

How Bankers Hedge against the Market Risk: a Case Study of Jammu and Kashmir Bank

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Abstract: *The Basic purpose of the study is to evaluate the market risk of Jammu and Kashmir bank. Further the Specific objectives of the study include (i) understanding the different types of Market Risks faced by the banks, (2) Evaluating what are the different tools which are used to evaluate the market risk of the banks (3) Evaluating the difference between the Internal Model approach and the Standard approach to account for market risk (4) How Historical Value at Risk (HVaR) is different from Standard approach assigned under BASEL norms. The study uses the data from five equity stocks and three debt stocks in which Jammu and Kashmir bank has invested for a period of 300 days prior from the date of investigation. The historical value at risk (HVaR) approach is used to identify the risk of each stock to compare it with the already set standard approach according to BASEL II. The findings of the study suggest that the internal model approach (HVaR) is very beneficial as compared to standard approach which sets a particular percentage to hedge against the market risk without analyzing the volatility of the stock. The implications of the study can be for banks and investors. Banks if have knowledge that they have invested in good stocks can used internal model based approach (HVaR) or any other approach rather than standard approach. Also investors can analyze what is the volatility of the stock and whether to invest in particular stock or not.*

Keywords: *Market Risk, Value-at-Risk, Standard Approach*

I. Introduction

Risk is demarcated as anything that can create interruptions in the way of accomplishment of certain objectives. It can be because of either internal factors or external factors, depending upon the type of risk that exists within a particular situation (Kanchu and Kumar, 2013). Exposure to that risk can make a situation more critical. A better way to deal with such a situation; is to take certain proactive measures to identify any kind of risk that can result in undesirable outcomes. In simple terms, it can be said that managing a risk in advance is far better than waiting for its occurrence (Kanchu and Kumar, 2013). The major types of risks faced by banks include (i) market risk, (ii) credit risk, (iii) operational risk and (iv) performance risk. Market risk can be defined as the risk that accounts for loss in banks trading book due to change in prices of equity prices, interest rates, credit spreads, foreign-exchange rates, commodity prices, and other indicators whose values are set in a public market (Mehta et. al., 2012). It is risk that the value of a portfolio, either an investment portfolio or a trading portfolio, will decrease due to the change in value of the market risk factors. The four standard market risk factors are stock prices, interest rates, foreign exchange rates, and commodity prices. The value of investments may decline over a given time period simply because of economic changes or other events that impact large portions of the market. Asset allocation and diversification can protect against market risk because different portions of the market tend to underperform at different times also called systematic risk. The associated market risks are, (i) Equity risk, the risk that stock or stock indexes (e.g. Euro Stoxx 50, etc.) prices and/or their implied volatility will change, (ii) Interest rate risk, the risk that interest rates (e.g. Libor, Euribor, inflation, etc.) and/or their implied volatility will change, (iii) Currency risk, the risk that foreign exchange rates (e.g. EUR/USD, EUR/GBP, etc.) and/or their implied volatility will change, (iv) Commodity risk, the risk that commodity prices (e.g. corn, copper, crude oil, etc.) and/or their implied volatility will change and others. Credit Risk is the change in Net Asset value due to change in perceived ability of counter parties to meet its obligations. Operational Risk is incurred due to costs which are amplified by the mistakes made during carrying out the transactions. Performance Risk accounts to the risk that arises due to non-monitoring of employees and keeping check at their performance. According to the Higher Education Funding Council for England (HEFCE), Risk Management is not just used for safeguarding the decline of the probability of bad events but it also covers the increase in probability of occurring good things. According to the "Dynamic Prospect Theory" a person has more likeliness to take a risk than a sure loss.

II. Literature Review

2.1 Market Risk and its Importance

With the increase in complexity and competition risks have gained a sky high importance. The modern banking sector tends towards high focus on risk management. The management of risk helps the banks to survive in the high competitive market. There are basically two types of risks faced by the banks which include (i) Financial and (ii) Non-financial (McNamee, 1997). The non-financial risk can be further subdivided into five more categories which include (i) operational, (ii) strategic, (iii) funding, (iv) political and (v) legal (Kuwait and Eisenbiers, 1997). The financial risks can be further divided into (i) Credit Risk and (ii) Market Risk. The credit risk includes, (i) Counter Part or Borrower Risk, (ii) Intrinsic or Industry Risk and (ii) Portfolio or concentration risk. The Market risk includes:

1. Equity risk,
2. Interest rate risk,
3. Currency risk and
4. Commodity risk.

Equity risk can be defined as a kind of financial risk that arises due to holding of investments in equity of a particular company (Kunishi and Yasuda, 2004). The risk arises due to fluctuations in the stock price. The main tool for calculating the equity risk is standard deviation. Interest rate risk is the risk that an investment's value will change due to a change in the absolute level of interest rates, in the spread between two rates, in the shape of the yield curve or in any other interest rate relationship. Such changes commonly affect securities inversely and can be condensed by diversifying (investing in fixed-income securities with different durations) or hedging (e.g. through an interest rate swap). Currency risk is the risk that arises from the change in price of one currency against another. Whenever investors or companies have assets or business operations across national borders, they face currency risk if their positions are not hedged. Commodity risk is the risk that commodity prices (e.g. corn, copper, crude oil, etc.) and/or their implied volatility will change.

Market risk management gains its importance due to the various factors because it, (i) provides senior management with information on the risk exposure taken by traders. This risk exposure can then be compared to the capital resources of the Financial Institutions, (ii) helps in measuring the market risk of traders' portfolios, which will allow the establishment of economically logical position limits per trader in each area of trading, (iii) compares returns to market risks in different areas of trading, which may allow the identification of areas with the greatest potential return per unit of risk into which more capital and resources can be directed, (iv) calculates the return-risk ratio of traders, which may allow a more rational evaluation of traders and a fair bonus system to be put in place, and (v) sets up the private sector benchmarks against the overpriced benchmarks of regulators (Mathews and Thompson 2008).

2.2 Approaches to Calculation of Market Risk.

There are two approaches in calculating the market risk which include Standardised Approach and Internal Model Approach.

a. Standardised Approach

A Standardised approach can be defined as an approach where a certain percentage of investment is to be kept as risk premium irrespective of the volatility of the Security. The Basel Committee on Banking Supervision (BCBS) issued in April 1993 a consultative document (BCBS11 (a)) that proposed to introduce a capital charge for market risk in all positions, both on and off-balance sheet investments. This was the logical and anticipated extension of the 1988 Accord whose credit risk focus invariably also included situations where the risk of default was driven by market risk. Thus, the 1993 proposal not only extended the financial risks covered by the supervisory framework but also established some separation at three levels which include (i) in the oversight of credit and market risks, (ii) between specific and general market risk and (iii) between the trading book and the regular banking book. For the general market risk component, the BCBS introduced its "building block approach" which essentially allowed for the direct summation of risk charges from separate components. After a relative short period of discussions, the proposal was formalized by BCBS in January 1996. Effective end of 1997, market risk supervision was incorporated into the 1988 Accord. The specification of the model is fairly straightforward. There are 13 to 15 maturity bands which have been pre-defined. The financial institution (FI) measures the remaining term for each security it maintains a position and slots these positions into the pre-defined time bands. The total capital charge for market risk exposure under Basel II is the sum of the aggregate capital charge for equity exposures, the aggregate capital charge for foreign currency exposures, and the aggregate capital charge for interest rate exposures for all currencies.

b. Internal Model Approach

Internal Model Approach can be defined as an approach developed by banks to analyze the overall risk position, to quantify risks and to determine the capital required to meet those risks. Value at Risk uses asset

return distribution and predicted return parameters to estimate potential losses. The BCBS has set probability equal to 1% and time period equal to 10 days. In contrast the Internal Model Approach uses 5% level of significance and takes into account a considerable amount of time. There are various methods for internal model approach which are used which include (i) Stress testing which represents a risk management tool used to evaluate the potential impact on a bank (or a group of entities) of a specific event and / or movement in a set of financial. The stress tests permit a forward-looking analysis and a uniform approach to identifying potential risks, generated by exceptional but plausible shocks, to individual institutions, but also to the banking system as a whole. Banks perform stress tests for their internal needs in order to identify reaction of sectors to extreme events; assess the sensitivity of credit factors and approaches to extreme events in order to ensure appropriateness; identify “hidden” correlations within portfolio; support portfolio allocations decisions and strategy beyond normal current conditions; evaluate potential capital requirements under possible future credit environments; and identify benchmarks to create some awareness of the current market situation, (ii) correlation Analysis, in which going to analyze how much the change in one variable like interest rate is going to affect the other like outcome (profit). Whether the variables are highly co related or not and accordingly taking decisions, (iii) external validation which includes Validation of models’ accuracy by external auditors and/or supervisory authorities should at a minimum include verifying the internal validation processes formulae used in the calculation process as well as for the pricing of options and other complex instruments are validated by a qualified unit - independent from the trading area. Structure of internal models is adequate with respect to the bank’s activities and geographical coverage results of the banks’ back-testing of its internal measurement system data flows, (iii) back testing which is a Statistical testing that consist of checking whether actual trading losses are in line with the VAR forecasts. The Basle back testing framework consists in recording daily exception of the 99% VAR over the last year. Even though capital requirements are based on 10 days VAR, back testing uses a daily interval, which entails more observations. On average, one would expect 1% of 250 or 2.5 instances of exceptions over the last year. Too many exceptions indicate that either the model is understating VAR the Bank is unlucky and (iv) most importantly Value at Risk which we are going to analyze the maximum amount we are likely to lose over some period, at a specific confidence level. VaR is the Risk Metrics system developed by JP Morgan. According to industry legend, this system is said to have originated when the chairman of JP Morgan, Dennis Weatherstone, asked his staff to give him a daily one-page report indicating risk and potential losses over the next 24 hours, across the bank’s entire trading portfolio. The measure used was value at risk (or VaR), or the maximum likely loss over the next trading day, the VaR was estimated from a system based on standard portfolio theory, using estimates of the standard deviations and correlations between the returns to different traded instruments. While the theory was straightforward, making this system operational involved a huge amount of work: measurement conventions had to be chosen, data sets constructed, statistical assumptions agreed, procedures determined to estimate volatilities and correlations, computing systems established to carry out estimations, and many other practical problems resolved. Developing this methodology took a long time, but by around 1990, the main elements—the data systems, the risk measurement methodology, and the basic mechanics—were all in place and working reasonably well.

The VaR figure has two important characteristics. The first is that it provides a common consistent measure of risk across different positions and risk factors. It enables us to measure the risk associated with a fixed-income position, say, in a way that is comparable to and consistent with a measure of the risk associated with equity positions. VaR provides us with a common risk yardstick, and this yardstick makes it possible for institutions to manage their risks in new ways that were not possible before. The other characteristic of VaR is that it takes account of the correlations between different risk factors. If two risks offset each other, the VaR allows for this offset and tells us that the overall risk is fairly low. If the same two risks don’t offset each other, the VaR takes this into account as well and gives us a higher risk estimate. Clearly, a risk measure that accounts for correlations is essential if we are to be able to handle portfolio risks in a statistically meaningful way.

III. Need for Study

Market risk management gains its importance due to the various factors because it, (i) provides senior management with information on the risk exposure taken by traders. This risk exposure can then be compared to the capital resources of the Financial Institutions, (ii) helps in measuring the market risk of traders' portfolios, which will allow the establishment of economically logical position limits per trader in each area of trading, (iii) compares returns to market risks in different areas of trading, which may allow the identification of areas with the greatest potential return per unit of risk into which more capital and resources can be directed, (iv) calculates the return-risk ratio of traders, which may allow a more rational evaluation of traders and a fair bonus system to be put in place, and (v) sets up the private sector benchmarks against the overpriced benchmarks of regulators (Mathews and Thompson 2008).

IV. Objectives of Study

The main objectives of the study include:

1. Understanding the different types of Market Risks faced by the banks.
2. Evaluating what are the different tools which are used to evaluate the market risk of the banks.
3. Evaluating the difference between the Internal Model approach and the Standard approach to account for market risk.
4. How Historical Value at Risk (HVaR) is different from Standard approach assigned under BASEL norms.

V. Research Methodology

5.1 Data and Sample Size

The data for the study has been collected from the secondary sources. The data regarding the share price of the investing companies has been collected from the official BSE website (*www.bse.com*) on 31st of March 2012. The data has also been collected from other secondary sources like *moneycontrol.com* and others. The data has been collected for nine companies which includes five equity investments and three debt investments. All these companies are taken from the investment portfolio of Jammu and Kashmir Bank. The Jammu and Kashmir Bank invests in both debt and equity securities.

5.2 Research Method

The study uses the VaR (Value at Risk) approach to calculate the maximum amount we are likely to lose over some period, at a specific confidence level. Then a comparison is made between the Standardised approach and Internal Model approach (VaR in this case) to evaluate the difference in the amount we are likely to lose over some period calculated using two different approaches. The various steps to calculate VaR using Historical Simulation include:

1. Suppose we use m days of historical data
2. Let v_i be the value of a variable on day i
3. There are $m-1$ simulation trials
4. The i th trial assumes that the value of the market variable tomorrow (i.e., on day $m+1$) is

$$HSVaR = v_m \frac{v_i}{v_{i-1}}$$

The calculation of VaR has been done using the already inbuilt VaR command in Microsoft Office Excel 2007. The time period to calculate the VaR is taken as 1 year trading period at a confidence level of 5% which will be simulating for the next 10 days. The number of units which Jammu and Kashmir bank have invested is taken as 500.

VI. Results

The study evaluates the data into three different stages. In the first stage all the individual investment companies are evaluated on both Internal Model Approach (which is VaR in this case) and Standardised Approach to identify the amount of capital required to meet market risk. The study revealed that there is a considerable difference in the amount calculated by Standardised approach and Internal Model Approach. Table 1 illustrates the amount which we are going to calculate by VaR approach at 5% level of Confidence and a time period of 225 days.

Table 1. Eroded amount due to volatility calculated by VaR approach

| Company's Name | Price Per Unit | Number of Units | Total Amount invested | Level of Confidence | Standard Deviation | Calculated HSVaR In percentage | Expected Eroded Amount |
|-------------------------------|----------------|-----------------|-----------------------|---------------------|--------------------|--------------------------------|------------------------|
| Bajaj Auto Limited | 1250 | 500 | 625000 | 95% | 1.79% | -2.53% | 15367 |
| Bharti Airtel Limited | 350 | 500 | 175000 | 95% | 2.03% | -3.34% | 5839 |
| Jammu and Kashmir Bank | 750 | 500 | 375000 | 95% | 1.70% | -2.36% | 8883.5 |
| Mahindra and Mahindra Limited | 700 | 500 | 350000 | 95% | 2.02% | -3.164 | 12650.9 |
| Tata Motors Limited | 150 | 500 | 75000 | 95% | 3.05% | -4.31% | 3238.3 |
| Indian Railways Limited | 100 | 500 | 50000 | 95% | 1.38% | -2.40% | 1202.5 |
| National | 100 | 500 | 50000 | 95% | 0.93% | -1.66% | 831.6 |

| | | | | | | | |
|--|-----|-----|-------|-----|-------|--------|--------|
| Housing Bank | | | | | | | |
| Rural Electrification Corporation limited | 100 | 500 | 50000 | 95% | 2.65% | -6.29% | 3149.2 |

Now taking into consideration the Standard Approach which necessities the banks to keep a certain percentage of their Risk Weighted Assets (RWA) as the amount of capital required to meet market risk. In case of Jammu and Kashmir Bank it is 9% of RWA. Table 2 will illustrate the amount which is to be kept to counter market risk according to Standard Approach provided by Basel Committee of Banking Supervision.

Table 2. Amount to be kept as to counter market risk using Standardised Approach

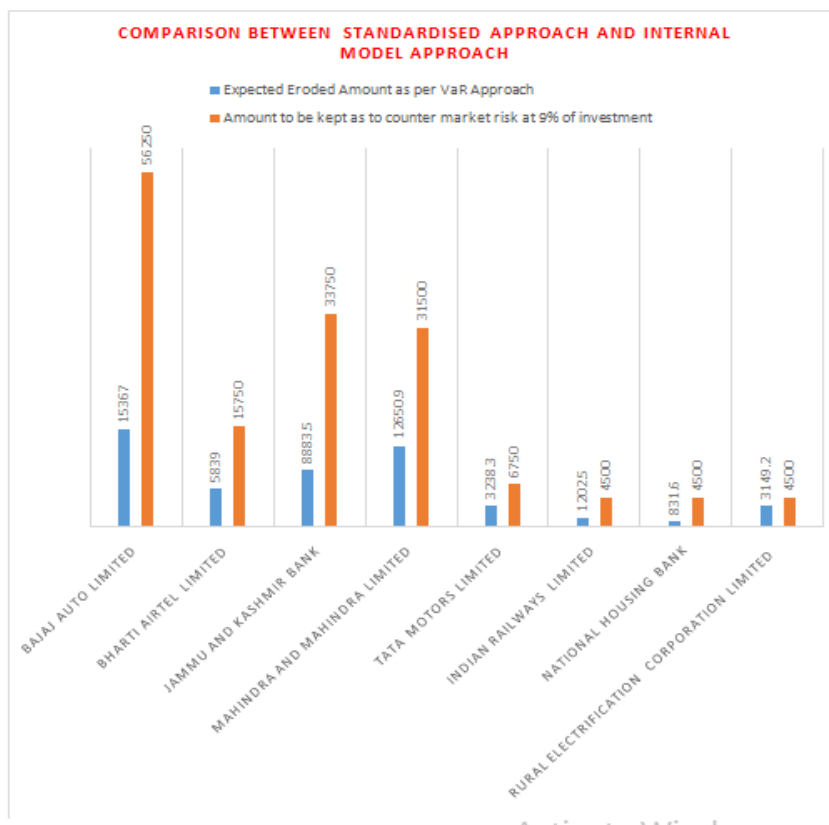
| Company's Name | Price Per Unit | Number of Units | Total Amount invested | Amount to be kept as to counter market risk at 9% of investment |
|--|----------------|-----------------|-----------------------|---|
| Bajaj Auto Limited | 1250 | 500 | 625000 | 56250 |
| Bharti Airtel Limited | 350 | 500 | 175000 | 15750 |
| Jammu and Kashmir Bank | 750 | 500 | 375000 | 33750 |
| Mahindra and Mahindra Limited | 700 | 500 | 350000 | 31500 |
| Tata Motors Limited | 150 | 500 | 75000 | 6750 |
| Indian Railways Limited | 100 | 500 | 50000 | 4500 |
| National Housing Bank | 100 | 500 | 50000 | 4500 |
| Rural Electrification Corporation limited | 100 | 500 | 50000 | 4500 |

Now we will make a comparison between the Internal Model Approach and Standard Approach to identify the amount which we need to keep to counter market risk of our investments in both cases. The comparative difference will be illustrated by table number 3

Table 3. The difference between the Internal Model Approach (VaR) and Standardised Approach.

| Company's Name | Price Per Unit | Number of Units | Total Amount invested | Expected Eroded Amount as per VaR Approach | Amount to be kept as to counter market risk at 9% of investment | Difference |
|--|----------------|-----------------|-----------------------|--|---|------------|
| Bajaj Auto Limited | 1250 | 500 | 625000 | 15367 | 56250 | 40883 |
| Bharti Airtel Limited | 350 | 500 | 175000 | 5839 | 15750 | 9911 |
| Jammu and Kashmir Bank | 750 | 500 | 375000 | 8883.5 | 33750 | 24866.5 |
| Mahindra and Mahindra Limited | 700 | 500 | 350000 | 12650.9 | 31500 | 18849.1 |
| Tata Motors Limited | 150 | 500 | 75000 | 3238.3 | 6750 | 3511.7 |
| Indian Railways Limited | 100 | 500 | 50000 | 1202.5 | 4500 | 3297.5 |
| National Housing Bank | 100 | 500 | 50000 | 831.6 | 4500 | 3668.4 |
| Rural Electrification Corporation limited | 100 | 500 | 50000 | 3149.2 | 4500 | 1350.8 |

It becomes evident from the table that the Standardised approach exaggerates the amount which we have to keep as to counter against the market risk. Since the difference is very huge. On the other hand VaR (Internal Model Approach) takes into consideration the volatility of the stock in the past trading year and on the basis of standard deviation it determines the amount that we have to keep to counter the market risk of our investment. There is very high correlation between the standard deviation of the stock and its HSVaR value. The difference can be clearly demarcated from the following graph,



The graph clearly shows that there is a considerable difference between the two approaches. Considering the total amount we have invested in these 8 investments Rs 175000 we have to keep Rs 157500 according to Standardised approach to counter the market risk. On the other hand if we use Internal Model Approach we have to keep a mere amount of Rs 51162 only to counter the market risk of all these investments. So we can say that VaR is a much more advanced technique which gives us the amount we need to keep against the market risk on the basis of volatility not any fixed vague model. Its calculated amount differs with the volatility of the stock. The more volatile a stock is the more is the amount that we have to keep to counter market risk.

VII. Conclusion

As with other forms of risk, the potential loss amount due to market risk may be measured in a number of ways or conventions. The two basic approaches are Standardised Approach and Internal Model Approach. The standard approach assumes a certain percentage of investment need to be kept as amount to counter market risk and Internal Model approach uses techniques and tools to analyze the same. The Historical Simulation approach one of the Internal Model Approaches to calculating Value at Risk also assumes that historical correlations are stable and will not change in the future or breakdown under times of market stress. In addition, care has to be taken regarding the intervening cash flow, embedded options, changes in floating rate interest rates of the financial positions in the portfolio. They cannot be ignored if their impact can be large. The VaR gives us the amount on the basis of volatility and not on any other basis. So the Internal Model approach can be a better tool to analyze the amount we need to keep as to counter the market risk. In short, VaR can help provide for a more consistent and integrated approach to the management of different risks, leading also to greater risk transparency and disclosure, and better strategic management.

VIII. Implications and Future Directions of the Study

There are wide implications of the study which include:

1. Senior management can use it to set their overall risk target, and from that determine risk targets and position limits down the line. If they want the firm to increase its risks, they would increase the overall VaR target, and vice versa.
2. Can be used to determine capital requirements at firm level and also right down the line, to the level of the individual investment decision: the riskier the activity, the higher the VaR and the greater the capital requirement.

3. VaR can be very useful for reporting and disclosing purposes, and firms increasingly make a point of reporting VaR information in their annual reports.
4. Can be used as information to assess the risks of different investment opportunities before decisions are made. VaR based decision rules can guide investment, hedging and trading decisions, and do so taking account of the implications of alternative choices for the portfolio risk as a whole. VaR information can be used to implement portfolio-wide hedging strategies that are otherwise rarely possible.
5. Can be used to provide information for new remuneration rules for traders, managers and other employees that take account of the risks they take, and so discourage the excessive risk-taking that occurs when employees are rewarded on the basis of profits alone, without any reference to the risks they took to get those profits. The future directions of the study include increasing the sample size and most importantly the companies taken here are all those companies where the amount to be kept to counter market risk has been exaggerated and in future studies we can look for few companies where the amount should have been underestimated also. That will strengthen the findings more evidently.

References

- [1] Black, F. & M. Scholes (1973). The Pricing of Options and Corporate Liabilities. *Journal of Political Economy*, 81, 637-59.
- [2] Cox, J. C., S. A. Ross, and M. Rubinstein (1979). Option Pricing a Simplified Approach. *Journal of Financial Economics*, 7, 229-63
- [3] Fischer Black, Myron Scholes (1973) "The Pricing of Options and Corporate Liabilities," *Journal of Political Economy*, 72, 229-246.
- [4] Islam, A. U., 2014. Impact of Armed Conflict on Economy and Tourism: A Study of State of Jammu and Kashmir. *IOSR Journal of Economics and Finance (IOSR-JEF)*, 4(6). pp. 55-60.
- [5] Islam, A. U. (in press). Corporate Governance Performance of publicly Listed Companies in India: A Cross-Sectional industry Analysis of BSE 200. *International Journal of Corporate Governance*.
- [6] Islam, A. U. and Dar, A. A., 2016. The Stock That Outperforms Not Only Minds but Also Markets: The Marijuana Stock. *Funoon: An International Journal of Multidisciplinary Research*, 2(1).
- [7] Robert C Merton (1973) "Theory of Rational Option Pricing," *Bell Journal of Economics and Management Science*, 4, 141-183.
- [8] Rangarajan K Sundaram (1997) "Equivalent Martingale Measures and Risk – Neutral Pricing: An Expository Note," *The Journal of Derivatives*, 7, 22-3.
- [9] R Engle (2001) "GARCH 101: The use of ARCH and GARCH Models in Applied Econometrics," *Journal of Economic Perspectives*, 15, 157-168.
- [10] Robert F Bruner, Sean D Carr (2007) "Lessons from the financial crisis of 1907," *Journal of Applied Corporate Finance*, 5, 34-42.
- [11] Philippe Jorion (2007) "Value at Risk – The new benchmark for managing financial risk," *McGraw Hill*.
- [12] Mark Zandy (2009) "Financial Shock: A 3600 look at the subprime mortgage implosion and how to avoid the next financial crisis," *Financial Times Press*.