in his study on "VaR (Value at Risk) for Insurance Risk" to measure the insurance companies risk by the amount of possible depreciation at the end of the year. This is quantified by doing a rough scenario-analysis on the securities which have to be accounted by the lower of cost or market. Internal Methods measure market risk under normal market conditions by using historical market data to predict future market events. The so-called Variance-Covariance-Method measures the volatilities and correlations of market variables from historical price data and produces a statistical model based on these estimates. The Historical Simulation Method uses historical price observations directly to simulate future price changes. Using historical data to predict the future, makes the assumption that the future shows a similar type of behavior with the past. So he advised to test this assumption frequently and to use stress testing in addition.

Shriram Gokte (2010) in his study on "A Systematic Approach to Risk Management: Insurance Industry", calculated the Market risk according to the QIS5 Technical Specifications arises from the level or volatility of market prices of financial instruments. Exposure to market risk is measured by the impact of movements in the level of financial variables (stock prices, interest rates, real estate prices and exchange rates). While calculating the market risk the market sub-risks should be combined to an overall capital requirement SCRmkt for market risk using a correlation matrix.

Jekaterina Kuzmina et. al. (2011) in their first study on "Risk Management Models and Tools for Insurance Companies", developed an internal risk management model for Latvian insurance companies, managing small stocks' portfolios and using such tools as risk measures (*Value at Risk* and conditional risk measures) and copulas (normal copula, skew normal copula and skew *t-copula*). The model should satisfy regulatory requirements and internal risk management standards, as well as allow dealing with otherwise complex multivariate modelling. In order to achieve the goal set generally accepted scientific qualitative and quantitative methods, including monographic method, analysis and synthesis, logical construction and evaluation, modelling methods are used. For empirical study, Excel and Mat cad were used.

Cheung and Powell (2012) in his study on "A Teaching Study using Parametric Computation and Monte Carlo Simulation" showed the procedures of doing one-step ahead Value at Risk (VaR) in Microsoft Excel using the non-parametric historical method. This paper extends this prior research by calculating VaR using parametric and Monte Carlo simulation methods. In the parametric method, the asset returns are assumed to follow a known probability distribution whilst the Monte Carlo method assumes that asset returns are driven by a known stochastic process.

McKinsey & Company (2012) working paper on managing market risk, analysed the performance of VAR models on their back-testing results as measured by accuracy, stability, and outliers, using four market conditions: normal (that is, average volatility), pre-crisis (moving from a phase of normal to high volatility), crisis (a period of sustained high volatility), and post-crisis (moving from a phase of high volatility back to normal. A desirable model will score high on accuracy and stability with a low (or expected) number of outliers in all phases of the economic cycle. Performance of 3 historical-simulation approaches Back testing on the EURO STOXX 50, December 2004–December 2011. Three weighting scales are used (equal weighting, time weighting and volatility scaling), in that volatility scaling shows promising result.

Humberto Banda-Ortiz (2014) conduct study on "Value at Risk (VaR) in uncertainty". VaR methodology has important limitations which makes it unreliable in contexts of crisis or high uncertainty. For this reason, they test the VaR accuracy when is employed in contexts of volatility, for which they compare the VaR outcomes in scenarios of both stability and uncertainty, using the parametric method and a historical simulation based on data generated with the Black & Scholes model. In addition, they found that the Black & Scholes simulations lead to underestimate the expected losses, in comparison with the parametric method and also found that those disparities increase substantially in times of crisis.

Methodology

Objective of the study: To study the assessment of risk with special reference to IDBI Federal Life Insurance Company Ltd.

Type of research: The research design used for this study is analytical research type. In analytical research, the researcher has to use the already available facts or information and analyze them to make a critical evaluation of the subject.

Sampling Technique: The sampling technique chosen for this study is convenience sampling. The funds available in IDBI Federal Life Insurance Company Ltd are Equity Growth Fund, Midcap Fund, Nifty Index Fund, Pure Fund, Guaranteed Growth Fund, Maxi Gain Fund, Aggressive Allocator Fund, Moderate Asset Allocator Fund, Cautious asset Allocator Fund. From those funds, Nifty Index fund and equity Growth Funds has been chosen for this study due to the percentage of investment in equity market is high respectively 99.45% and 99.61% compare to all other funds.

Data and source of data: Data is a raw material for almost all research studies. In this study there is a need

to gather secondary data. Required data for the study is collected from the official websites of NSE India and IDBI Federal.

The Time period for this study is from March 2015 to Feb 2016 and it consists of 248 days of trading.

Tools Proposed For Analysis

Value at Risk: VaR indicates the maximum loss which can incur on a particular time horizon with a defined level of confidence. In other words, VaR, as a statistical estimate, requires the following parameters: The time horizon will be one day, i.e., we will estimate daily VaR .The level of confidence has been set at 95%.

Parametric Test: A parametric model as it relies on a fixed parameter set assumes more about a given population than non-parametric methods. When the assumptions are correct, parametric methods will produce more accurate and precise estimates than non-parametric methods, i.e. have more statistical power. As more is assumed when the assumptions are not correct they have a greater chance of failing, and for this reason are not a method. To test the parametric assumption, the daily loss is calculated for the historical data and plot histogram.

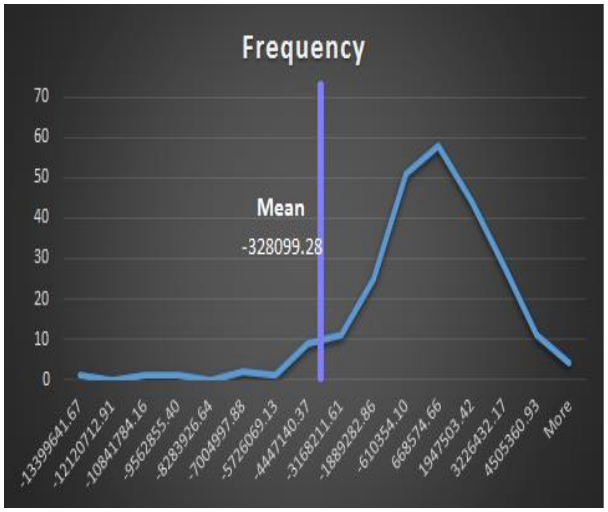

Fig. 1: Histogram of Daily Risk

The bell curve is the most common type of distribution for a variable, used to depict a normal distribution consists of a bell-shaped line. The above histogram shows right skewed bell curve. The normal distribution is the easiest distribution to work with in order to gain an understanding about statistics. However, in real, distributions tend to be skewed. Too much skewness, and many statistical techniques don't work. Advanced mathematical techniques have to be used like Non parametric Historical simulation, Monte Carlo simulation. The non-parametric test chosen for the study is Monte Carlo simulation Method.

Results & Discussion

Individual Stocks VAR: VaR indicates the maximum loss which can incur on a particular time horizon with a defined level of confidence. VaR for individual stocks are calculated with defined Confidence Level, Confidence Level chosen for this analysis is 95%.(1.645)

Nifty Index Fund: Tech Mahindra, HCL Technologies, Kotak Mahindra Bank Ltd has highest standard deviation and variance and lowest average return. The individual VaR is high for Tech Mahindra Ltd, Lupin, Hero Motor Corp, NTPC Ltd.

Equity Growth Fund: The maximum loss is calculated in terms of percentage. All stocks had same loss percentage.

Portfolio VAR: VaR for portfolio is calculated using the correlation value of each stocks return with other stocks return. Correlation matrixes are formed using the calculated value.

Table 1: VaR of Portfolio and Difference Between portfolio VaR and Individual Stock VaR

	Nifty Index Fund (Rs.)	Equity Growth Fund (Rs.)
Portfolio VaR	4,307,464.36	54,885,970.18
Sum of Individual VaR	8,352,298.22	98,768,449.83
Difference	4,044,833.86	43,882,479.65

Nifty Index Fund: VaR of portfolio is lesser than the individual stock VaR. The difference between Individual VaR and Portfolio VaR is Rs.4,044,833.86**.**

Equity Growth Fund: VaR of portfolio is lesser than the individual stock VaR. The difference between Individual VaR and Portfolio VaR is Rs**.**43,882,479.65. The maximum loss are reduced while invested as portfolio.

Monte Carlo Simulation: Monte Carlo method is a broad class of computational algorithm that rely on repeated random sampling to obtain numerical result. Random numbers for Confidence level are generated and future returns are calculated. Using DATA TABLE, 200 iterations of future returns are calculated. The average and Standard Deviation of 200 iterations are calculated.

Table 2: Predicted Portfolio VaR and Difference between Portfolio VaR and Individual VaR

	Nifty Index Fund (Rs.)	Equity Growth Fund (Rs.)
Portfolio VaR	4,313,064.32	61,458,396.49
Sum of Individual VaR	8,363,156.69	110,595,668.27
Difference	4,050,092.38	49,137,271.78

Comparison of predicted risk of the portfolio with actual risk: To compare the predicted risk with actual risk, compute Monte Carlo Simulation using data from March 2015 to August 2015 and then calculate the actual risk for the data from September 2015 to February 2016. After that compare the predicted VaR with actual VaR. This comparison will help to calculate the accuracy of the Monte Carlo Simulation Method.

Table 3: Comparison of Predicted VaR with Actual VaR of Individual stocks

	Nifty Index Fund (Rs.)	Equity Growth Fund (Rs.)
Predicted VaR	98,18,465.01	136,770,315.50
Actual VaR	63,83,931.05	108,344,779.60
Difference	32,68,814.48	30,320,436.80

The comparison of predicted VaR with actual VaR helps to identify the accuracy of the Monte Carlo Simulation.

Nifty Index Fund: The actual VaR is lesser than the predicted VaR. The difference between the both is Rs.32,68,814.48.

Equity Growth Fund: The actual VaR is lesser than the predicted VaR. The difference between the both is Rs.30320436.80. So that Monto Carlo Simulation is the suitable method for calculating the predicted VaR of portfolio.

Stressed VAR: Stress-Testing is a useful tool for financial risk managers because it gives us a clear idea of the vulnerability of a defined portfolio. By applying Stress-testing techniques we measure the potential loss we could suffer in a hypothetical scenario of crisis. One of the most important functions of Stress-testing is to identify hidden vulnerabilities, often the result of hidden assumptions, and make clear to trading managers and senior management the consequences of being wrong in their assumptions. The august 24, 2015 market crash is chosen as scenario of stress testing.

Table 4: sVaR of Portfolio

	Nifty Index Fund (Rs.)	Equity Growth Fund (Rs.)
sVaR of portfolio	72,26,236.91	115,242,650.10
Sum of Risk in Individual Stock	89,89,669.33	145,063,365.80
Difference	17,63,432.42	29,820,715.65

Stressed standard deviation is high for ONGC compare to all other companies stocks. The standard deviation of ONGC is 4.08%. The stressed VaR of the portfolio is Rs.72,26,236.91 and it is 1.68 times of normal VaR. The difference between the individual sVaR and portfolio sVaR is Rs.7,63,432.42.

Conclusion

In order to measure the worst portfolio loss over some time horizon within some confidence level, there are various methods of VaR computation available. Since VaR-Monte Carlo Simulation main objective is the prediction of the highest expected loss for any given portfolio. Even when those methods are considered useful tools for risk management under conditions of markets stability.

VaR for portfolio is reduced by half compare to individual stock VaR. Investing as portfolio is helpful in reducing the risk level. Monte Carlo simulation is a suitable technique to calculate Risk of the portfolio and to predict the risk in future. The average return of some of the stocks are in negative and also highly volatile in nature. Then there is no change in the portfolio of investment. The stock of HCL Technology, Tata Motors, Tech Mahindra Ltd, Kotak Mahindra Bank has high risk and low return. So the investment decision maker should analyzed the other stocks in the market and change the portfolio. We found that they are substantially inaccurate in contexts of crisis or high uncertainty. . The organization can use stress test to identify the hidden vulnerability of their stocks in the stressed scenario. As well, it was observed that the companies achieved greater losses recovery since the peak of the crisis, but it reaches the stability of the pre-crisis period.

Reference

1. Shriram Gokte (2010) "A Systematic Approach to Risk Management: Insurance Industry" *The Review of Financial Studies, Vol. 14, No 2, pp. 371-405.*
2. Jekaterina Kuzmina, etal. (2011), "Risk Management Models and Tools for Insurance Companies", *AcademyPublish.org – Risk Assessment and Management.*
3. McKinsey & Company (2012), "Managing market risk: Today and tomorrow", *McKinsey Working Papers on Risk, Number 32*.
4. Cheung and Powell (2012) , "A Teaching Study using Parametric Computation and Monte Carlo Simulation", *Australasian Accounting, Business and Finance Journal Volume 6 | Issue 5.*
5. Chinmoy Majumdar (2008), "VaR (Value at Risk) for Insurance Risk- a simple model", *10th Global Conference of Actuaries*.
6. Humberto Banda-Ortiz (2014), "Value at Risk (VaR) in uncertainty: Analysis with parametric method and Black & Scholes simulations", *InnOvaciOnes de NegOciOs 11(22): 177 – 190 © 2014 UANL, Impreso en México (ISSN 2007-1191).*
7. Jose Manuel Feria Domínguez (2004)," Applying Stress-Testing On Value at Risk (VaR) Methodologies", *Investment Management and Financial Innovations, Issue 4.*
8. Willi Ufer (2008), "The Value at Risk concept of Insurance Companies", *Journal of Derivatives vol. 6, no. 1 (Fall 1998):7–24.*

9. George E. Rejda (2014). *Principles of Risk Management and Insurance* (12thEd.). Washington: Pearson Publishing.
10. Scott Harrington & Gregory Niehaus (2004). *Risk Management and Insurance* (2nd Ed.). Noida, India: Tata McGraw-Hill,
11. Allen, L., J. Boudoukh, and A. Saunders (2004) *Understanding Market, Credit, and Operational Risk: The Value at Risk Approach,* (7th Ed.). Oxford: Blackwell Publishing.
12. René Doff (2015), *Risk Management for Insurers* (3rd Ed.). New York: Risk Books Publishing.
13. Philippe Jorion (2006). *Value at Risk: The New Benchmark for Managing Financial Risk,* (3rd Ed.). Noida, India: Tata McGraw-Hill.
14. http://www.idbifederal.com/.
15. http://www.nseindia.com/products/content/equities/equities/eq_security.htm.
16. http://www.goldmansachs.com/gsam/worldwide/insurance/thought-leadership/cio-strategy/index.html.
17. https://www.fundresearch.de/PartnerCenter/GoldmanSachsAssetManagement/Nachrichten/GSAM-Insurance-CIO-and-CFO-Survey-Shows Insurers-Growing-More-Optimis.html.
18. http://www.businesswire.com/news/home/20140505006000/en/GSAM%E2%80%99sAnnual-Insurance-Survey-Shows-Insurers-Offense.
19. http://www.eifr.eu/files/file0423762.pdf.
20. http://sovereign-consultancy.nl/en/glossary/stressed-value-risk.
21. www.bis.org/publ/bcbs158.pdf.
22. http://www.businesstoday.in/markets/stocks/why-the-markets-took-a-deep-plunge-on-august-24/story/223044.html.
23. http://money.cnn.com/2015/08/24/investing/stocks-market-crash-by-the-numbers/.
24. http://www.cnbc.com/2015/09/25/what-happened-during-the-aug-24-flash-crash.html.