

An Overall Analysis of Risk and Risk Mane

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Abstract. The study reviews systematic risk and nonsystematic risk, comparing their distinct characteristics and introducing strategies for the minimization of risks, proposing potential solution and alternatives to the limitations of existing methods such as the simple duration concept. This paper aims to enrich the literature on risk and risk management and provide implications for firms on the topic of risk and risk management, ligaturing these strategies and processes with potential risks firms will face, thus regarding enterprise risk management strategies.

Keywords: Risk management, systematic/Non-systematic risk.

1. Introduction

With the development of society, more and more potential risks have been appearing. The \$50 million worth of damage in 1960s lead to large demand for the employment of risk managers to provide considerations and suggestions for strategic plans and emphasize the importance of understanding risks. These risks have a negative impact on profitability and cash flow, which could be devastating to the industry at some unspecified date in the future. The worse news is that market uncertainty and the company's own line management practices are becoming increasingly useless and unrealistic. In other word how to deal with potential threats and emergencies gradually become the scope of all companies need to consider, and take effective measures.

The paper can be organized in following 2 sections : Section 2 introduces two major risks are presented in turn with their respective solutions and case studies. Section 3 is the process of risk management and listing the diverse ways in risk management with providing case study. In this way, this research paper provide better understanding of the relationship between them and the market and maximize the interests of the company or the single industry and multi-industry portfolio invested by investors, so as to ensure high returns at the lowest possible cost and maintain competitive advantages and good development trends. Keeping up with market changes has become an important part of the word risk, which not only requires breaking the limitations of risk management policies, but also requires a lot of investigation and research to summarize a simple and concise plan, and more factors will be taken into account.

2. Types Of Risks

2.1 Systematic Risk

There are 2 types of risks in finance, which are systematic risk and non-systematic risk. First of all, systematic risk is also defined as “market risk” and “undiversifiable risk”, it is the risk that can influence the whole asset and even cannot be reduce by investing in “asset portfolio”[1]. Systematic Risks are everywhere. From the financial risks of 1970s, making more recognize it as a significant source of dubiety for firms to the recent raising of interest rate from the Federal Reserve [2]. Another example would be the relationship between gold futures and real interest rates in the G7 countries of them are influence by the risks that influence the market portfolio, market portfolio is the theoretical portfolio of all companies and asset classes basically just means that all companies together, such as inflation, natural disaster, and war [3]. So the systematic risk is what is going to be used to determine

the risk of a firm when investors are thinking about what is the cost of equity capital and what kind of risk premium do investors want for investing in an asset or multiple assets.

2.1.1 Beta

Beta is measure of systematic risk and it is the percentage change in an assets return or the stocks return. Such as a firm's stock return, Assuming the percentage change given 1 percent change in a market portfolio, Imagine this market portfolio increase 1 percent or goes down 1 percent what will happens is that to a company's return how tied in is company's return to common market conditions and by virtual of doing that it is to show how much systematic risk that an asset has, the only one thing need to care about is the systematic risk because the other one which is the specific risk that can be averaging out by adding more number of asset. Beta means sensitivity of company's return to the return of the market . This can refers to CAPM model [4].

There are different situation in beta, as we know that the beta of market portfolio is 1, The number is the standard line, then there are got 4 situations. The company which have the beta bigger than 1 this refers to the company that has less systematic risk than average firm. On the other hand the company which have beta smaller than in between 0 to 1 have less systematic risk than market portfolio. if there is the beta of zero which means a firm that does not have systematic risk also means it does not react with to any market portfolio change, and also it is possible to have negative number of beta, this is getting extremely confusing, This essentially means that a business has a negative risk premium and the return of the business is below the risk-free rate and the question is why an investor choose to invest in something that has return that is less than the risk-free rate investors can choose to get higher percent risk free, why they choose to investing something with return below the 0. The reason is that a negative beta can Stable fluctuations for when the market goes bad. Therefore as an investor adding the asset like that to their portfolio as an insurance in case they big up and down in market, but these 2 situations are very rare. Beta is calculate by following formula

$$\beta_s = E(rs) - rf / E(rm) - rf. \quad (1)$$

Rf= Risk free rate

E(Rm)=Expected return from the market

E(Rs)=Expected return from own investment

Bs=Beta for the investment

As an example, The beta value for company apple, assuming that expected return from market portfolio for company apple is 8%, and risk-free return of 2% then expense ratio of 0.18%. The expected return of company is equal to the expected return of the company apple(8%), minus the expense ratio for 0.18%, which equals 7.82%. Putting those data into beta formula, then getting the Beta = (7.82%-2.00%)/(8.00%-2.00%) = 0.97.

As the result of 0.97, when the market goes up 10% next year, company apple rise 19.4%, on the other hand when Market portfolio reduce 9.7%, company apple will to fall 10.3% with expense ratio.

2.1.2 Pestle Analysis

Another attempt to minimize and predict the systematic risk is via the pestle analysis. The word "PESTLE" is stands for respectively as: political, Economy, Social, Technology, Legal, and Environmental. Generally speaking this is to helping investors to getting familiar with environmental business and potential risks and then analysis situations with those 6 aspects.

The combination of Pestle analysis and Ansoff Matrix[5] . Ansoff matrix is very useful when in term of evaluating the risk from a macro point of view, to the whole market. On the other hand pestle analysis is to determine the potential risk leading by one or more in these 6 kinds of factors. This combination greatly increase the chance of succeed.

Such as Walmart supermarket and Auchan in China, these 2 international company choose to settle in China for enormous profits they can earn. At same time When a company trying to sell its product internationally, the likelihood of failure is huge as there is a culture shock. It very important to doing research on primary market and secondary market, the successful example of this are Starbucks sell

their own version of Chinese traditional festival food, this need supported by large and hard supply chain and be familiar with local market, With the rapid development of China's food delivery industry. It becomes a tough choice between real services and the cloud service. This phenomenon best describe the combination of Ansoff matrix and Pestle analysis I terms of market development and technological factor.

2.2 Nonsystematic Risk

Apart from systematic risks, the other type of risk is defined as “nonsystematic risk”. Prior to laying out the different types of non-systematic risks, it is necessary to have an understanding of what the term means. It can be commonly spotted in our daily life. Non-systematic risks has been continuously swaying countless industries. Unlike systematic risks, non-systematic risk, also known as idiosyncratic risks, does not refer to the entire market but is instead specific to a company or industry. It is one industry or company’s specific risk inherent in all investment related to it. This specific risk can be caused by countless factors and can be summarized into two main areas: Business risk refers to the external and internal issues of a certain firm. This includes entrepreneurial which associates with resource management within a company and entrepreneurial judgements, capital structure, operations, strategic decisions etc. On the other hand, legal and political risks refer to the forced changes firms experience due to governments. For instance, if company A relies greatly on an ingredient which is now banned by the government due to environmental issues, it was cause a large drop in their stock values.

2.2.1 Diversification

Although it is impossible to anticipate all sources and future unsystematic risk, this type of risk can be minimized through the process of diversification, thus we say that it is “diversifiable”. When an investor invests in contrasting fields, allocating investments across different categories, it will help to eliminate impacts from sudden events. For instance, if we use a portfolio that is only invested in airline stocks, in 2020 when Covid was on the rise, airlines continuously stopping would have caused a substantial drop in the overall portfolio value.

However, if we invested in delivery stocks at the same time, these decrease in values could be counterbalanced as more and more resorted to online shopping and ordering during lockdown and extreme pandemic periods. This defensive position of investing might not guarantee maximum profit for the short run but accomplishes the purpose of minimizing risks from fluctuations in a particular sector. The concept of diversification can be applied to many cases including: “diversification across countries; across sectors; across companies and etc.”. This strategy is especially vital for investors who are not as risk-tolerant as others, perhaps wholly replying on the portfolio for a living, as this will enable the portfolio to increase the risk-adjected returns. Therefore forming diversified portfolios will be able to allow investors to reduce non-systematic risks. It is an idea that the U.S. securities and Exchange commission publicly promotes, outlining its importance [6]. However, limitations also exists. A large number of investments may lead to potential economic burden for the investor, many argues that an optimal diversification can only be achieved with more than 15, 20 or even stocks spread across various sectors, hence requiring a relatively large amount of capital whilst demanding additional management as well.

3. Risk Management

The importance of risk management introduced in the Risk Management Guide for Information Technology Systems by Stoneburner et al. recommended by the National Institue of Standards and Technology can be applied to businesses and other institutes[7]. In the overview of risk management mmethodology, it outlines that risk management comprises of three principle processes: risk assessment, risk mitigation and evauluations[8]. Similar to IT systems, Risk management is crucial, allowing firm managers to protect the firm, althoughtIT systems aims to achive IT security, and businesses aims to minimize their volatility, it is, in practice, comparable concepts.

Whether it's a small business or a multinational corporation, there are several common challenges and risks that can be as result of greatly harmful to the project. A good sense of risk can help investor in different way to better figure out trade-offs, opportunities to reach with different investment approaches. In finance risk management is to analyze the mitigation uncertainty and acceptance or more aspects in investment decision. By predicting the impact of potential risks on the company and the market, and considering the investment purpose and risk tolerance, the solution is finally summarized. This is the time when risk management needs to be used.

There are several risk management process, five necessary steps in risk management process have to be counted[9]. The first step is means to identifying the risk that appear in the business environmental situation, it be defined as legal risks, environmental risks, market risks which is systematic risks, The more risks are identified, the more risk rates are reduced, So it's good to identify as many risks as possible.

The second step is analyzing those risks that are identified, First of all, a risk analysis team will analyze a risk, consider the probability of the risk occurring and decide what to focus on first, and what will be the consequences of such a risk if it occurs.

Next is the prioritized risk. After starting with the analysis risk step, rank each risk by breaking down its likelihood of occurrence and potential impact on the project. This step gives a comprehensive view of the project at hand and clarifies the focus of the team.

After ranking the risks company need develop their own treatment plan. Starting with the most effective risk the team with either solving or at least reducing the risk so it is no longer a risk anymore. It should be noted that in the process of dealing with individual risks, the resources of the team should be used very carefully to avoid the negative impact of the project on the project. This step also brings new solutions to past projects.

The last step is to continuously monitor the pro-risk, which is a continuous study to ensure that the communication between the team and the shareholders is transparent, and to take contingency measures when the potential risk becomes large

The case study in “Tesla”, this is a company for designing, developing, manufacturing high performing e-vehicles[10]. There is no doubt that Tesla has supply chain risks and technological risks such as price volatility and cyber security, there are 3 main reasons to illustrating this idea. First of all modern vehicles provide larger opportunity to hacker to access to the company system, secondly new system allow consumers to upgrading system regularly this is vulnerable to hacker, thirdly the information for individuals or company in the data base are not safe and private, the solution for this more investment in employee training to improve better data security. For the risk from International business and market risk, Setting up more subsidiaries to deal with these risks can help us get solutions in a faster and more timely manner, which greatly reduces the damage to the interests of the main company. In terms of cost, a technology company needs to be able to produce renewable power, which is good for the environment, good for the reputation of the company, and it also reduces the amount of money spent on the cost.

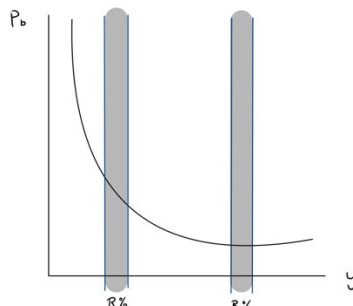
3.1 Macaulay Duration + Modified duration

The Macaulay duration concept is often recognized as the most fundamental method for duration calculations. It is the weight average of the maturity of individual cashflows, with the weights being proportional to their present values. This concept was first introduced by Frederick Macaulay and can be illustrated by the following formula

$$D = \sum_t t \left(\frac{PV(CF_t)}{P} \right) \quad (2)$$

When applied to zero coupon bond, the duration always corresponds to its maturity. The formula suggests that the higher the duration, the higher the price change of a bond given a change in market interest rates, ceteris paribus for all other factors, thus more exposed to interest rate risk, experiencing a larger decrease when interest rate rises. This is rather uncomplicated and plain for understanding.

However, it still contains limitations that seem inherent in itself. The duration concept does not recognize time sensitivity about price changes, hence meaning that it would fail to recognize the difference in price change for high and low interest rate environments. This limitation can be made apparent in the following graph:



As shown in the graph, the region on the left will experience a large change in price to do steeper gradient. This fact is not captured by the duration, meaning that it fails to differentiate between price change for high and low interest rate environment.

Modified Duration elaborates on the Macaulay formula. It is a more accurate measurement of price sensitivity. Demonstrating the effect of a change in interest rate by its price sensitivity, i.e. the relative price change with respect to a change in yield.

$$MD = -\frac{1}{P} \frac{\partial P}{\partial y} = \frac{1}{1+y} \sum t \frac{PV(CF_t)}{P} \quad (3)$$

Despite that it provides a solution for the issues regarding price sensitivity in the Macaulay duration concept, the Modified duration concept determines the portfolio using current market data, resulting in repeated recalculations and rebalancing of the portfolio, as market changes via time.

3.2 Effective Duration

Effective duration does not necessarily provide solution for the limitations of the duration concept and modified duration concept, but is more helpful in special situations when analyzation of the sensitivity of hybrid instruments, including embedded options, to the interest rate is required. Hence, it could be argued that the effective duration concept provides investors and firms with the most comprehensive measure of duration; best used when valuing bonds with embedded options, with not well defined internal rates of return or yield to maturity.

The Effective Duration concept is a measure of duration for bonds that considers fluctuations in the bond's price relative to changes in the bond's yield to maturity by recognizing that as the interest changes, the embedded options may be exercised by the bond issuer or investor, thus causing a change to the cash flows and duration and uncertainties. In simpler words, it takes into account possible up and downs in the expected cash flows of a bond. It is calculated by the following formula:

$$\text{Effective Duration} = \frac{PV_- - PV_+}{2 * \Delta \text{yield} * PV_0} \quad (4)$$

PV₀: price of bond at time 0 (current price)

PV₋: price of bond immediately before the change in yield
(PV of cashflows when the yield goes down parallelly)

PV₊: price of bond immediately after the change in yield
(PV of cashflows when the yield goes up parallelly)

ΔCurve : Amount of parallel shift in the yield curve

As an example, if an investor purchases a bond for 100% nominal value of the share, and that the bond is currently yielding 11%. With a 20 basis point change in yield, it is predicted that the price after shifting down the benchmark yield curve by 20bps will be \$100, the the price after shifting up the benchmark yield curve by 20bps will be \$95.

$$\frac{100 - 98}{2 * 100 * 0.002} = 5 \quad (5)$$

In this example, the result of 5 indicates that a 100 basis point (1%) change in the yield would be expected to change the price of the bond by approximately 5%.

Nevertheless, this duration method includes limitations that all duration methods have: First, It assumes that the market yield remains the same for the entire tenure of the bond. Second, it assume that there will be a parallel shift in market yield, meaning that (definition of parallel shift:) interest rate changes by the same amount for all the maturities. These assumptions are often not the case in real life, thus making these method inaccurate. Regime switching models which will not be detailedly introduced in this essay does address these limitations. Regime switching models are time series models in which parameters are allowed to take on different values in each of the key period basis. It regards that there can be different yields and volatility for different periods of time, dealing with the first assumption. Furthermore, it divides the tenure of bonds into certain key period basis, hence accommodating non parallel yield changes.

4. Conclusion

In conclusion, It is an investor's nature to seek return and avoid risks, since it provides the investor with a deeper understanding and analysis of a particular bond, therefore, understanding these investment's risk is crucial for effective planning for the future course for investment purposes and for businesses. It's ability to empower a company with the capability to handle potential negative impacts from various events in the life of a business by identifying, responding and developed preventive mechanics; and eliminate the likelihood of the occurrence by assessing and analyzing different risks, dealing with different risk in the order of its priority as analyzed, is not to be discounted. It is a tool that best prepares firms and companies for eventualities, providing them with a higher chance to continue on to their path of becoming a thriving entity. On a more micro scale, it guarantees employees and consumers with a secure workforce and partnership. In fact in Australia, there are clear law stating the legal responsibility of entrepreneurs to ensure safety in the workplace according to their state WHS legislations [11]. A better company's brand image will then be illustrated, sending a positive message to the community, bring back hope, providing everyone from the board of directors to the employees with a promised quality of life. A great example would be when AGL Energy faced coal seam gas protest in 2013, their risk management plan allowed them to respond actively, stating that it is a "low-risk, low emissions, and low-impact industry", putting confident back onto their investors and workers, believing that it is a safe and proactive industry, allowing them to fight over the difficult crisis [12]. Thus why risk management considered a fundamental element of finance and business management.

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