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Stock investment risk: is volatility a good proxy? An alternative long-term approach based on quality

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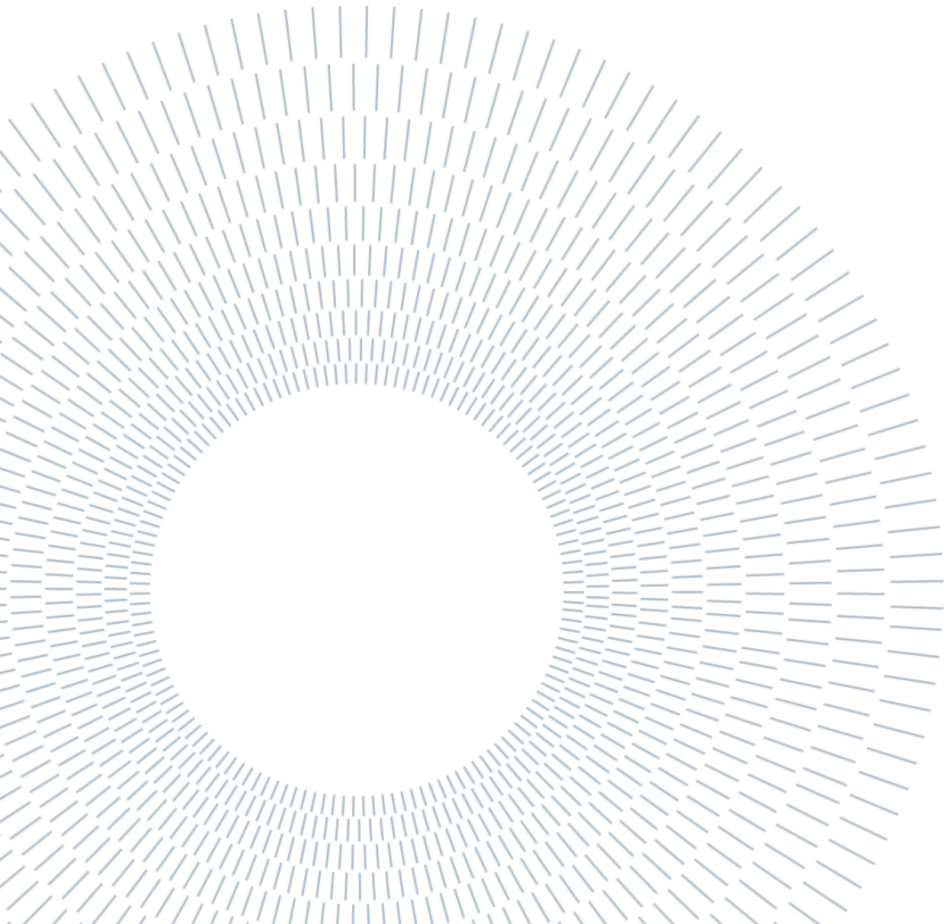


Abstract

Every scientific field is based on theories that try to explain the elements that characterize it. When these theories are well established in the community is difficult to criticize them and approach to a “paradigm shift”. The aim of this thesis is to analyze critically the main notions of the Modern Finance, born during the 50’s, and in particular the linear relationship between risk and return. Moreover, we want to separate the concept of risk from the concept of volatility, stating that this view is reductive and doesn’t consider the real determinants of the risk in equity investing.

The first thematic, in confutation of the CAPM and the efficiency of the market, is supported by different papers from practitioners and researchers like A. James Heins, Rober A. Haugen and Nardin L .Baker. While the second topic considers the creation of a possible new model for evaluating the risk, suited for listed and non-listed companies. Our aim is to employ a blanket procedure that considers a rational observation of the most important elements that determine the success of a company and consequently the actual risk assumed by an investor.

We preferred to keep our process of analysis mostly under a qualitative point of view rather than a numerical one, recognizing obviously the importance that the latter can have (if not overused).

In the end is provided a section that describes how to consider and exploit the volatility.

Key words: risk, volatility, qualitative evaluation, market inefficiency

Abstract in lingua italiana

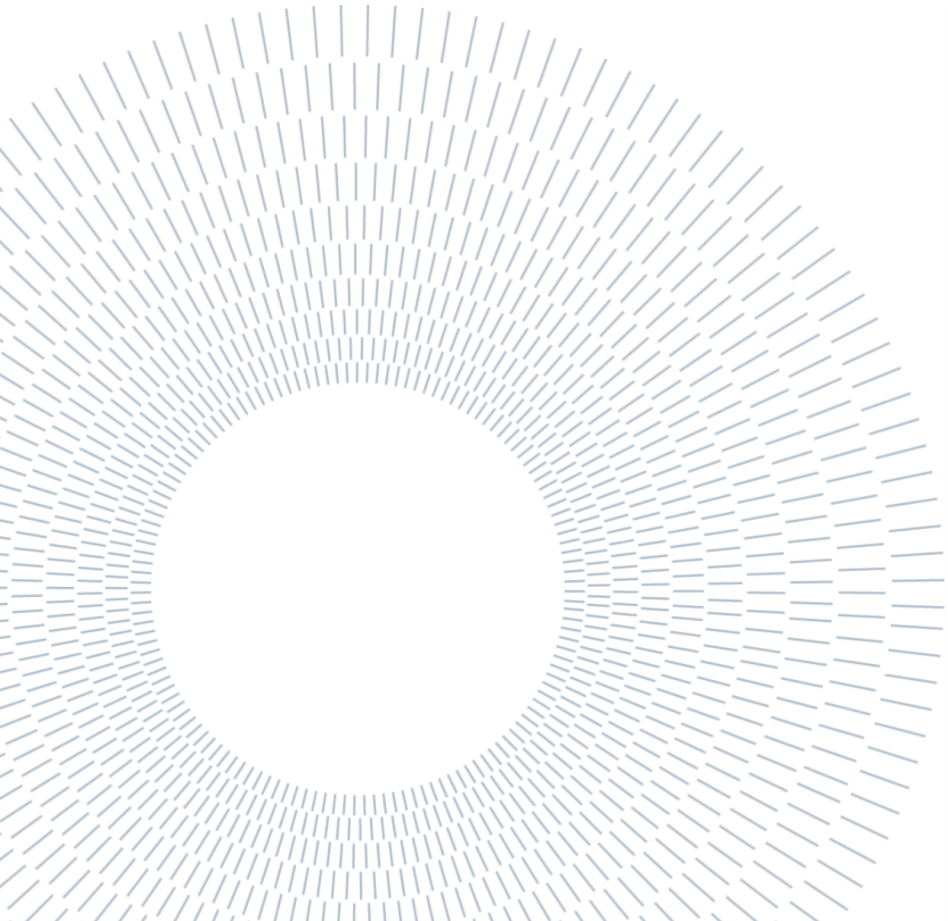
Ogni campo scientifico si basa su teorie che cercano di spiegare gli elementi che lo caratterizzano. Quando queste teorie sono ben consolidate nella comunità è difficile criticarle e avvicinarsi ad un "cambio di paradigma". Lo scopo di questa tesi è analizzare criticamente le principali nozioni della Finanza Moderna, nata durante gli anni '50, e in particolare la relazione lineare tra rischio e rendimento. Inoltre, si vuole separare il concetto di rischio da quello di volatilità, affermando che questa visione è riduttiva e non considera le reali determinanti del rischio nell'investimento azionario.

Il primo tema, che confuta il CAPM e l'efficienza del mercato, è supportato da diversi articoli di professionisti e ricercatori come A. James Heins, Rober A. Haugen e Nardin L. Baker. Mentre il secondo argomento considera la creazione di un possibile nuovo modello di valutazione del rischio, adatto a società quotate e non quotate. Il nostro obiettivo è quello di impiegare una procedura generale che consideri un'osservazione razionale degli elementi più importanti che determinano il successo di un'azienda e di conseguenza il rischio effettivo assunto da un investitore.

Abbiamo preferito mantenere il nostro processo di analisi prevalentemente sotto un punto di vista qualitativo piuttosto che numerico, riconoscendo ovviamente l'importanza che quest'ultimo può avere (se non abusato).

Alla fine viene fornita una sezione che descrive come considerare e sfruttare la volatilità.

Parole chiave: rischio, volatilità, valutazione qualitativa, inefficienza del mercato



Contents

Introduction

How we define the investment risk associated with the purchase and holding of shares of capital

In every field of our life (business, economics, environment, finance, information technology, health, insurance, safety, security etc.), considering that is not possible to foresee and control every variable, is present a component of insecurity

that doesn't guarantee the desired outcome or the success of our actions. This is called "risk" and over the years has been strongly debated on how to define and manage it in a proper way. The process of assessment is usually characterized by three main steps:

1. Identification of the sources, events, causes and potential consequences of risk
2. Analysis of the previous elements and definition of a level of risk
3. Evaluation through a comparison of the identified risks with a scale of measure and subsequently find actions to reduce it.

If we take into consideration the case of the investment risk associated with the purchase and holding of shares of a company, we may notice that describing it only with the volatility/ standard deviation (that represents the variation of an asset return from its historical mean) is quite reductive and does not highlight the real threat at which the stockholders are exposed to.
Sometimes we tend to explain the risk within not precise boundaries, ending up with a generalized definition that does not analyze in a rationale way the concrete determinants of the risk. Forcing in some cases to find, by any means, a link with mathematical elements. This method could lead to wrong evaluations of the actual level of risk.

A common mistake in its definition is to strictly connect this concept with the term "uncertainty". An interesting distinction can be found from the economist Frank Knight, which attributes "uncertainty" to events for which is not possible to define a probability of occurrence to their outcomes, which are not known. With "risk" he refers to events that can have a probability of occurrence of their outcomes, which are known. So, the risk can be quantifiable, uncertainty not.
Imagine having a box with inside 5 blue balls and 5 red balls. If it is asked to say what are the odds to pick a red ball, the answer will be 50% (5 red balls out of 10 overall balls→ 5/10). Instead, if the number of red and blue balls is unknown, is not possible to say the probability of picking a particular ball.
Considering that the financial markets cannot foresee the future movements of the stocks 'prices, we can conclude that the markets deal with uncertainty. Anyway, there are some elements related to a company or

the industry of belonging that can be measured to determine a possible level of risk for investing in that company.

Another aspect to add is the common knowledge that people give a higher weight for a loss respect the weight given for an equivalent gain. This sentence recalls what Daniel Kahneman (Nobel prize for economy) and Amos Tversky, two important psychologists that came up with the "prospect theory", demonstrated through their experiments that the losses are 2,5 more undesirable in comparison with the desirability for equivalent gains.
This study helps to do a further step: the "risk" should be referred only to negative outcomes while should not evaluate in the same way possible positive and negative results.

If we take the imagine below and we consider that the lines represent the movement of the prices in certain time frame for two different stocks, is possible to say that the stock A has a higher volatility respect the stock B. So according to the concept that higher volatility corresponds to a higher risk, the stock A is considered riskier that B. What is missed by this claim is that both the stocks end at the same level of price. This for saying that what matter for an investor is the loss of capital.

FIGURE 1 RANDOM MOVEMENTS OF TWO STOCK PRICES

Volatility is a natural characteristic on the financial market and is the direct consequence of the stock exchanges' daily opening. Instead, what is against the nature of investors, and from which they try to protect, is losing money. Volatility only tells how the fluctuation of the prices is from one day to another. If for example, the prices do not change (the exchanges are closed, or they open monthly), the volatility should be zero during these periods, but this doesn't mean that the investments are less risky and the possibility to lose money is null. Another case is for the non-listed companies, even if they do not have a price history for the stocks, the component of risk is still present. This for saying that the volatility could be seen as a consequence for a higher perceived risk on a specific asset or market, but it is not a proper measure of risk.
We can identify the volatility as an indicator of the ability of the market to price correctly the value of a stock of a company. Considering that the underlying value (fundamentals) of a company doesn't change so frequently, where there is higher price volatility means the market has harder time to correctly price a stock. This explains why the less volatile stocks belong to firm for which is easier to predict its future prospects.

The correlation between variance and risk could be indicative, even if not precise, when the distribution of the returns is symmetric. This latter shows, with the same probability, possible positive results, and negative ones. Consequently, higher is the standard deviation, wider are the returns, higher could be the probability to have losses. But questions raise. Knowing that the stock fluctuated a lot from its average value, does it tell that will do the same in the future? It will move positively or negatively respect the mean?
How often the distribution of the returns is symmetric? Past returns tell something about the future ones? Higher risk means higher returns?
The following two extreme examples can further emphasize the previous doubts, highlighting some points of weaknesses:

a) Giving the same weight to positive and negative outcomes, a person could evaluate indifferently two opposite situations from the point of view of risk.

	Monthly returns												Volatility
Fond B	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	0,0%
Fond C	0,5%	0,5%	0,5%	0,5%	0,5%	0,5%	0,5%	0,5%	0,5%	0,5%	0,5%	0,5%	0,0%

TABLE 1 MONTHLY RETURNS COMPARED TO VOLATILITY FOR TWO FUNDS (B-C)

b) If a risk adverse person, relying his assumptions on the Modern Portfolio Theory basis, should decide in which fund invest, would choose the fund B. It has 0% of volatility and so it appears less risky than fund A.

	Monthly returns												Volatility
Fond A	1,0%	2,0%	0,2%	6,0%	0,4%	2,0%	0,5%	2,0%	3,0%	0,6%	0,8%	1,9%	5,6%
Fond B	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	0,0%

TABLE 2 MONTHLY RETURNS COMPARED TO VOLATILITY FOR TWO FUNDS (A-B)

On the contrary, there are many other factors to look at when you want to evaluate the possible future development and success of a business and consequently the returns for an investor.
A correct way of approaching risk, should be to check and evaluate the variables that affect the returns for an investor, and on the analysis of the trend of these variables, identify the risk.

Introducing briefly what will be explained afterwards more in detail, the two main components of risk for an investor are the quality of the business and the price at which you are paying the shares. The first element will be divided in different factors to be better described.

When we talk about “investing”, we mean betting on a company for a long-term period, basing on concrete judgement. In daily life, if you want to test the value of some actions, you should give time that those actions have an impact. The same in the financial field, in order to see the rightfulness of the dictions that you have taken, you should see the impact on different economic cycles. In the short term there are too many unexpected variables that can affect the result.

This for saying that there is no other way to see an investment, so we are not considering investments in short terms like speculation (that is far away from the concept of choosing a company for its underlying value and in which instead the volatility is a potential element of concern for the investor, as will be described in the final section).

Suppose the price of a stock goes up 10 percent in one month, 5 percent the next, and 15 percent in the third month. The standard deviation would be five with a return of 32.8

percent. Compare this to a stock that declines 15 percent three months in a row. The standard deviation would be zero with a loss of 38.6 percent. An investor holding the falling stock might find solace knowing that the loss was incurred completely “risk-free.”

Superseded theories

Nowadays, the risk an investor is going to face investing in stock markets is assessed using the volatility of past stock market prices, measured through the standard deviation. But is this the most correct way? For decades, this risk assessment method has been thought in universities and employed by professional investors all over the world. Our intention in this work is to provide an alternative method to assess the level of risk an investor is going to face in investing in stocks in financial markets. To pursue our objective, we need you to read this work imagining that you do not know what you have been thought in the past about financial investments and we would like to ask you to try to follow our reasoning and to see if it makes sense. Why are we asking you this effort? We support the Thomas Samuel Kuhn vision[1]. In his 1962 book, "The Structure of Scientific Revolutions" he introduced a new style of philosophy of development of science. He stated that sciences undergo periods of stable growth until a so called "paradigm shift" occurs. A paradigm is a generally recognized scientific achievement that serves as a model problem and solution for a community of practitioners for a period of time. Scientists accept the dominant paradigm until anomalies emerge and new theories are developed, challenging the dominant paradigm, and eventually becoming the new accepted ones. When a new paradigm is accepted, the replaced one is defined as "superseded theory." There many examples of superseded theories over the history, concerning different scientific disciplines. We would like to present you three of them to get the point.

Eclectic medicine

The first we want to address is the eclectic medicine[2]. It was a popular branch of medicine, especially in America during the latter and first half of respectively 19th and 20th centuries. The theory was born as an alternative to the Standard medicine practices, which made use of mercury-based remedies, and was an extension of the earlier herbal medicine American traditions. Eclectic medicine promoted the use of botanical remedies combined with physical therapies. Numerous were the Eclectic Medical Schools opened in USA during those years that continued to operate until Abraham Flexner published in 1910 the "Flexnert Report". The work was commissioned by a council which was part of the American Medical Association. Flexnert Report strongly criticised eclectic medicine practices, raising doubts on their scientific validity. Consequently, Eclectic Medicine Schools started to close and the last one was closed in Cincinnati in 1939.

[1] https://www.simplypsychology.org/Kuhn-Paradigm.html
[2] https://en.wikipedia.org/wiki/Eclectic_medicine

Homeopathy

The second superseded theory we want to present is related to the Eclectic Medicine and always concern the med-environment: the "Homeopathy[3]". It was born in 1796 with Samuel Hahnemann as an alternative to mainstream medicine of the late 18th century. Homeopaths believed in the "similar similibus curentur" doctrine, according to which a substance that in healthy people causes symptoms of disease can cure the same symptoms in sick people. These substances were diluted repeatedly, until substance and diluent were not more distinguishable. As for the Eclectic Medicine, numerous homeopathic schools began to be opened all over the world, with the first USA-based one opened in 1935. Homeopathy reached its maximum success during the 19th century, when many homeopathic practices were able to successfully treat diseases where other treatments failed. Regarding the epidemic disease called cholera, the rates of death in homeopathic-based hospital appears to be lower than in conventional one. Despite the success, were many the scientists that criticised Homeopathy that started to wane by the end of the century, with the last exclusive-homeopathic school in USA closed in 1920. Despite, the criticism, homeopathic practices made a strong come back in the 70', probably due to an increase in population of the chemo-phobia: an "irrational" preference of natural product. It is with the beginning of the 21st century and with the combination of statistical analysis coming from different multiple scientific studies that homeopathic practices were proved lacking of scientific evidences, showed to cause the placebo effect, and defined as pseudo-sciences. Consequently, governments funding for homeopathy were recommended to be with-rowed by bodies both at a national and international level. Despite the lack of scientific justifications on the effectiveness of treatment of diseases, homeopathic practices are nowadays still used but considered as unethical by the medical bodies.

Contraction Theory

The third and last superseded theories we want to present is instead related to the geology discipline: the "contraction theory[4]". It was the dominant paradigm used by geologist to explain how mountains were formed as well as earthquake and volcanos' activities causes. The theory, developed by James Dwight Dana known also as "global cooling," suggested that Earth had been in a molten state and that mountains and other features formed because of the cooling and shrinking of the Earth. To better get the idea we can refer to the words of Benjamin Jordan, an associate professor of physical sciences at the Brigham Young University of Hawaii. He stated that the phenomenon is like "*having an orange that starts to dry out over time and the surface became wrinkled. The Earth was also brittle so in addition to wrinkling, forming mountains and valleys, it was also cracking and breaking and creating faults and earthquakes."* In the beginning of the 20th century, a new theory came up. In 1912, Alfred Wegener, started working at his book "The Origin of

[3] https://en.wikipedia.org/wiki/Homeopathy
[4] https://www.insidescience.org/news/scientific-consensus-almost-never-wrong-%E2%80%94-almost, https://en.wikipedia.org/wiki/Geophysical_global_cooling

Continents and Oceans", published in 1915. The work describes the so called "continental drift" idea, according to which current continents were originally a single land mass (Pangea) which split into many pieces, drifting apart. The concept proposed by Wegener had supporting evidences related to the perfect fitting of sides of different continents, if united together. Moreover, the presence of particular fossil plants distributed in South America, Africa, Antarctica, India, and Australia represented another evidence that these continents were once united. Despite these evidences, Wegener theory was rejected as geologists were sure interior of Earth was solid and continents could not float around. Wegener rejection was also due to his inability to explain from a scientific point of view the mechanism he presented behind his hypothesis. Redemption came in the 50' and 60', when different scientists made many geophysical and geological observation, making continental drift hypothesis feasible. Is in 1965 and 1967 that the "paradigm shift" occurs: a series of paper defined the theory of plate tectonic, builds on the idea of continental drift.

As we have seen, many widely once accepted theories, thought in universities for many years and that were having consensus among scientific communities, revealed years later to be not completely true. Our work is not intended to demonstrate that the risk measurement of a stock financial investment using volatility of historical market price is totally wrong, but rather to provide an alternative view by inserting in the mind of the reader some doubts about the effectiveness of the method. Moreover, we propose an alternative, more qualitative method to address the risk an investor is taking while investing in financial markets.

Ockham's Razor principle

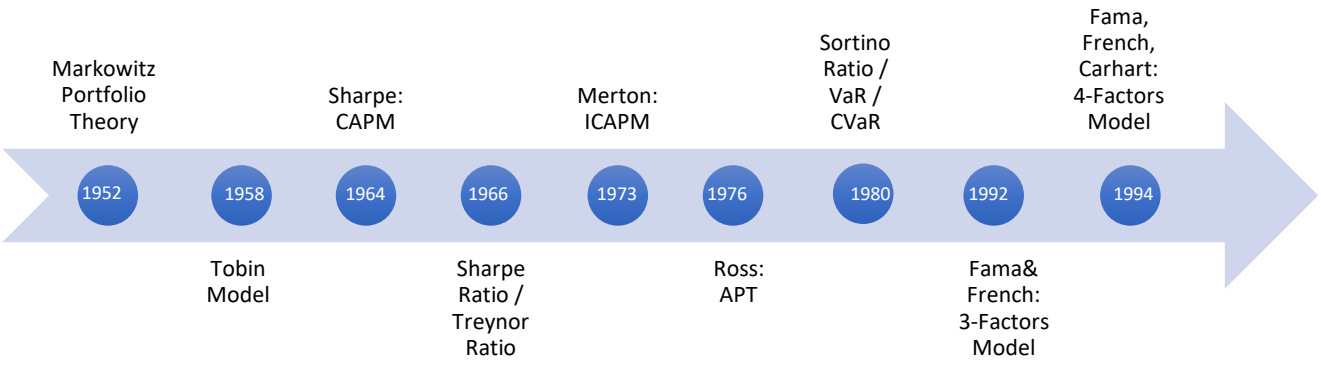
Our main idea is that professional investment funds use the volatility measure using standard deviation to provide mathematical-based information to the investors, to keep them "relaxed and more secure" about the risks they are taking. However, over-modelling of problems could be an issue. Ockham's Razor principle[5], also called as "Occam's Razor" or "law of parsimony" perfect address this idea. The principle was developed by William of Ockham, an influential medieval English Franciscan friar as well as philosopher and nominalist. Ockham in his principle stated: "*entities should not be multiplied beyond necessity*". There could be many complex alternatives explaining the same phenomena. The term "razor" refers to "shaving-away" action of unnecessary assumptions. The principle should be seen as a philosophical tool to be understood in the sense that the most straightforward or simplest explanation for something is the most likely to be sufficient and preferred. This is the idea behind our model: we want to provide the more intuitive and simplest way to address our problem without over-modelling it from a mathematical point of view. Ockham's principle has gained empirical support in helping to converge to better theories: complex models are usually affected by statistical noise, while simpler one can get the underlying structure better. Our goal is to prove that through our model it is possible to address the investment risk as the historical market price volatility does, with less mathematical assumptions, making our model, according to the Razor principle, preferable. Moreover, throughout history of finance, are many the models, like the Capital Asset Price Model (CAPM) and the Markowitz Portfolio Theory that uses standard deviation as assumption to calculate riskiness of an investment. The increasing assumptions on which are based these models increase the statistical noise, affecting the reliability of the results.

[5] https://en.wikipedia.org/wiki/Occam%27s_razor

Literature Review

Timeline of financial theories, formulas and tools

As introduced in the previous sections, many are the financial models which made use of the standard deviation as assumption to measure the volatility of stock market prices on financial markets. We are going to address and explain each of them from a chronological point of view.



1. Markowitz Portfolio Theory, 1952

Markowitz, Nobel prize for economy in 1900, developed the Portfolio Theory in 1952. The assumptions behind the model are that in the market there are investors in sufficient numbers to suggest that each of them does not have the power to influence the market from dominant positions, and that taxes do not affect the choices of the investors themselves. Moreover, the traded stocks are perfectly divisible, and each characterized by a certain expected annual return (k_i) and a certain statistical variance of that return (s^2_i) or by, if preferred, the standard deviation (s_i). These parameters depend on the hypotheses that are adopted on the statistical distribution $f(r_i)$ of the yield r_i of the security; in general, it will be:

$$k_i = \int_{-\infty}^{+\infty} f(r_i) \cdot r_i dr_i$$

$$\sigma^2_i = \int_{-\infty}^{+\infty} f(r_i) \cdot [r_i - k_i]^2 dr_i$$

k represents the average of the possible yields at maturity, while σ the standard deviation of the returns themselves with respect to the average. The higher the deviation, the greater the dispersion of returns, the greater the risk perceived by investors. If the statistical distribution of the yields can assume only a discreet set of values r_{ij}, each one associated with probability p_j) the previous formulas become:

$$k_i = \sum_j p_j \cdot r_{ij}$$

$$\sigma^2_i = \sum_j p_j \cdot [r_{ij} - k_i]^2$$

Let's introduce a relationship of 'dominance' between different securities, according to which a generic fund X is 'dominated' by another Y if one of the following relations is valid:

$k_Y \geq k_X$ with $\sigma_Y < \sigma_X$ or $\sigma_Y \leq \sigma_X$ with $k_Y > k_X$

It is worth noting that dominant and dominated securities do not contribute to define any arbitrage positions, and therefore are compatible with a situation of market equilibrium. In fact, for stocks we talk about expected return, and therefore *ex ante* it is not possible to establish with certain their future payoff, neither construct investment strategies that generate positive flows without risk. This said, the expected return does not represent an absolute parameter for the choice of the security and the different preferences depend also on the degree of risk aversion/propensity of investors.

Let's now consider the same parameters for a generic portfolio P, composed by n risky securities according to a percentage weight x_i, determined from the fraction of wealth invested in every security of the basket. It will be characterized by an expected yield k_P and by a variance σ^2_P, defined by the following statistical formulas:

$$k_P = \sum_{i=1}^{n} x_i \cdot k_i$$

$$\sigma^2_P = \sum_{i=1}^{n} x_i^2 \cdot \sigma_i^2 + \sum_{i=1}^{n}\sum_{j=1}^{n} x_i \cdot x_j \cdot cov(i,j) \qquad i \neq j$$

The expected return k_P is then the weighted average of the expected returns of the securities in the portfolio, while the variance σ^2_P does not coincide with the weighted summation of the variances of the individual securities. It is necessary to take into account the statistical covariance cov(i,j) between the generic securities i and j that make up the portfolio, and that is the correlation that exists between the yield of the securities themselves and the function of the joint probability distribution $f(r_i,r_j)$ or of the individual probabilities in the case of discrete discreet events:

$$cov(i,j) = \int_{-\infty}^{+\infty} f(r_i, r_j) \cdot [r_i - k_i] \cdot [r_j - k_j] dr_i dr_j \qquad \text{Continuous function}$$

$$cov(i,j) = \sum_{n} p_n \cdot [r_{in} - k_i] \cdot [r_{jn} - k_j] \qquad \text{Discreet function}$$

A 'convenient' measure of this correlation is the coefficient of correlation r_{ij}: $\rho_{ij} = \dfrac{cov(i,j)}{\sigma_i \cdot \sigma_j}$

This coefficient can assume values between -1 and +1, therefore we will define that two stocks are:

- Positively correlated, if $\rho_{ij} > 0$
- Without correlation, if $\rho_{ij} = 0$
- Negatively correlated, if $\rho_{ij} < 0$

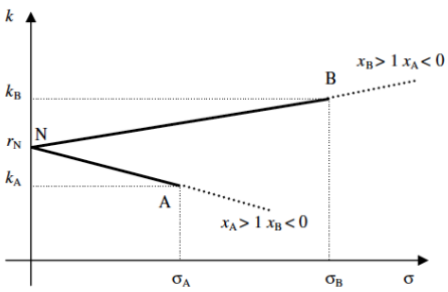


FIGURE 2 THE PLACE OF ELIGIBLE PORTFOLIOS ON THE RISK-RETURN PLANE, IN THE CASE $\sigma_{AB} = -1$.

This coefficient is useful since when the two stocks are perfectly negatively correlated ($\rho_{ij} = -1$) it is possible to combine them creating a portfolio N characterised by risk null with a result (not expected but certain) equal to r_N as showed in the figure 2 The two straight line in the graph show the place of acceptable portfolios, both in the case that short-selling is allowed or not. The straight line N-B individuate the dominating portfolios: an investor will not invest totally in A, since at the same level of risk, there are dominating portfolios with higher expected returns.

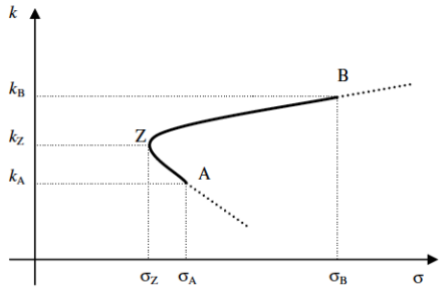


FIGURE 3 THE PLACE OF ELIGIBLE PORTFOLIOS ON THE RISK-RETURN PLACE, IN THE CASE $\sigma_{AB} = 0$

Different is when the two stocks are independent, so the coefficient of correlation $\rho_{ij} = 0$. In this case, the place of acceptable portfolios is not characterised by a linear relation, but is a curve, as showed in figure 3. Here is not possible to have portfolios with risk null, but is still possible to decrease the risk of the two single stocks, obtaining for instance a portfolio Z which is characterised by a risk lower both of A and B's risks. As before, the curve Z-B represents the dominating portfolios, which will be preferred by investors.

Markowitz Portfolio Theory allows to create a portfolio composed by different stocks, which expected return is the weighted average of the expected returns of the different stocks, but the portfolio risk can be decreased, extremely eliminated, due to the properties of some stocks to be independent or negative correlated with each other. The graphical solution of the problem is given by the tangent utility curve of each investor to the efficient frontier, according to his degree of aversion/propensity to risk.

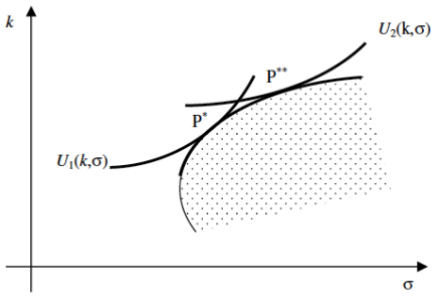


FIGURE 4 THE DETERMINATION OF THE OPTIMAL PORTFOLIOS

This theory doesn't work in period of recession, since companies on the market will be affected negatively, no matter the level of correlation. Moreover, as Burton G. Malkiel reports, some fund managers claim that the diversification, whit the passing of time, has not continued to give the same rewards as in the past. The globalization has increased the correlation rate among the different markets and asset class. Finally, this theory does not individuate a market equilibrium, since each investor will decide for a different optimal portfolio, according to his utility function.

2. Tobin Model, 1958

To address the Markowitz Portfolio Theory problem of not individuating a market equilibrium. Tobin, Nobel prize for economy in 1981, added in the Markowitz model the possibility to invest in stock with fixed return. Which offer a return with risk null, as r_f in figure 2.1. This allow to create portfolios composed both of risky stocks and a risk-free stock.

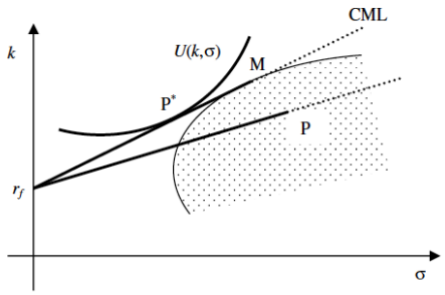


FIGURE 5 THE OPTIMAL PORTFOLIO CHOICE ON THE CAPITAL MARKET LINE IN THE TOBIN'S MODEL

Considering portfolio M, which has the property of being tangent between efficient-frontier of Markowitz and the exiting line from r_f, a series of dominant portfolios with respect to the efficient-frontier can be obtained. This new frontier, is called "*capital market line"*, since it represents the most efficient portfolios that can be obtained investing in the risk-free stock and in risky stocks. Portfolio M is the same for all categories of investors that are risk-avert, and is defined as "*market portfolio"*. Every risk-avert investors will invest a fraction of their wellness in the risk-free stock and the remaining fraction in the market portfolio M, which is the same for everyone and composed by all stocks in the market. The fractions will depend on the maximization of the single utility function of investors. The main characteristic of the Tobin Model is that a market equilibrium is reached: the wellness fraction invested in each risky stock with respect to the others is the same.

3. Sharpe Model: Capital Asset Pricing Model (CAPM), 1964

The last problem to be solved is to understand how the prices on the market of risky stocks settle to create the equilibrium defined by the market portfolio M. Sharpe, Nobel Prize for economy in 1990, solved the problem in 1964 developing the Capital Asset Pricing Model (CAPM). The CAPM relies on some assumptions:

- Investors have rational and homogeneous expectations
- Financial markets are efficient in the "strong-form" (see market efficiency section)

Sharpe shows that under the assumption of homogeneous expectations about the future value $P^_I$ of the n stocks in the market, and thus under the option of the efficiency in strong form of the market, it must be working in the uni-temporal model considered so far:

$$P_i = \frac{\hat{P}_i}{(1 + k_i)}$$

In financial markets, it is not future prices that change based on expectations, generating the values $P^_i$. Instead, are the future expectations that determine the prices today of securities, generating the equilibrium k_i returns.

Sharpe demonstrates that for an optimal portfolio of securities P (and thus also for the market portfolio) the following relation must hold:

$$k_i = r_f + \frac{k_M - r_f}{\sigma_M} \cdot \frac{\partial \sigma_P}{\partial x_i} \qquad i = 1, 2, \ldots, n$$

In equilibrium the expected return of each share must be equal to the market risk-free rate, plus a certain risk premium, which is proportional to the marginal contribution that the share itself brings to the risk of the portfolio P. The previous relationship, due to the separation theorem (which states that an optimal portfolio can always be considered as composed of the risk-free securities and the market portfolio) can also be rewritten in the following way:

$$k_i = r_f + \frac{k_M - r_f}{\sigma_M} \cdot \rho_{iM} \cdot \sigma_i$$

The most known formulation of the Capital Asset Pricing Model (CAPM) however is another: $k_i = r_f + \beta_i \cdot (k_M - r_f)$

The parameter *beta* (β_i) is defined as: $\beta_i = \frac{\rho_{iM} \cdot \sigma_i}{\sigma_M}$ with the numerator of this parameter which is usually indicated as "non-diversifiable risk" σ_{NDIV} of a generic share *i*.

This means that the risk premium demanded to a security does not cover all the risk, but is proportional only to that part which is systematic (= not eliminable) by diversifying a portfolio efficiently (i.e. by investing in a fund which belongs to the *capital market line*). On the other hand, the residual part ('diversifiable risk') can be eliminated through portfolio diversification. By difference, the diversifiable risk σ_{DIV} of a security is equal to:

$$\sigma_{DIV} = \sigma_i - \rho_{iM} \cdot \sigma_i = \sigma_i \cdot (1 - \rho_{iM})$$

The beta enjoys the additive property, in the sense that the beta of a portfolio P is equal to $\beta_P = \sum_{i=1}^{n} x_i \cdot \beta_i$ the weighted sum of the betas of the securities which compose it.

This means that the risk of a portfolio is not equal to the weighted sum of the risks of the shares which composed it, but instead the non-diversifiable risk of the portfolio is equal to the sum of the systematic risks of the shares which compose the portfolio.

The beta of the fixed income security is zero, while the beta of the market portfolio M is equal to one. From this it is deductible that the beta of a portfolio which belongs to the *capital market line*, due to the separation theorem is equal to the fraction of wealth invested in the market portfolio: $\beta_{CML} = x_M \cdot \beta_M + x_{rf} \cdot \beta_{rf} = x_M$

The risk σ_{CML} of an efficient portfolio, which belongs to the *capital market line*, will be entirely non-diversifiable, and given that its return correlated only with the market portfolio ($\rho_{iM} = 1$) will be equal to:

$$\sigma_{CML} = x_M \cdot \sigma_M = \beta_{CML} \cdot \sigma_M$$

Stocks (or portfolios) that have a *beta* > 1 are identified as 'aggressive' funds: their expected return amplifies (positively or negatively) the market trend. On the other hand, securities (or portfolios) characterized by *beta* < 1 are indicated as 'defensive' funds: they tend to buffer market fluctuations, containing the risk.

To sum up, the risk-premium required in equilibrium by the market to a stock/portfolio is proportional to the parameter *beta*, which represents the systematic risk, or non-diversifiable, with respect to the market portfolio risk.
To be noted that the CAPM affirms that, in the long term, to obtain higher returns, a higher value of *beta* is necessary. In other words, to have higher returns the investor has to bear higher risks.

The CAPM presents some issues:

- The *beta* it is not observable, but can be estimated only through econometric techniques, like the linear regression: $k_i = r_f + \beta_i \cdot (k_M - r_f) = (1 - \beta_i) \cdot r_f + \beta_i \cdot k_M = \alpha_i + \beta_i \cdot k_M$ with $\alpha_i = (1 - \beta_i) \cdot r_f$
  This means that it will be based on past data, so there is no guarantee that the beta of the security will remain the same in the future. In the case where there is no data on the historical performance of stock i, the practice is to consider 'sector' betas (*beta book*) by looking at what this parameter is worth for similar companies operating in the same business.
- The second issue is that the model doesn't consider multi-temporal horizons.

4. Merton Model: Intertemporal Capital Asset Pricing Model (ICAPM), 1973

To address the multi-temporal issue, Merton introduced in 1973 the Intertemporal Capital Asset Pricing Model, ICAPM, as an extension of the CAPM proposed by Sharpe. The ICAPM model takes into consideration that investors participate in markets for multiple years, adopting different strategies and behaviours depending on the happenings/conditions in the market and risk change over time. Merton creates this model in order to give the possibility to investors to hedge their investments risks against the uncertainties of the market in the future. The expected return of a stock investment is not only related to its covariance with the market portfolio, as in the CAPM, but is also related to some state variables, also defined as risk-factors, which provide a proxy for the changes in future investment opportunities set. Many microeconomic and macroeconomic variables are excellent candidates for systematic risk factors against which investors want to hedge. This is because innovations or unexpected changes in macro variables can generate global impact on firms' fundamentals. Therefore, an investment strategy based the ICAPM accounts for more portfolios that

an investor can use to hedge against these risks. Since ICAPM covers multiple time horizons, multiple *beta* coefficients are needed.

The main issue of the ICAPM is that is not able to fully define what those risk factors are. Moreover, despite underlining the importance of those factors in affecting the calculation of an asset price, the model does little to quantify to what extend the risk-factors are going to affect prices.

5. Ross Model: Arbitrage Pricing Theory (APT), 1976

The Arbitrage Pricing Theory (APT) is a model proposed by Stephen Ross in 1976 as an alternative to the Capital Asset Pricing Theory. The main difference with the CAPM is the APT does not assume that the markets are efficient, instead it makes the assumption that the price of stocks may be mispriced by the market, before the market itself correct the securities' prices back to their fair values. Temporarily mispriced securities give a short-term profit opportunity for an arbitrageur.

Unlike the Capital Asset Pricing Model, which only takes into account the single factor of the risk level of the overall market, the APT model looks at several macroeconomic factors and therefore is a multi-factor model: assets' returns can be predicted through a linear relationship between the expected returns of a series of macroeconomic factors, which capture systematic risk that cannot be reduce by diversification.

$$ER(x) = Rf + \beta_1 RP_1 + \beta_2 RP_2 + \ldots + \beta_n RP_n$$

Where:

- $ER(x)$ – Expected return on asset
- Rf – Riskless rate of return
- β_n *(Beta)* – The asset's price sensitivity to factor
- RP_n – The risk premium associated with factor

The *beta* coefficients in the APT are estimated through a linear regression, as in the CAPM, and they represent the sensibility of the stock to each of the risky factors. The number of macroeconomic risk factors to be used in estimating the expected return of an asset is a subjective decision: investors will arrive to different results according to their choice. The macroeconomic factors which have been proven to be the best price predictors are gross national product (GNP), unexpected changes in inflation, shifts in the yield curve and corporate bond spreads. Other commonly used factors are gross domestic product (GDP), commodities prices, market indices, and exchange rates.

The arbitrage pricing theory provides traders with a model for calculating an asset's theoretical fair market value. Traders then search for tiny deviations from the fair market price and trade accordingly after determining that value.

6. Fama and French: 3-Factors Model, 1992

Eugene Fama, Nobel Prize, and Kenneth French, professors at the University of Chicago Booth School of Business, proposed in 1992 a multi-factor model, known as the '3-factor model', as an expansion of the CAPM model. In the 3-Factors Model the expected return of a stock depends not only on the *beta*, and thus on excess return on the market, as in the CAPM, but also on the 'size' of the firm, and the composition of its assets, in terms of its market-to-book (M/B) ratio. These 2 new factors were introduced after conducting some researches which showed a systematic undervaluation for small minus large portfolios (SMB) and income stocks versus growth stocks (HML). Given the same future expectations, this means that in equilibrium this type of enterprises must show a greater expected return.

$$k = \alpha + \beta_1 \cdot k_M + \beta_2 \cdot \mathrm{SMB} + \beta_3 \cdot \mathrm{HML}$$

The sensitivity to the market, sensitivity to size, and sensitivity to value stocks, as measured by the book-to-market ratio are the main factors driving expected returns.

7. Fama, French and Carhart: 4-Factors Model, 1997

Subsequent research has shown that (against of what the theory of efficiency would like to deny) equities that in the previous 12 months have performed better than Fama & French predict, are likely to do the same in the next 12 months. A further variant was then proposed, the '4-factor' model of Fama, French & Carhart, which also takes into account the past performance of the securities through the prior 1-year momentum (PR1YR).

$$k = \alpha + \beta_1 \cdot k_M + \beta_2 \cdot \mathrm{SMB} + \beta_3 \cdot \mathrm{HML} + \beta_4 \cdot \mathrm{PR1YR}$$

MODELS USED TO EVALUATE THE RISK ADJUSTED PERFORMANCE FOR PORTFOLIOS

8. Sharpe Ratio, 1966

Developed in 1966 by Sharpe, this ratio is one of the most widely used methods for calculating risk-adjusted return. It is given by the ratio between (r_p - r_f) and σ_p, so the ratio between differential yield compared to risk free securities and risk.

$$Sharpe\ Ratio = \frac{\bar{r}_p - r_f}{\sigma_p}$$

$\bar{r}_p$ = expected return of the portfolio or investment
r_f = risk-free interest rate
σ_p = standard deviation of portfolio returns

A risk-averse investor will try to maximize this ratio, trying to 'beat' the risk/return profile of any other portfolio, so trying to position himself 'above' the *Capital Market Line*.

Moreover, the Sharpe ratio can help explain whether a portfolio's excess returns are due to smart investment decisions or a result of too much risk. The ratio is used to compare different portfolios and understand which portfolio gives better returns compared to the volatility, which measures risk.

According to the Modern Portfolio Theory (MPT) adding assets to a diversified portfolio that has low correlations can decrease portfolio risk without sacrificing return. Sharpe ratio should increase by adding diversification compared to similar portfolios with a lower level of diversification.

The Sharpe Ratio can be used both ex-post, to evaluate a portfolio's past performances, and ex-ante using expected portfolio performances and expected risk-free rate to calculate an expected Sharpe Ratio.

The main limit of this ratio is that uses the standard deviation of returns in the denominator as proxy of total portfolio risk, assuming that returns are normally distributed, which is a strong assumption, since in reality the distribution might be affected by fat tails, decreasing the reliability of the normal distribution assumption. The second limit is always related to the standard deviation as measure of risk: the standard deviation assumes that price movements in either direction are equally risky. Finally, a third limit is related to the possibility to be easily manipulated by fund managers: they can lengthen the interval of measurement in order to present their "best side".

9. Sortino Ratio, 1980

In 1980 Franck A. Sortino introduced a variation of the Sharpe Ratio which differs only in the denominator. Instead of using the total standard deviation of portfolio returns, it uses asset's standard deviation of negative portfolio returns, defined as downside deviation, in order to differentiate harmful volatility from total overall volatility. In this way the ratio does not takes into consideration the positive deviations of a portfolio return from the mean, giving a better view of a portfolio's risk-adjustment performance, since positive deviations are a benefit. As for the Sharpe Ratio, the higher the Sortino Ratio, the better, since the portfolio analysed will have higher returns with lower related risk.

$$\text{Sortino Ratio} = \frac{R_p - r_f}{\sigma_d}$$

where:

R_p = Actual or expected portfolio return

r_f = Risk-free rate

σ_d = Standard deviation of the downside

10. Treynor Ratio, 1966

Introduced in 1966 by Jack Treynor, this ratio tells how much excess return was generated for each unit of risk taken by a portfolio. The numerator is the same as in the Sharpe and Sortino Ratio. The difference is in the denominator, which contains the portfolio *beta* reflecting systematic risks. It indicates how much return an investment earned for the amount of risk the investment assumed. The higher the Treynor Ratio, the more suitable will be the investment.

$$\text{Treynor Ratio} = \frac{r_p - r_f}{\beta_p}$$

where:

r_p = Portfolio return

r_f = Risk-free rate

β_p = Beta of the portfolio

One of the limits of the Treynor Ratio is that is based on historical data, so it has a backward-looking nature. Since investments are likely to behave and perform differently from the past, the ratio does not necessarily indicate future performances.

11. Value at Risk (VaR) by JPMorgan, 1980

Value at risk is a widely applied risk management technique which rather than produce a single statistic or express absolute certainty, it makes a probabilistic estimate. It is the maximum expected portfolio losses at a specified confidence level (a given probability) over a specified holding period subject to simplifying assumptions, like normal market conditions. There are three main approaches by which VaR can be calculated: historical simulations, Monte-Carlo simulation and variance-covariance method. The first one is based on the assumption that past returns will represent a good proxy for future returns. The historical method looks at past return, ordering them from the worst loss to the greatest gain. The Monte-Carlo simulation uses computational techniques to simulate expected returns over many possible iterations. Then it takes the chance that a loss will occur and reveals the impact. Finally, the variance-covariance method assumes a normal distribution of gains and losses, allowing potential losses to be framed in terms of standard deviation σ from the mean μ.

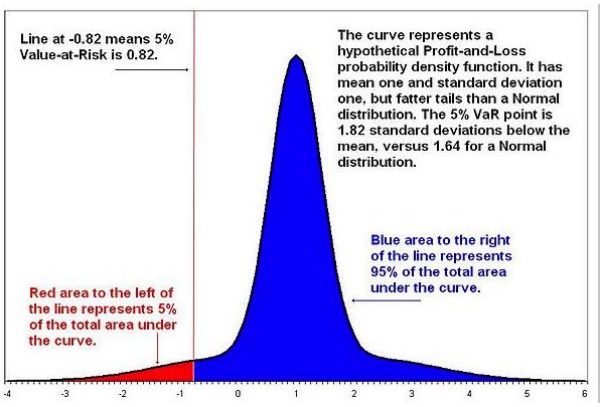


FIGURE 6 THE 5% VALUE AT RISK OF A HYPOTHETICAL PROFIT-AND-LOSS PROBABILITY DENSITY FUNCTION

$$\text{VaR} = \mu + \sigma N^{-1}(X)$$

Considering that: $N^{-1}(1 - x) = -N^{-1}(x)$

This last method is the most used, since it is the fastest.

Many are the limits of the Value at Risk. In 2008 David Einhorn debated VaR in "Global Association of Risk Professionals Review", stating that:

- Tail-risks are not measurable
- VaR leads to excessive risk taking
- Is not sub-additive: VaR resulting from a combined portfolio can be large than the sum of the VaRs of its single components

12. Conditional Value at Risk (CVaR), also known as Expected Shortfall

In order to address the first problem of traditional VaR underlined in the section above, Conditional VaR, also known as Expected Shortfall is used to solve the problem of measuring tail-risks. It calculates the level of tail risk in a portfolio of investments. It is expected loss given that the loss is greater than VaR threshold. It is derived through a weighted average of the losses of the tail of the distribution of possible returns which are beyond the VaR level. CVaR allows for a more conservative approach compared to traditional VaR in terms of risk exposure. Is useful to underline that two portfolios having the same VaR can have strongly different CVaR.

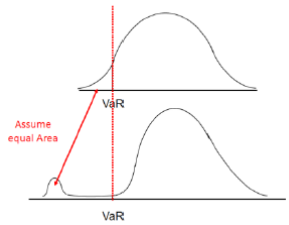


FIGURE 7 DISTRIBUTIONS WITH THE SAME VAR BUT DIFFERENT EXPECTED SHORTFALLS

$$CVaR = \frac{1}{1-c}\int_{-1}^{VaR} xp(x)\,dx$$

where:

$p(x)dx$ = the probability density of getting a return with value "x"

c = the cut-off point on the distribution where the analyst sets the VaR breakpoint

VaR = the agreed-upon VaR level

Inefficiency of the market

Efficiency of the market: history and definition

The Efficiency Market Hypothesis (EMH) is considered as one of the substantial propositions in social sciences and has a strong significance for academic theories and professional practices.

From the paper of Sewell (2011) we derived that the first to provide a definition of “efficient” market was Fama (1965b) in his landmark empirical analysis of stock market prices. In this work, he also arrived to the conclusion that stock market prices follow a random walk and we will see more in depth the meaning of random walk and its relation with the hypothesis of efficiency of markets later on. In the same year, in his work "Proof that adequately expected prices fluctuate randomly," Samuelson made the first formal economic argument for "efficient markets”. In 1967 Roberts coined the term “efficient markets hypothesis” and introduced the distinction between strong and weak market efficiency form. The Efficiency Market Hypothesis definition most acknowledge by academics and economists is the one defined by Eugene Fama in his article “Efficient Capital Markets: A review of theory and empirical work” (Fama 1970). According to Fama, the EMH states that in an efficiently working market, the current price of an asset reflects at any time the fair value of that asset, since the current asset price immediately and “fully” reflects all the new available information. Moreover, in this work Fama defined, using the Roberts distinction as starting point, three degrees of definition of an efficient market:

- a 'weakly efficient' financial market in which the prices of securities reflect at any time all available information on the past price developments of the securities;
- a 'semi-strongly efficient' financial market in which the prices of securities reflect at any time all the public information available on the market;
- finally, a 'strong efficient' financial market in which the prices of securities reflect at any time all public and non-public information.

To be underlined that stronger efficiency forms include all weaker forms as well.

The EMH is closely related to two other cornerstones of neoclassical financial economics: The Capital Asset Pricing Model (CAPM) developed independently by Sharpe (1964) and the portfolio theory of Markowitz (1952). If market is efficient investors should not expect to achieve in a long-term horizon higher returns than the level justified by the amount of systematic risk attached to a particular security.

Ended, because of the EMH, as an investor is impossible to beat the market, because all the new relevant information about stocks is already incorporated in the market price and there are not undervalued or overvalued available securities that investors can trade.

Deviations from the weak form efficiency thus have an impact on other theories that describe the capital based on the efficient market hypothesis.

Random Walk Hypothesis: history and definition

The term "random walk" is used in statistics to describe the seemingly random movement of a variable. There is no known relationship between it and previous values or other factors, nor is there any discernible pattern. The variable simply shifts from one state to the next. There could be a pattern or relationship between the movement of the variable and other factors. However, no such pattern or link has been discovered.

The EMH is linked with the random walk hypothesis of stock prices in the market. According to this hypothesis, popularized in 1973 by Princeton University Economics Professor Burton Malkiel in his book “A Random Walk Down Wall Street,” shares price, which represents the variable, moves seemingly at random, like the steps taken by a drunk walking down a street; it doesn’t have any known relationship with historic values or other variables, nor does it have any identified pattern. However, the idea does not rule out the possibility that a stock's price follows a pattern or is influenced by other causes. The EMH seems to explain the random walk hypothesis: if stock markets efficiently, immediately and in fully react to new information, since only new information move prices and new information are unknown and randomly occur, future prices are unknown and move randomly and are independent from the price changes generated by older information.

Before Burton Malkiel, the first speaking about the random walk concept was the French mathematician Louis Bachelier in 1900 in his PhD thesis “Théorie de la spéculation”. After this work, the random walk hypothesis has been strongly debated during the 60’, with “The Random Character of Stock Market Prices” in 1964 by the American financial economic Paul Cootner and in 1965 with the “Random Walks in Stock Market Prices” by Eugene Fama.

Efficiency of the Market and Random Walk Hypothesis implications

The implications of the EMH and of the random walk hypothesis are quite similar and related:

The market cannot consistently be beaten on

a risk-adjusted basis. In particular EMH and Random Walk Hypothesis are incompatible with many well-known investment strategies. The incompatibility change for the EMH according to the three different degrees of efficiency defined by Fama:

- In a weakly efficient financial market, knowing the past performance of a security is useless, because it does not add any new useful information to predict its future performance. The current price of a stock is the best estimator of future prices. Therefore, the technical analysis, which is the study of past prices of stock to forecast future stock prices, is useless with the aim of beating the market. Technical analysis does not work also in the Random Walk Hypothesis, since by analyzing the price of a stock relative to its historic price and the prices of other, similarly situated assets profits cannot be gained, since the Random walk theory argues that there are no such relationships known.

- In a 'semi-strongly efficient' financial market prices reflect all information contained in companies' public financial statements or published in the information sources. Therefore, neither technical nor fundamental analysis, which is the analysis of key financial metrics of a company to help the investor in selecting “underpriced” companies, can be used to beat the market.
  The same investment strategy is useless also for the random walk hypothesis, since the theory argues that the unreliability of corporate data and the likelihood that even reliable data will be misinterpreted render fundamental analysis unsuccessful.
- Finally, in a “strong” efficient market all investors have the same information at the same cost, and no information can give an advantage on the market.
- The Random Walk Hypothesis makes also market timing strategy useless: timing your buy and sell orders to best capture an asset’s value (buy low, sell high) is not possible since Random walk theory argues stock prices move at random, there is no way to correctly predict entry and exit points. Attempting to time the movement of a certain stock involves a risk that is disproportionate to the return, implying that a market timing approach will lose money over time.
  As a result of both EMH and Random Walk Hypothesis, traders should be incentivized in investing in passively managed vehicles such as Index Funds and Exchange Traded Funds (ETF), which do not attempt to beat the market.

Market conditions of efficiency

Eugene Fama, in his article of 1970, does not only provide a definition of Efficient Market Hypothesis, but also defines three market conditions consistent with efficiency which are needed to be fulfilled to have efficient capital market:

- no transaction costs at the entire market,
- no costs for all available information for all market members
- the current price, with fully reflected available information, is in consensus of all market members.

However, in reality, considering capital markets, these conditions are not always met. For this reason, these conditions are only sufficient and not necessary. This means, for example, that a market can be efficient if sufficiently many (but not all) members have access to information. The fact that these conditions are unnecessary is a potential point for the inefficiency of the market.

Critique to the market efficiency (theories and experts that support this opinion)

"I'd be a bum on the street with a tin cup if the markets were always efficient".[6] -Warren Buffett

Warren Buffet is one of the most famous investors which has stated that the stock markets are not efficient, and that this characteristic of the markets has allowed him to gain excess profits over years, but he is not the only one. Many economists over the years have raised arguments over the EMH and have tried to demonstrate that the market is inefficient. Let's understand the implication of an inefficient market.

An inefficient market is a market which is not conform to the law of the EMH. Prices of assets do not immediately and fully reflect all the new available information. As a result, some assets may be under- or over-valued in the market, creating opportunities for excess profits for traders, as well as higher losses given the level of risk exposure.

In the 1980's many economists starting believing that stock prices were partially predictable, raising a new era of discussion: returns on stock can be predicted and sustained. Some of the critics of market efficiency have been centered on the following: size effect, seasonal and day-of-the-week effect, excess volatility, stock market crashes, insider trading. Moreover, some economists believe that there exist some behavioral and psychological aspects which enable the prediction of stock prices. All these aspects will be analyzed more in depth below.

Insider trading

Insider trading in stock markets refers to trading activities conducted by individuals in leadership position inside companies or by people with a close relationship with them. These people have access to "inside information" which are not public and can exploit them to gain excess profit. This violates the strong efficiency form proposed by Fama and it's one of the main threats of the EMH. In fact, doubts on whether all information is public available for all as soon as it is created are raised. The "inside information" problems is nowadays regulated within corporate governance contracts. These contracts try to ensure transparency and reliability of public-quoted companies. Moreover, provides rules for "inside" agents.

Seasonal effects

Seasonal effects are market anomalies which occur in periodic intervals making the stock prices systematically differ from the fundamental one. Seasonal effect often occurs in a calendar month. The literature usually refers to the "January effect", the "sell-in-May-effect", but the period of occurrence can be shorter than a calendar month, like the so called "weekend effect". During a seasonal effect, higher or lower

[6] https://www.nytimes.com/2013/11/15/opinion/rattner-whos-right-on-the-stock market.html#:~:text=Buffett's%20views%20are%20clear%3A%20%E2%80%9CI,the%20markets%20were%20always%20efficient.%E2%80%9D&text=A%20significant%20number%20of%20endowments,%26P.

returns, in function respectively of positive or negative effects, occurs when compared to the average return. All these seasonal effects seem to occur due to behavioral and psychological conditions of investors affecting the financial sector.

Sell-in-May-effect

People tend to sell in May and re-buy in September. This is because many studies have recorded that in those months a lower growth rate is created when compared to the rest of the year. One of this studies is the one of Bauman and Jacobsen in 2002. They observed this effect in the time range 1970-1998 and noticed that this effect is stronger in the more developed European Countries. A possible reason for this effect is of psychological nature: in May the temperatures become warmer and warmer and emerges a holiday mood. As a result, money goes into holiday plans instead of shares and some people will avoid the risk of asset volatility by not investing during the holiday season.

The fact that these seasonal effects has occurred in recent years and will generally exist with a high probability in coming years raises questions concerning the validity of the EMH. In fact, under the EMH such a highly predictable event should not endure.

Size Effect or January effect

One of the most powerful effects discovered by researchers is the tendency for smaller-company stocks to earn higher returns than large-company stocks during the month of January. Fama and French (1991) looked at the price of S&P500 shares from 1941 to 1990 comparing them with the "CRSP small-stock portfolio", which divided all stocks into deciles based on their total capitalization size. He discovered that the CRSP portfolio's smallest quintiles outperformed S&P500 equities in January, but there were no significant differences in the other months of the year. The key question here is whether the greater returns of small businesses are part of a predictable pattern that will allow investors to earn higher risk-adjusted returns.

The correct measure of risk for a stock, according to the capital asset pricing model, is its "beta," or the degree to which the stock's return is connected with the market's overall return. The size effect can be interpreted as indicating an anomaly and a market inefficiency if the "beta" measure of systematic risk from the capital asset pricing model is accepted as the correct risk measurement statistic, because portfolios consisting of smaller stocks have excess risk-adjusted returns using this measure.

Ritter in 1988 studied that the price movement of small businesses at the end of a year is due to the buying and selling behaviour of individual small investors. This investor group motivation is the realization of losses on the tax account. The related sales concern loser shares in the middle of

December and subsequent acquisitions are carried out in this market segment in the middle of January. The behaviour of investors in this period is also motivated by yearly bonuses which are distributed by companies and liquidation of long-term investments to add value. This volume of financing will be reinvested in Januar

Excess Volatility by Shiller

Over the last three decades, the excess volatility puzzle, first recognized by Shiller (1981) and LeRoy and Porter (1981), has gotten a lot of attention. The EMH, according to efficient market theorists, can be used to explain price fluctuations. New information concerning dividends, for example, may be made public. In 1981, Shiller performed research on stock market volatility and its relationship to dividend variability. He discovered that stock prices had excessive volatility, which cannot be explained by new information entering the market, such as dividends and excess returns. Schiller noted: *"measures of stock price volatility over the past century appear to be far too high – five to thirteen times too high – to be attributed to new information about future real dividends.... The failure of the efficient markets model is thus so dramatic that it would seem impossible to attribute the failure to such things as data errors, price index problems, or changes in tax laws.*[7]*"*

This excess volatility, according to Shiller, can be related to investors' psychological activity. He contends that significant price swings can be explained by the investing public's collective change of mind, which can only be described by their thoughts and beliefs about future occurrences. According to Shiller, the popular models theory posits that people react improperly to information they receive. As a result, contrary to what the EMH would have you believe, openly available information is not always already factored into stock market prices. At the same time as Shiller was drafting his article, two economists, Stephen Le Roy and Richard Porter, were doing a study that came to nearly identical results as Shiller's.

Stock prices are more volatile than the efficient capital markets model would predict, according to Le Roy and Porter, based on aggregated and disaggregated data. The identical results and independence of the two articles support Shiller's hypothesis of popular model relevance.

Behavioral Finance

The efficiency of the market hypothesis assumes individuals are rational, showing similar behavioral patterns. Many economists support the argument according to which agents trading on the stock markets may react irrationally to new information and undertake wrong investment decisions leading to anomalous pricing of assets. This is the behavioral finance concept. According to the paper of Szyszka (2008) the sources of irrationality are psychological biases and heuristics of a human mind. Psychological sources of irrationality may be different:

[7] Robert J. Shiller, "Do Stock Prices Move Too Much to be Justified by Subsequent Changes in Dividends?", 1981, pag. 433-434

- - Overoptimistic belief: numerous research (Odean (1998), Barber & Odean (2001)) reveal that people are overconfident in their assessments, causing them to trade too much and intensively, take on too much undiversified risk, and cause the market to overreact to new information.
- Risk aversion: Kahneman and Tversky (1979) looked at how preferences change depending on the circumstances in which options are presented. Individuals usually prefer a certain gain than a gamble of the same expected value with a chance for much higher win. When faced with a choice between a certain loss and a gamble with the same negative anticipated value (which may result in an even greater loss but also provides a chance to avoid the loss), people prefer to take the risk and gamble. Losses tend to make people more sensitive than profits.
- Emotions and moods: finally, investors who are in a good mood are more likely to take bigger risks and are more optimistic. Furthermore, weather conditions have a big impact on people. According to Saunders (1993) and Trombley (1997), this may have a direct impact on capital markets, as market returns are higher on average on days with favorable weather than on days with heavy clouds or rain.

Behavioral economists argue that the trade volume is too great to justify the EMH argumentation: if the price were always correct, the trade volume would be lower because there would be fewer excess returns to expect. The passive "buy and hold" method is the ideal investment strategy in light of the EMH. This notion is challenged by behavioral finance, which claims that markets are not always efficient and that investors who make better than average use of available information can earn abnormal profits. In light of this, it would be worthwhile to look for good investment possibilities and devote efforts to investigating market mispricing that occurs from time to time. In some circumstances, active trading methods may be superior to passive "buy and hold" strategies.

3.1 **Behavioral approach example: Noise Theory by Black 1986**

In 1986, Black developed the “noise theory”, which has the implication that stock prices can diverge from the fundamental values. A noise is a participant of the market who has incorrect information and who implements trades based on this information under the false believe that the information is correct.

According to Black, the presence of noise investors is necessary to explain the high volume of trades in the financial market. No individual shares would be traded without the presence of noise investors. In fact, rational investors trading with each other will realize that the trader who is willing to pay a higher price for an asset would have higher information about the asset’s returns.

Sophisticated traders are incentivized by the presence of noise traders to gather as more information as possible. This information brought by sophisticated investors tend to move the asset price towards its

fundamental, giving the sophisticated traders the opportunity to gain profit by the presence of noise traders.

The noise theory is based on the concept of asymmetric information: agents engage in a trade with each other, based on different information.

Bubbles: examples of market inefficiencies and Financial Instability Hypothesis by Minsky

As analyzed in the "critique to market efficiency" paragraph, many are the economists which supports the inefficiency of the markets by providing examples which seems not to be explained by following the efficiency of the market hypothesis. In this section we are going to present another aspect of the markets which is against the efficiency hypothesis: the Bubbles. A bubble is an economic cycle characterized by a gradually increase of prices of some assets, followed by a phase of fast decrease of prices, also called "Bubble burst".

While the "bubble burst" is a consequence of the market recognition of a mispricing of some assets and its reaction in order to bring back the market prices in equilibrium, the escalation of the prices of some assets during the formation of a bubble cannot be explained by following the Efficiency of the market Hypothesis. During this initial phase in fact the price at which assets are traded largely exceed the fundamental or intrinsic values of those assets. Many economists agreed that the creation of bubbles are due to psychological factors affecting the investors, who undertake exuberant market behavior like overexcitement and over optimism to initial rise in price, generating even more speculative demand. The mismatching between prices and fundamental values strongly violates the market efficiency hypothesis: it makes evident that information is not discounted immediately and fully in consensus of all market members.

To better understand how bubbles work and how the misbehaviors of individuals influence their creation, we can refer to the work "Stabilizing an Unstable Economy" made by Hyman Minsky in 1986, in which the economist identified five steps in the development of bubbles:

1. Displacement: during this phase, investors notice a new paradigm, like a new technology or a historically low interest rate, getting enamored.
2. Boom: following a displacement, prices start raising slowly, but as more and more investors enter the market, driven by the fear of losing a once-in-a-life opportunity, the prices gain momentum.
3. Euphoria: during this phase prices reach extremely high values and caution from the investors side is abandoned.
4. Profit Taking: this is the phase, the investors who are able to get the warning signs, sell their positions and take profits before the burst of the bubble. Understanding when the bubble is going to burst is hard.

5. Panic: in this phase the market recognizes the overvaluation and adjusts the prices which start decreasing. Investors desire to liquidate their positions and supply overwhelms demand, decreasing the prices even more.

Minsky not only identifies these five steps in the development of bubble, but in his work "The Financial Instability Hypothesis" in 1992, he develops an economic theory according to which the creation of Bubbles and financial crises are correlated to the levels of volatility. The downside of linking volatility to risk in order to take investments' decisions could lead to wrong behaviors on the market. Let's analyze more in depth:

- Low volatility channel: if volatility levels on the markets are low, and volatility is linked with risk of investments, agents on the markets are inducted to undertake riskier investments. When those investments turn sour, a crisis follow. Moreover, according to the volatility paradox of Brunnermeier and Sannikov (2014), low fundamental risk leads to higher equilibrium leverage, and hence the build-up of systemic risk.
- high volatility channel: the higher the volatility levels on the market, the higher are the uncertainties about future cash flows and discount rates and hence, the higher the risk of adverse future economic outcomes. This could bring to the creation of financial crises.

To better understand the relation between volatility as risk measure and financial crises we can refer to the paper "Learning from history: Volatility and Financial Crises" written in 2016 by the Finance and Economic Discussion Series Divisions of Research & Statistics and Monetary Affair Federal Reserve Board, Washington, D.C., according to which low turbulence Granger-causes high volatility but not vice versa, bolstering the argument that low volatility drives risk-taking that only manifests during a crisis, whereas high volatility is a warning indication of pending crises. Volatility does not anticipate crises on its own. They believe this is because the level of volatility fluctuates over time and across countries: what is high in one country or time period may be low in another. When they breakdown volatility into high and low volatilities, they find substantial evidence that low volatility lasting up to ten years predicts crises, with the effect being largest when volatility is low for at least five years. When financial markets become more prominent and less regulated, the volatility-crisis relationship gets more pronounced.
According to the theoretical literature, both high and low volatility can influence agents' decision-making, resulting in a worsening of financial status.

Financial crashes over the years

Let's now see examples of bubbles occurred over the history, the causes of their creation and the negative impacts once they "burst".

1929 stock market crash

In 1929, the world's worst stock market crash occurred, and it was one of the causes of the Great Depression. The crisis brought an end to the Roaring Twenties, a period in which the economy grew rapidly and the stock market soared. The Roaring Twenties brought to investors over-optimism and overconfidence: they started buying stock not on fundamentals but in anticipation of rising shares prices, given the growth period of the economy, convinced that it was "easy money[8]". This brought to the creation of an overproduction, leading in many markets to oversupply: company were forced to dump products at loss.

Moreover, investors were buying on margins, paying only a percentage of the asset's value and borrowing the rest from a bank. This led to excess leverage, that until the stock prices raised, it amplified positively the gains. However, when the prices in September 1929 started to decrease, the losses began to be amplified too. As a consequence, share prices began to decrease. The losses were rapid, and banks issued margin calls[9], but funds were not deposited and entire portfolios were forced to be liquidated.

The Bubble burst between Monday, Oct. 28, and Tuesday, Oct. 29. The Dow continued to lose value until the summer of 1932, and it wasn't until 1954 that it regained its pre-crash value.

Black Monday crash of 1987

On Monday, Oct. 19, 1987, the US markets fall of about 20%. It was not a single event causing the stock market crash, but a combination of different factors, among which a widening U.S. trade deficit and computerized trading. In particular, the use of computer system to implement trading strategies on a large scale was relatively new. And it was this use of automated program trading that played the biggest role in the crash. One of the most used automated trading strategies in that time was the "portfolio Insurance". This investment strategy tries to hedge a portfolio against the market risk by short-selling some index futures. The cons of the use of automated computerized programs in those years, was that when prices were raising, they produced more buy orders, while when prices were falling, they produced more sell orders. It was this too high number of selling order that started to create panic among investors. Since 1987, many protective mechanisms to prevent panic selling by investors has been built. Since the Black Monday crash main cause was due to an automated technology rather than an economic problem, the recovery of stock market was quick and it recouped all its losses by September of 1989.

Dot-com bubble of 1999-2000

[8] https://www.investopedia.com/terms/e/easy-money.asp
[9] https://www.investopedia.com/terms/m/margincall.asp

This bubble was a rapid increase in the internet-based stocks valuations during the bull market in the late years of 1990. The technology-dominated NASDAQ Composite Index (NASDAQINDEX:^IXIC) raised its value enormously from 1995 to 2000, passing from 1000 point to more than 5000. The bubble burst in the first years of 2000 and the NASDAQ went back rapidly to 1,139.90 points on Oct. 4, 2002. The main cause of the dotcom crash was the over optimism of investors about internet startups to become profitable in the future and the speculation of investor. As for the 1929 crash, people were not buying on fundamental, but were betting on the future ability of those companies to become profitable. But many internet-based startups, due to the over optimism of investors, were able to raise huge amount of capital and going public without a well-defined business plan and track record of profits. But without a strong business plan these companies ran through their cash, starting the market crash. The NASDAQ value did not recover to its 2001 peak until fifteen years late.

Financial crisis of 2008

The Federal National Mortgage Association (FNMA or Fannie Mae) wanted in 1999 to make home loans more accessible to people with bad credit and less money to put down than traditional lenders required. These "subprime" borrowers were offered mortgages with payment terms that reflected their high risk profiles, such as high interest rates and variable payment schedules.

Mortgage-debt became more accessible to previously unsuitable borrowers and investors, resulting in a surge in mortgage originations and property sales. The homeownership reached a saturation level and consumers bought houses they couldn’t afford. Moreover, as a consequence of the previous dotcom crash and September 11th, the Federal Reserve decreased the federal funds rate in order to boost the economy. Consumers, many of whom were first-time buyers, took on more debt to purchase other items. Companies who wanted to take advantage of the booming economy took on a lot of debt in order to do so. Similarly, financial institutions employed cheap debt to improve their investment returns.

When interest rates started to increase, the values of homes started decreasing and many consumers were at that moment owning homes which were valued less than what they paid for them. They were unable to sell their homes because they owed money to their lenders. If they had adjustable-rate mortgages, their payments increased as the value of their homes decreased. The most vulnerable subprime borrowers were already saddled with mortgages they couldn't afford.

In March of 2007, theWhen

investment bank Bear Stearns was unable to cover its losses connected to subprime mortgages in March 2007, the debt-fueled stock market began to exhibit signs of impending catastrophe. The stock market did not crash as a result of Bear Stearns' failure; it continued to grow, reaching 14,164 points on Oct. 9, 2007, although the major stock indexes had lost about 20% of their value by September 2008. The Dow Jones Industrial Average didn't reach its lowest point until March 6, 2009, when it was 54 percent below its high. The Dow needed four years to fully recover from the crash after that.

Articles and experts to confirm the thesis

After the publication of the paper by Sharpe and Lintner in (1965) about the Capital Asset Pricing Model, there were different researchers and practitioners that studied and tested in the practice the model and its assumptions. Starting from the latter and then arriving to the former, in this section we want to highlight different analysis and critics raised during the years.

The main concepts covered in this part are:

- Stock volatility as a measure of risk for an investment in a company
- Linear relation between Beta (risk) and return under the CAPM

Critics on the CAPM assumptions

In the course of the year became known that the assumptions done for the CAPM have a low connection with what happen in the reality. This led the application of the CAPM to find not satisfying results and on the contrary displays the opposite relation for which the model was born. An interesting paper that describes pretty well the connection between the unrealistic assumptions and their implication for the so called "volatility effect" (anomalous relation between risk and return that underline the non-linear relation between the two figures), is the one Baker, Bradley, Taliaferro (2013).

a) No constraints (e.g.: leverage, short selling and regulatory)
    - Leverage: Already in the early studies done by Brennan (1971) and Black (1972) the constraints that have some investors on the possibility to borrow money at risk free rate have conducted to a decrease of the slope of the CAPM curve, highlighting higher returns for low beta stocks respect what the theory tells. The problem is that in the CAPM is present just one efficient portfolio, and investors according to their level of risk aversion decide the amount to take/give on leverage. When borrowing restrictions prevent investors from using leverage, they have little choice except to shift their portfolios toward high-beta assets in order to capture an higher reward through the equity risk premium. This increased demand for high-beta assets respect the low-beta securities might explain why the security market line is less steeply upward-sloping than the CAPM prognosticate.
    - Short selling: High risk shares are overpriced because investors are influenced by the positive future results and move their capitals towards these stocks. Knowing that the possibility to do short selling is limited, the persons that understand the inflated price of the High-risk shares cannot correct the upward trend and the returns will be eroded.

Investors have the same expectations in terms of risk and expected return: for the efficient frontier of equities portfolios to be the same for all investors, this assumption is required. On the other hand, it is unrealistic, because each investor or group of investors may have different expectations and perceptions of a financial asset's risk and projected return.

b) Investors want to maximize absolute wealth's expected utility, are risk adverse and are only interested in the mean and variance of returns.

- The model assumes that the investors give the same weight to the dividend yield and the capital gain. Instead in the reality, shareholders have different preferences for these two elements.
- Relative utility: The vision of the CAPM under which people only care about their own personal wealth is not connected with what happens in the reality. In fact, persons are interested in the maximization of their wealth in relation the others.

  Frank [2011] finds that the vast majority of people would prefer earn $100,000 when others make $90,000 than $110,000 when others earn $200,000. Higher relative wealth is preferred over lower absolute wealth.

  Sharpe (1981) and Roll (1992)'s observation that professional portfolio managers are often judged on their return relative to a specific benchmark index, switches the focus from absolute return and risk to the research for an outperformance in terms of returns and a similar risk (tracking error) respect a benchmark. This implies the presence of the relative utility in the money management industry.
- Agents maximize option value: this statement results in contrast to what the CAPM affirms, that the investors are risk adverse. Well, this can be also considered true, but if the portfolio managers that decide where to allocate their clients' money are risk takers, automatically the CAPM assumption doesn't hold anymore.

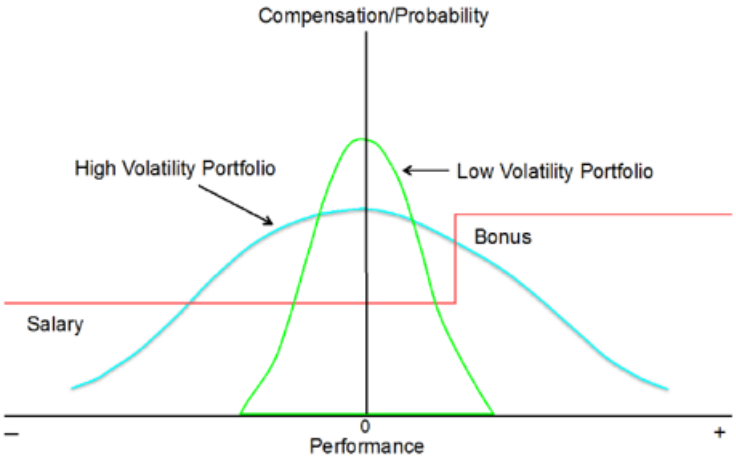


FIGURE 8 OPTION-LIKE MANAGER COMPENSATION

The figure identifies the composition of the manager compensation proposed in the paper by Haugen and Baker (2012). It is characterized by a base salary that can be implemented only at the achievements of considerable performances. Moreover, are present in the graph the probability distributions of a Low volatility portfolio and a High volatility portfolio, making clear the incentive of the manager to move toward the latter in order to improve its compensation. Another problem is raised by Haugen

and Baker: that consider the process of selection of the companies in the periodic investment committee meetings that define the model portfolio used as a guide for the creation of clients' portfolios. Here, the different analyst specialized by industry or sector, through a presentation of the companies to the Chief Investment Officer, must propose the possible future highest performing stocks in which invest. With the purpose of doing a good impression, analysts take into consideration companies so called "noteworthy", expected to outperform. Companies that have already received media coverage and for which are present more information on the market. These latter will produce a higher fluctuation of their stocks respect the others. In addition, the choice of these newsworthy firms is easier to be explained to the clients.

- Investor choice based on Mean variance criteria: the model assumes that the risk is represented by the variance and the expected return is defined by the mean of the returns. This hypothesis has the benefit of requiring just knowledge of two variables that can be easily expressed on Cartesian axes. The problem is that the variance is a reliable measure of risk if the returns follow a normal distribution., a thing that is not so frequent as many researchers have shown[10]. The following example underlines an anomaly in the practical application of the CAPM considering two securities A and B, with different distributions but same mean and variance. According to the model they are equally evaluated even if the distributions of returns are different.

Titolo A:	
Probabilità (Pi)	Rendimento (Ri)
10%	5%
20%	10%
40%	15%
20%	20%
10%	25%
Rendimento medio A:	**15%**
Varianza A:	**0,30%**

Titolo B:	
Probabilità (Pi)	Rendimento (Ri)
10%	9%
20%	11%
40%	13%
20%	21%
10%	27%
Rendimento Medio B:	**15%**
Varianza B:	**0,30%**

FIGURE 9 DIFFERENT STOCKS, SAME FINAL RESULTS

For an investor, the two stocks are not the equal, because the stock B has a longer right tail, and this attract investors since will deliver higher returns. This characteristic, proper of the B stock's distribution (skewed) is not considered in the model that uses the variance as a measure of risk.

[10] Sentence of Alan Greenspan

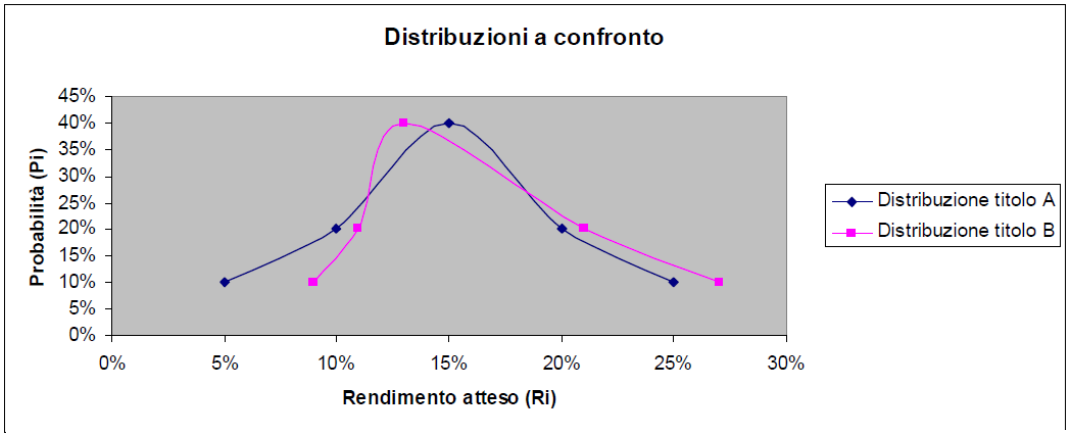


FIGURE 10 COMPARISON OF DISTRIBUTION

- Preference for skeweness: According to Barberis and Huang (2008) that recalls the Tversky and Kahneman's (1992) cumulative prospect theory, investors account stocks' skewness as a factor to consider in their evaluation. A positive skewed security is considered attractive because permits to pay a fair price for having some possibilities (really low) to win a big reward compared to an higher probability to bear a small loss. This is the same concept of lottery: if the person that buys the ticket knows some statistics would notice that he is overpaying the ticket for the possibility to win. Anyway, there is this big reward that attracts and leads people to buy ticket (same as volatile companies). This phenomenon contributes to the volatility effect resulting in an overpriced volatile stock that yield negative average returns.

c) Single period model: this assumption doesn't find confirmation in reality because in the market there are different types of investors, for example speculators that are interested in short term profits will evaluate the risk in a different way respect a value investor with a long-term view.

d) Information is complete, simultaneously accessible, and rational processed: This assumption is necessary in order to ensure an efficient market. If this were not the case, investors with different information would have different frontiers of efficient portfolios. In the real world, this assumption is not verified: accessibility to information is not immediate but takes time and money. All the following part is related to the inefficiency aspect that we have already treated in a previous section. Anyway, here are detailed behavioral factors that highlight the mistakes in doing rational investment decisions.

- Attention grabbing stocks: Barber and Odean (2008) sustain those individual investors are attracted by the so called "attention-grabbing stocks", present in the news or that have incurred in outstanding performances. The concept is that investors have difficulty in searching from the whole number of stocks in the market and focus on the most known. This goes in contrast with the CAPM assumption that investors have complete

information. Moreover, the stocks that bear the favor of the investors are the ones that shows a high volatility and this factor led to an inflation on their prices. This confirms the volatility effect.

- Two causes of the irrational process adopted by the investors are the "representative bias" that according to Tversky and Kahneman (1983) describes the strong appealing for anecdotes than objective elements. An example is the high attention reserved for companies that do an IPO, expecting to find the next Google or Apple. Another cause that recalls the lack of rationality in the investment process is the "overconfidence" showed by both individual investors and fund manager in the stock picking and in the market timing.

e) Taxes and transaction costs that are not being considered:

- The tax rates for investors and investments are not the same. Investors that live in different countries bear different rates.
- Transaction costs are present for every deal put in place.

According to the CAPM: An investor should be compensated based on the risk that is not diversifiable. It is possible to have a high individual risk investment that is moderate in comparison to the market risk.

After the raising of these doubts, the following questions may arise: Should a diversified portfolio solely contain stocks or should it also include other asset classes? Should diversification be done on a national or global scale? It is feasible to construct a globally diversified portfolio that contains all asset classes in the CAPM with no transaction fees.

The model does not well reflect the structure of security returns, according to data supplied by Douglas (1969), Lintner (1965a), and most recently Miller and Scholes (1972). According to Miller and Scholes' work, α's individual assets are systematically connected to their β's: high-beta assets tend to have negative α's, whereas low-beta stocks tend to have positive α's.

Because of its empirical flaws, the CAPM is unlikely to be used in applications.

Papers that test the CAPM

Considering the unrealistic assumption that support the Capital Asset Pricing Model by Sharpe, (Haugen, Heins 1972) propose an analysis of this "risk premium hypothesis" trying to verify and test the model that during the years gained a great success thanks to its intuitive pattern and not very solid empirical proofs (according to the authors).

In the CAPM can be identified two different components:

- the mean of the possible results that stands for the expected return
- the covariance of an individual asset with the so called "marker portfolio" that represent the risk embedded in the investment.

The problem here is that both the expectations of the investors (there are different information and transaction costs, different valuation of future returns) and the appropriate rate of return are not known. The only certainty can be found on past and present values.

Through the observation of the stability of the parameters (constant variance of the returns) in a fixed past period, according to the CAPM, is possible to say that this pattern can be maintained also in the future and so define the expected return and risk based on these results. This is called stationarity problem.

There are two assumptions that, in the results obtained in support to test the CAPM model, can affect the outcome:

- **Problem of selection of a time period** (assume stationarity in the underlying probability distribution) = the important consideration to do here is that depending on the actual situation of the market (bear or bull), the results can be lower respect the expectations in the first case while having results that exceed the expectations in the latter. So, the nature of the empirical result is affected by the nature of the market we are sapling in. The tests done to support the Sharpe's model were taken during a bullish market from 1953 to 1968 (all the stocks obtained outstanding results). A longer period of time is necessary to deliver a fair analysis.
- **The posterior selection problem**= the technique used to validate the model considered the creation of a portfolio built at the end of the period under analysis. For this reason, only companies that survived in this period were considered, the others that disappeared/failed were not counted. The adoption of this method affects the result in favor of the risk premium hypothesis. It is evident that if the failed issues were taken into consideration, the results would have showed a higher level of risk and obtained lower average returns.

To highlight this last problem Haugen and Heins randomly picked and maintained 150 issues from the New York Stock Exchange between 1926 to 1969. At the same time, the ones that went out of

	$\overline{G}_R$	$\overline{\sigma}_r$
90 Broken Series	.040	.557
60 Successful Firms	.073	.264

FIGURE 11 AVERAGE RETURNS AND VOLATILITY FOR SUCCESSFUL AND UNSUCCESSFUL COMPANIES

the exchange were substituted with other random companies.

The results present in the image upstream makes clear the doubts raised by the two authors.

To solve the posterior selection problem is necessary to pick randomly stocks at the beginning of the period under analysis and maintain them till the end. In order to prove this methodology, 114 portfolios of 25 stocks each were constructed (stocks included in the NYSE). The same amount was intended for each stock and the portfolio's performances were monitored monthly in the period between 1926 and 1971 (same method of substitution used above for stock that are delisted from the exchange).

The analysis has been divided in three parts:

- A longer period of time (1926-1971) to not being subject to particular market moments (bear or bull)
- A period of variance's stationarity (1946-1971) that permits to highlight the average returns reached respect a period of higher variance (1926-1971).
- A division in shorter periods (5 years each from 1926 to 1971) to denote the problem of the time-period selection.

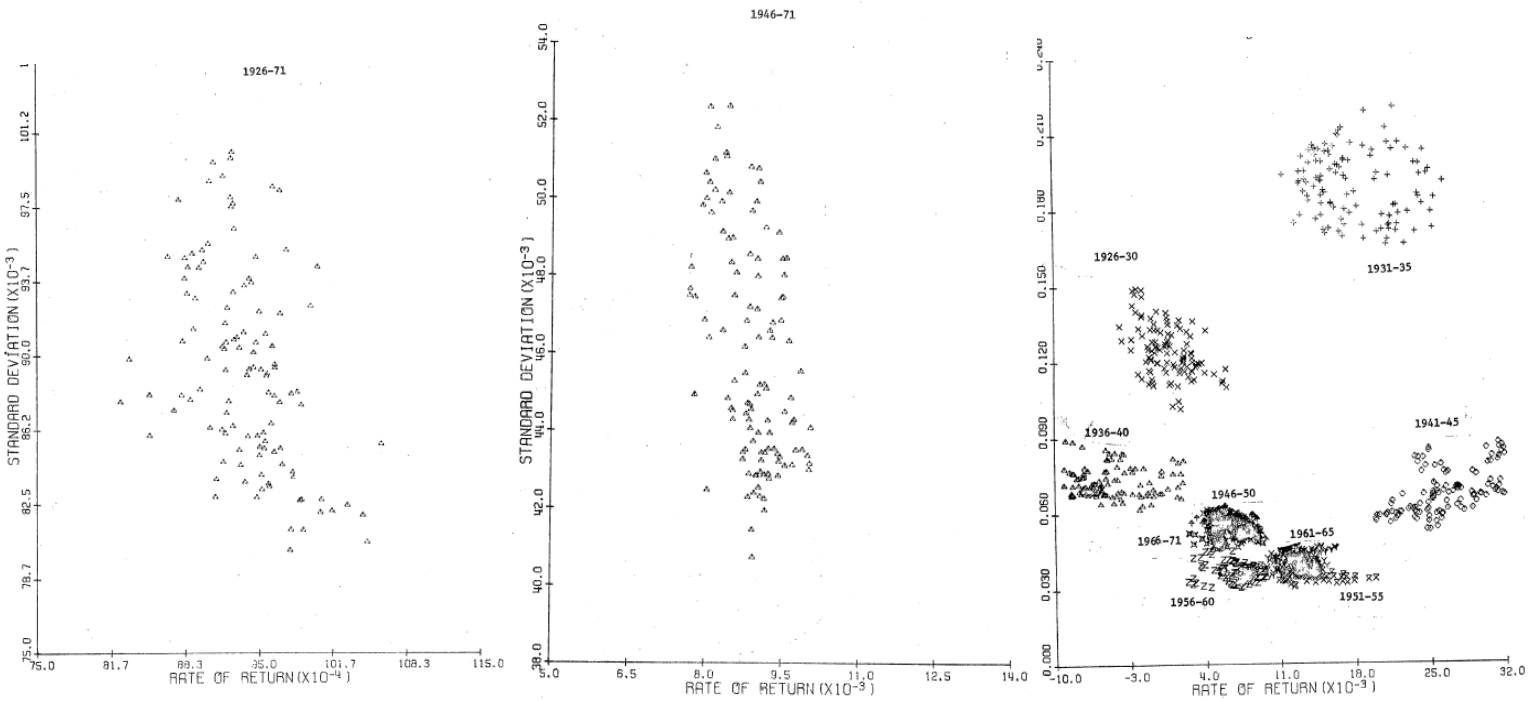


FIGURE 12 RELATION BETWEEN RATE OF RETURN AND STANDARD DEVIATION FOR DIFFERENT RANGE OF YEARS

Statistics	1926-71	1946-71
Average of portfolio returns	.0094	.0089
Average of Standard Deviations	.0893	.0460

FIGURE 13 REGRESSION STATISTICS FOR LONG PERIODS

The result is that the relationship between return and standard deviations is mainly negative over the long periods (first graph) and can alternate a positive or negative pattern in bull or bear markets (third graph). To further strengthen the time-period problem hypothesis, was tested that when the market performance over a 5-year period was higher respect the previous 10 years' return there was a positive relation between returns and standard deviations (it happens in 1941-1945 and 1961-1965).

The conclusion in that no risk premium exists. Is clear from the charts that in the long run stock portfolios with a lower variance outperform the ones with a higher variance. But even here a strict relation that is valid for all the situations is not evident.

Considering that we assume the volatility as the difficulty of the market to price correctly the shares of a company, the previous graphs make evident our hypothesis. In the different clusters (ages) the market changed the way to evaluate and consequently price the stocks. There are ages where the market was more

irrational (higher volatility), it has difficulty in determine with a certain degree of confidence the evolution of the business.

Researchers have known since the first testing of the CAPM that the empirical relationship between risk and return is too flat (see, for example, Fama and MacBeth [1973]). Low-beta equities have positive alpha, according to Black, Jensen, and Scholes [1972]. Fama and French [1992] show in their seminal study that beta does not predict return in the 1963-1990 period, especially after controlling for size.
An update of the data and evaluation of the flat curve defined by the previous authors was exposed in (Fama, French; 2004), where were considered the monthly return of stocks present in the NYSE from 1928 to 2003. Each portfolio was built including stocks with the same Beta calculated at the beginning of each year using the previous five years of monthly returns.

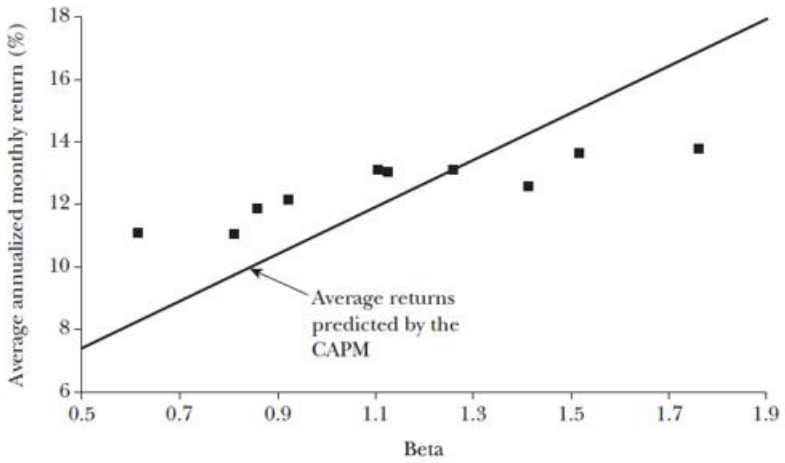


FIGURE 14 AVERAGE ANNUALIZED MONTHLY RETURN VERSUS BETA FOR VALUE WEIGHT PORTFOLIOS FORMED ON PRIOR BETA, 1928-2003

Another great contribution to the return-risk question was apported by Aswath Damodaran, well-known finance professor at the Stern School of Business at New York University. He made/is currently providing different publications on the theme at the extent that he created its own measure to assess the equity risk premiums.
During its years of research found some anomalies and problems on the base upon which the risk is calculated in the CAPM (β) and exposed this concept with great clarity taking as example the process of Beta determination for Disney (Damodaran,1999).

The concept of risk has been specified with the risk perceived by an investor that is well diversified, the marginal investor. For this reason, the risk is seen as the incremental value of risk that a company brings to the diversified portfolio (usually a market index). An investor should be remunerated based on the non-diversifiable risk. Can happen to have an investment with a high individual risk, but to be low compared to

the market risk. Another characteristic that is common to all the Betas is that they measure a relative risk of an asset, this means that its value moves around one.
After having done these assumptions, some questions can emerge: the diversified portfolio should include only equities or other asset classes? The diversification should be done domestically or globally? In the CAPM with no transaction costs is possible to have a globally diversified portfolio that includes all the asset classes.

Some problems can emerge in the definition of the Beta and that can affect it (all the tree problems are followed by examples considering Disney as the reference company):

1. Choice of the market index: when we select the market portfolio, usually an index in taken into consideration. It will simulate the diversification side, but most of the indexes represent only some equities instead the overall equities in the market. For example, the S&P 500 considers the biggest 500 companies for market capitalization in the USA and does not evaluate the performances of the other thousands of companies present in the market. In the emerging markets the situation is even worst: the indexes cover only few companies. Even the Morgan Stanley Capital Index is not really

Index Used	Beta Calculated
Dow 30	0.99
S&P 500	1.13
NYSE Composite	1.14
Wilshire 5000	1.05
MS Capital Index	1.06

FIGURE 15 ESTIMATED BETAS FOR DISNEY CONSIDERING MONTHLY DATA FROM JANUARY 1993 TO DECEMBER 1997

appropriate because does not take into consideration other assets like fixed income or real assets. For the previous reasons the choice of the index can affect the value of the Beta.

2. Choice of a Time Period: there is not a strict rule about the time span that should be considered in the definition of Beta. For sure considering a different number of years leads to different results. There are opposite advantages in choosing a shorter or longer period of analysis. For the former, the

Time Period Used	Beta Estimated
3 years	1.04
5 years	1.13
7 years	1.09
10 years	1.18

FIGURE 16 IMPACT OF TIME PERIOD CHOICE FOR THE COMPUTATION OF BETA

investor will have less data available, but this one will be more reliable. For the latter, the benefit will be a larger number of observations at the expense of a less reliable data.

3. Choice of return interval: daily, monthly quarterly or annually. If the return period, when an asset is being traded, is shorter or longer respect the market index return period, the Beta can be affected.

Return Interval Used	*Beta Estimated*
Daily	1.33
Weekly	1.38
Monthly	1.13
Quarterly	0.44
Annual	0.77

FIGURE 17 BETA CALCULATED WITH DIFFERENT RETURN INTERVAL

Problem of measuring the correlation with the market index.

Different financial services like Bloomberg arrived to a solution for these problems adjusting the value of Beta in order to have a more reliable one. Bloomberg tends to give different weights to the Regression Beta discovered and to the Beta equals to 1. This choice is due to the tendency of the firms that stay in the market to increase the size, becoming more diversified and moving their Beta toward 1.

$$\text{Adjusted Beta} = \text{Regression Beta}\ (0.67) + 1.00\ (0.33)$$

This however has a big flaw: the equation doesn't consider that the companies can reach a beta equal to 1 with a different speed, depending on their sensitivity to the market conditions (companies influenced by business cycles will have higher Beta) and operating and financial leverage (fixed costs vs total costs; D/E).

The (Haugen, Heins; 2012) paper follows the one dated 1972 by the same authors, where they analyzed the period 1926-1971 identifying anomalies in the well-established relation between risk and return. The result of their previous paper was that for the US Stock market, to a higher risk corresponded a lower realized return. In the succeeding years other practitioners[11] supported this position bringing other proofs from different equity markets.

In this paper Haugen and Baker provided further explanation of the risk return anomaly through studies in in all the stocks[12] for 21 developed countries and 12 emerging markets that cover the period from 1990 to 2011.

[11](Ang, Hodrick, Xing and Zhang 2006); (Blitz, Van Vliet, 2007) ;(Baker, Bradley Tagliaferro, 2013)

[12] The database includes the 99,5% of the capitalization of each country

The pattern used in this analysis considers that at the beginning of each month, according to the stock's volatility, is made a division in deciles rolling 24 months standard deviations of returns. Then for each of the following 264 months is observed the total return for each decile and the results are the following. The effectiveness of their study is due also to the simpleness of exposition and the inclusion in the samples of non-survivors' company, a thing that is not present in the CAPM analysis.

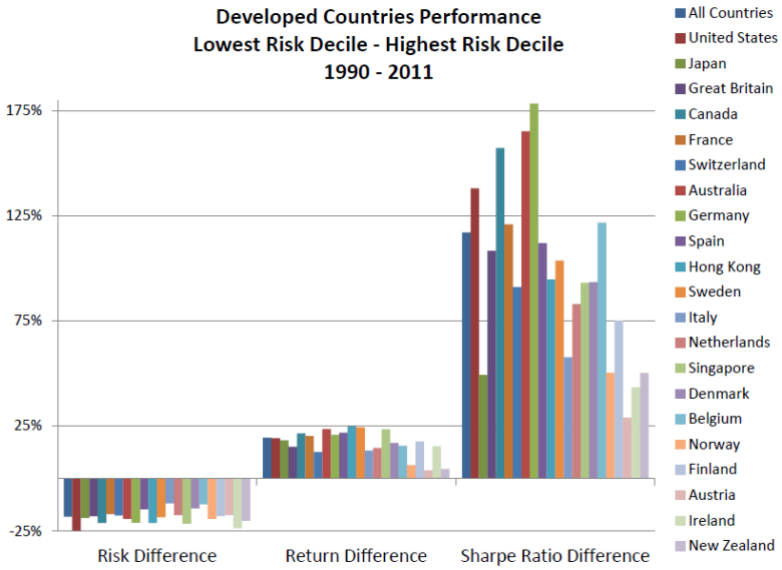


FIGURE 19 DEVELOPED COUNTRIES PERFORMANCE LOWEST RISK DECILE-HIGHEST RISK DECILE 1990-2011

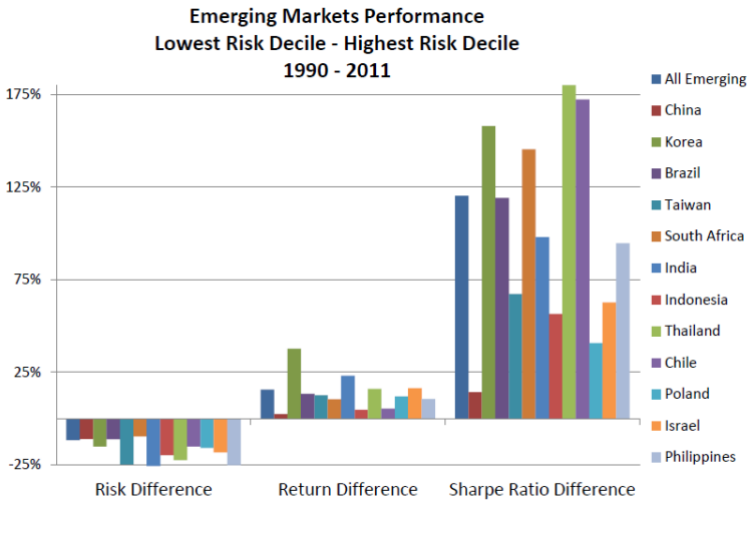


FIGURE 18 EMERGING MARKETS PERFORMANCE LOWEST RISK DECILE-HIGHEST RISK DECILE

The graphs above are self-explanatory, means that they clearly show the inverted relation risk-return by subtracting the results reached in the lowest volatility deciles with the ones of the highest volatile deciles for three dimensions: volatility of total returns, total returns and Sharpe ratios.

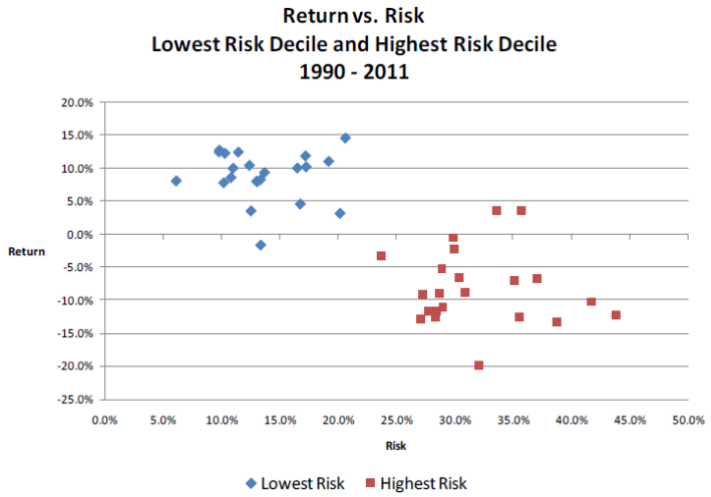


FIGURE 20 LOWEST RISK DECILE AND HIGHEST RISK DECILE DIFFERENCE CONSIDERING RISK-RETURN

The concept behind our thesis is not to statically confute the linear relation between risk-return, but instead the goal is to try to understand what are the factors that should be evaluated to give a better response to the answer: is worth to invest in this company?

We read a lot of articles of many "experts" in the financial field, that have different opinions on what to look when assessing the risk of an investment. Someone follows the CAPM rules, other thinks that using the covariance in returns among securities is not the right method. A supporter of this last thought is Warren Buffet, that following the Graham & Dodd [13]classes become one of the greatest investors of all time. Same or similar sort happened to other students of the two professors as stated with examples by Buffet itself in a article written for Harvard University[14]. All the "disciples" were communed by the same way of reasoning about the evaluation of stock investment, they focused mainly on two variables**: market price** and **intrinsic value** of a business, trying to find discrepancies between them. This difference, continuing, is due to the inefficiency of the market.

A statement made by Warren Buffet that explains well this concept: "When the price of a stock can be influenced by a "herd" on Wall Street with prices set at the margin by the most emotional person, or the greediest person, or the most depressed person, it is hard to argue that the market always prices rationally. In fact, market prices are frequently nonsensical"

A famous example, often cited by Buffet is related to the selling of Washington Post Company in 1973 for $80 million. The company owned valuable assets that at the time could have been sold for $400 million (nowadays even for $2 billion). A decrease in the selling price to $40 million would have increased its Beta and consequently the riskiness of the company, for the CAPM followers. According to Buffet is absurd considering that having the possibility to pay half of the original price there are persons that thinks that it is riskier.

The advocates of the value investing theory, taught by Graham and Dodd, affirm that the strong movements of the prices of a firm respect its value is to be reconnected only to how the market perceive this value, and this perception is particularly wrong if we look to the short term. For this reason, an investor should spot this gap.

The thing is that an investor should not try to move away from companies that have high volatility, considering them riskier. The important thing to look at is the company in the long term, if it has the right characteristics to perform well in the market and if it is protected with the so called "economic moat" (sustainable competitive advantage) from other companies.

The second aspect for which an investor should pay attention is to buy at a price that is below the fair price, in order to be protected from possible mistakes in company's evaluation or unexpected events.

Considering the unrealistic assumptions of the CAPM, the strategies that follow this model do not work.

[13] Economists and professors at the Columbia Business School

[14] "The Superinvestors of Graham and Dodsville"

An example that explains the failure in the application of this approach is proposed by (Kepler[15],1990) that provides a case in which the general overconfidence of the investors in placing money in the Japanese market, led to heavy losses in the financial market.
From the 80s to 90s, with the increased globalization of financial markets, investors wanted to create portfolios that were well globally diversified. For this reason, there was an increase of capital employment towards the Japanese equities that showed a low volatility in terms of monthly return for the previous five years compared with other markets.

[this recalls the same concept of Minsky that underline the misbehavior of persons in decisions taking during the periods of low volatility. Or basing the idea that low volatility predicts lower risks, according to MPT and CAPM].

Using as market portfolio the MSCI Japan Index, the Japanese stock market dropped about 47% in the first nine months of the 1990, bearing higher losses than any other stock market in the MSCI World Equity Index. The Dutch stock market, on the other hand, plummeted just 17.2 percent while having the same standard deviation (5.2%) as the Japanese market. The Australian stock market, which ended the year with a standard deviation of 7.4%, only dropped 13.7 percent.
This was the result of a general misperception on the valuation of the Japanese stock market, following the MPT rules, that instead was overvalued.
The input variables to the CAPM model are estimations, not known numbers, for this reason, the quality of the input is reflected in the output of model.

[15] First Vice President of Commerzbank Capital Markets, New York

A factor that worth to be mentioned, and that is endorsed by Benjamin Graham, is the importance of keeping the stocks invested for a long period of time. This because in the short term there could be some price shocks that are temporary, but this does not mean that the company is riskier. On the contrary, the elements that states possible losses, the real risk for an investor, are related to a deterioration of the company's quality, vulnerability to future liquidity needs or an overpayment respect the intrinsic value of the stock.

	1-Year Periods	5-Year Periods	10-Year Periods	15-Year Periods	20-Year Periods	25-Year Periods
High	54.0% (1933)	23.9% (50-54)	20.1% (49-58)	18.2% (42-56)	16.91% (42-61)	14.7% (42-67)
Average	12.1%	9.8%	10.1%	10.0%	10.5%	10.8%
Low	-43.3% (1931)	-12.5% (28-32)	-0.9% (29-38)	0.6% (29-43)	3.1% (29-48)	5.9% (29-53)

FIGURE 21 RANGE OF RETURNS FOR US STOCKS FROM VARIOUS HOLDING PERIODS (FROM 1926 TO 1988)

Is possible to notice that taking a single year, the return could be extremely high or on the contrary is possible to incur in a huge loss. Increasing the length of the investment the probability to have a loss diminishes till becoming negligible from a 15–20-year period. Obviously as stated before, the importance of not being forced to liquidate the investment in the short term can play a main role.

Discussion

We can identify the volatility as an indicator of the ability of the market to price correctly the value of a stock of a company. Considering that the underlying value (fundamentals) of a company doesn't change so frequently, where there is higher price volatility means the market has harder time to correctly price a stock. This explains why the less volatile stocks belong to firm for which is easier to predict its future prospects.

A person that shares this thought and from which we took inspiration and advice is **Terry Smith,** founder, and chief executive of Fund Smith. This fund, established by Terry Smith in 2010, has now 33 billion $ of assets under management and has obtained outstanding performances over the years. Is necessary to do a further mention also to his book "Investing for Growth" in which we found precious tips and points of reflection.

In his fund, one of the sectors in which he invests is called

"Consumer staples" = Consumer staples are a group of fundamental products utilized by customers. Foods and drinks, domestic items, and hygiene products, as well as alcohol and tobacco, fall under this category. Consumer staples firms have been proven to outperform in market turbulences, according to research. Furthermore, in a declining economy, consumer staples stocks have more steady profit levels, becoming a safe place where to invest. The main characteristic of these products is that they satisfy daily necessities of the customers and for this reason they are bought frequently no matter the period that a person is facing.

By Comparing the volatility of companies operating in this industry (like P&G, Unilever) you will notice a low value of it. This is also due to their big size and consequently a higher number of analysts that try to price their stocks frequently. The concept here, is that the analysts transform specialistic knowledge in common knowledge for the market. In this way the prices will reflect better the actual situation. Another point to underline is that usually, more there is a debate or different perspectives around a company, higher is the probability to have a correct price for it.

Observing with broad lens the market and the different industries, with the aim of keeping the analysis clear and rational, we can identify some characteristics for which is better to pay attention in the selection of a quality company in which invest. The paragraph below will explain the reasoning behind the firms chosen for the graphical demonstration of our idea.

We preferred to keep the explanation simple and straight to the point, avoiding giving too much importance to complex ratios and formulas to evaluate the industries and consequently a company. Further reasoning is present in the following section where we gather all the determinants of the risk with the corresponding justifications.

The decision has been to distribute the factors that determine the quality of a company in different areas, to better highlight the source of problems or point of strength that can affect the future profits of a company. Starting from an industry level and then going more in deep with the company level and the characteristics of the product sold, the things to look at are[16]:

1. *Industry level*
    a. Peculiar characteristics of the industry that affect its profitability
    b. External capital dependence
    c. Industry predictability and future perspectives of growth
2. *Company level*
    a. Importance of solid competitive advantage
    b. ESG compliance
    c. Longevity of a company in the market
    d. Presence of the founder or family descendants in the capital of the company
    e. Managers'/ directors' valuation and main shareholders' ownerships
3. *Product and service level*
    a. Importance of the image of the brand
    b. Yearly cyclicity of the product/service and its components
    c. Product/service's repurchase time by customers
    d. Predictability of the product/service offered
4. *Financial statement's elements*
    a. Level of margins
    b. Cash conversion
    c. Capability to increase/maintain the level of ROCE
    d. Cash flow to debt ratio

After having done these assumptions, to do a first screening, is possible to proceed with a list of industries in which the previous characteristics can be put in practice.

Examples of Industries in which is better not to invest:

a) *Real estate, steel, mineral, chemical, engineering, heavy construction companies* due to the cyclicality of their products and do not have a differential brand value.
b) Airlines, Telco: require high capital.

[16] the following factors have been chosen looking at the value investment strategies of hedge fund like Fund Smith and Lindsell Train. Moreover, a process of brain storming was put in place.

c) *Auto Manufacturers*: low margins, large capital demand, durable products (if a person is in financial difficulty, lengthens the period of use of that car), high competition.

d) Pharmaceuticals: difficulties to forecast patent duration and capacity of innovation.

e) *Insurance and banking*: banks need big capital (leverage problem), are tied to economic policies, fintech that competes with them, earnings instability.
The banks, however, give high dividends because they have no way to reinvest earnings profitably (to grow the company).

f) *Agricultural products:* high competition, foreign products at lower cost, deterioration of products.

Examples of industries in which could be convenient to invest:

a) Consumer staples

b) *Healthcare products*: e.g.: syringe manufacturers are few (oligopolists), the same for hospital products (oligopoly)

c) *Transport systems-Elevators and Escalators:* there are few companies that own the majority of the market, so they can sell them at a good margin. Moreover, this industry is strictly linked with the maintenance or replacement of the equipment already sold that assure constant revenues over the years.

d) *Internet Services*: Alphabet (Network effects generate monopoly situation)

e) Social media/social network advertising: Facebook (leading position and low competition)

f) Technologies and entertainment: Netflix (leading position and low competition)

g) *Computer Software*: Oracle, Sap (ERP duopoly)

At the end of this list is possible to affirm that there are industries that embed lower overall risks respect other industries[17].

[17] This is a general rule, there could be some companies in "better not to invest" that are profitable and on the contrary, there are companies in "better to invest" that are not convenient.

Earnings Or Cash Flow?

A topic that created high debate during the years is the choice of a measure that indicates the future performances of a company. There are discording opinions, and the conclusion can be that there is not a single best indicator, but what should be done is to analyze a company considering different aspects. For sure some of them are more value relevant than others.

Two main different way of thinking can be identified: the first one, supported by the Financial Accounting Standards Board (FASB), assigns to earnings a superior role as predictor of future prospects. In fact, this measure should incorporate more information for shareholders and stockholders.

On the other side there is another view endorsed by the business press like the Institutional Investor in which is reported that the 61,8% of chief financial officers have the priority of the cash flow maximization, assigning more value to it.

Are worth to be mentioned two papers that analyze more in deep the reason why there is so much uncertainty and discussion around these two accounting voices.

The paper written by Bartov, Goldberg and Kim (2001) explain that according to conventional thinking, the relationships under investigation should differ throughout countries due to various socioeconomic conditions that result in variances in financial reporting and stock price determination.
Earnings created in the three Anglo-Saxon countries (United States, United Kingdom, and Canada) are expected to outperform cash flows in terms of explaining stock returns considering that in these countries the capital is historically raised in public markets and reporting regulations are unconstrained by taxation requirements. In contrast, the superiority of earnings over cash flows in explaining stock returns is not expected in the two non-Anglo-Saxon countries, Germany and Japan, where capital is historically sourced from private sources. Another interesting reasoning has brought by Black (1998) in which highlights the relevance of the position in the lifecycle of the company. At every stage there are some characteristics that are more significative and say more about the status of the company. An example is that:

- Startup= cash flow is more important
- Growing stage= cash flow/earnings
- Maturity = earnings
- Decline stage = cash flow

At the end there is not one measure that overcomes the others, but a broader view in the analysis of a company is for sure necessary to take a more conscious decision for an investment. For this reason, is better to consider different aspects even not strictly related to cash flow or earnings (like return on investment and capability to repay debts). The important thing is to understand the building blocks that affect the future results of a firm. The focus should be on the elements that determine the quality of a company.

Long Term Vs Short Term Analysis

LONG PERIOD:

When you decide the company in which you want to invest, you are bearing a risk that is linked to the previous points (industry, company, products, and services sold) and this doesn't come from the volatility of the stock prices in the past periods. That is, as we will explain in the section "what is volatility and how to exploit it", an element that should be monitored only for the short term but that doesn't impact the long-term results based on the real and rational evaluation of the underlying factors of a company.

The aspect that an investor should consider is the **total return**. It is the sum between the dividends distributed by the company and the change in the price of the share (in case of buyback operations by the company or selling of the share by the shareholder). Moreover, the change in company' evaluation reflects the amount and the effectiveness of the retained earnings reinvested in the business.

In practice, the question that should be done is: What/Where is the risk that I took for these returns?

The focal point is to understand what are the elements that affect my returns.

What we did below is to consider the graphical relation between the long-term trend of the earnings (taken as a proxy of the company quality) and the long-term movement of the price per share because is evident that the former affects the latter in the long run.

Having in mind this final objective, what we want to consider is the trend of the earnings and not its single value to avoid the uncertainty of this element taken only for one year. The reasons are that it can be affected by the decisions of the managers/countries on how to record different revenues/expenses voices or by extraordinary events that can inflate or deflate the value. [Moreover, earnings follow an accrual logic that doesn't give a real view of the moment in which money flow in or out the company.]

By analyzing how the earnings are built and the quality components of the business, we can effectively determine whether the company has the basis to be profitable in the future. And this is the first element that affect the investor's risk (possibility of losing money).

With the aim of stressing this concept, we can take as example a company that has P (price of a share) equal to 1 and EPS (earnings per share) at the same value. This would mean that, if a company distributes all the earnings to the shareholders, these latter will pay 1 for something that will generate 1 the following year (100% of returns). Obviously, this is not possible in the real world and for this reason, the market values the shares at a much higher price respect the earnings that they generate.

This was an extreme case, but the reasoning behind is that the change in the price and the dividends (depending on the internal policies of the company such as the payout ratio) occurs in accordance to the

earnings that the company is able to generate. If the company increases its earnings, there is no doubt that soon or later will see an increment of its price per share.

On the contrary we demonstrate that taking a shorter period the relation that is evident over a long-term period breaks up, making visible some dynamics that moves away the share price from a rational judgment of the real situation of the company. In addition to these factors, can happen that under specific situations in the economy (e.g.: period of recession or period of booming), the price will react with a higher or lower intensity to the positive or negative movements of the earnings over a short period. For this reason, the price can move randomly for a certain time span, but in the end, it will adjust to what really happened in the economy and therefore following the trend of the earnings (as we stated before, proxy of quality).

In the long term, the increase of information that come out from a company, will align the price of a stock with its real value (determined by the quality of the business). This proves highlight the inefficiency of the market to correctly price the shares.

In accordance with what we wrote before, we selected first, companies that belong to the most prominent industries previously mentioned. Subsequently, we show some companies that belong to the "better to avoid" industries with the purpose to make evident the difference in the performance achieved in the eye of an investor.

With the intention to keep the thesis fluently readable, we reported here only some of the companies chosen with the relative graphs. The other ones are present in the Appendix A.

Convenient to invest

Legend:

1. Graph above represents the quarterly Price per share with distribution of Dividends (if present).
2. Graph below represents the quarterly Net Earnings

[18]**ALPHABET**: A company that covers a strong position in the sectors in which it plays, it has strong competitive advantage thanks to its early entrance, well-known brand and effective business model that permits to place its services as a bottleneck or in high dependance for other firms competing in its field and in complementary sectors.

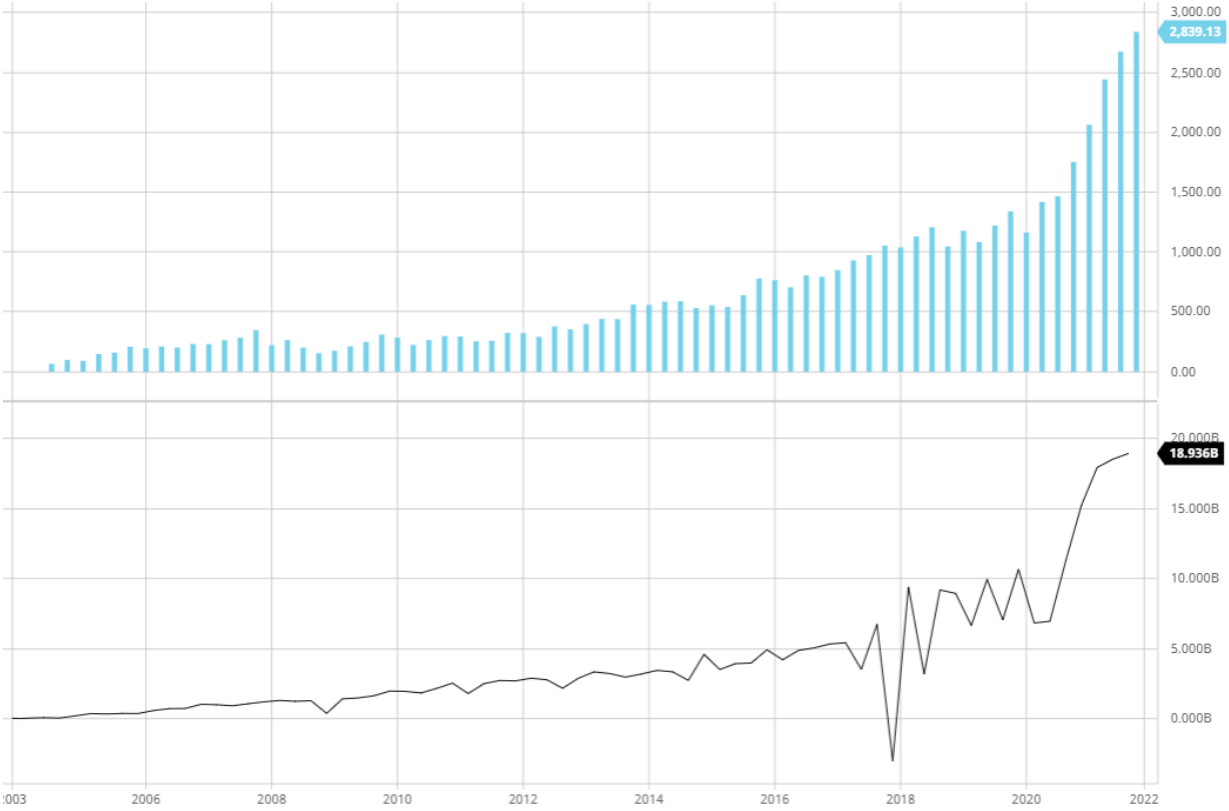


FIGURE 22 PRICE PER SHARE (ABOVE) AND EARNINGS (BELOW) OF ALPHABET

[18] https://www.barchart.com/stocks/quotes/GOOGL/interactive-chart

SAP[19]: Global leader in the provision of enterprise cloud computing that permits to companies of different size to manage in a digitalize way their business. Together with Oracle serves the most important firms in the world, and this enhance its visibility and reliability. The company face low competition due to high entrance barriers.

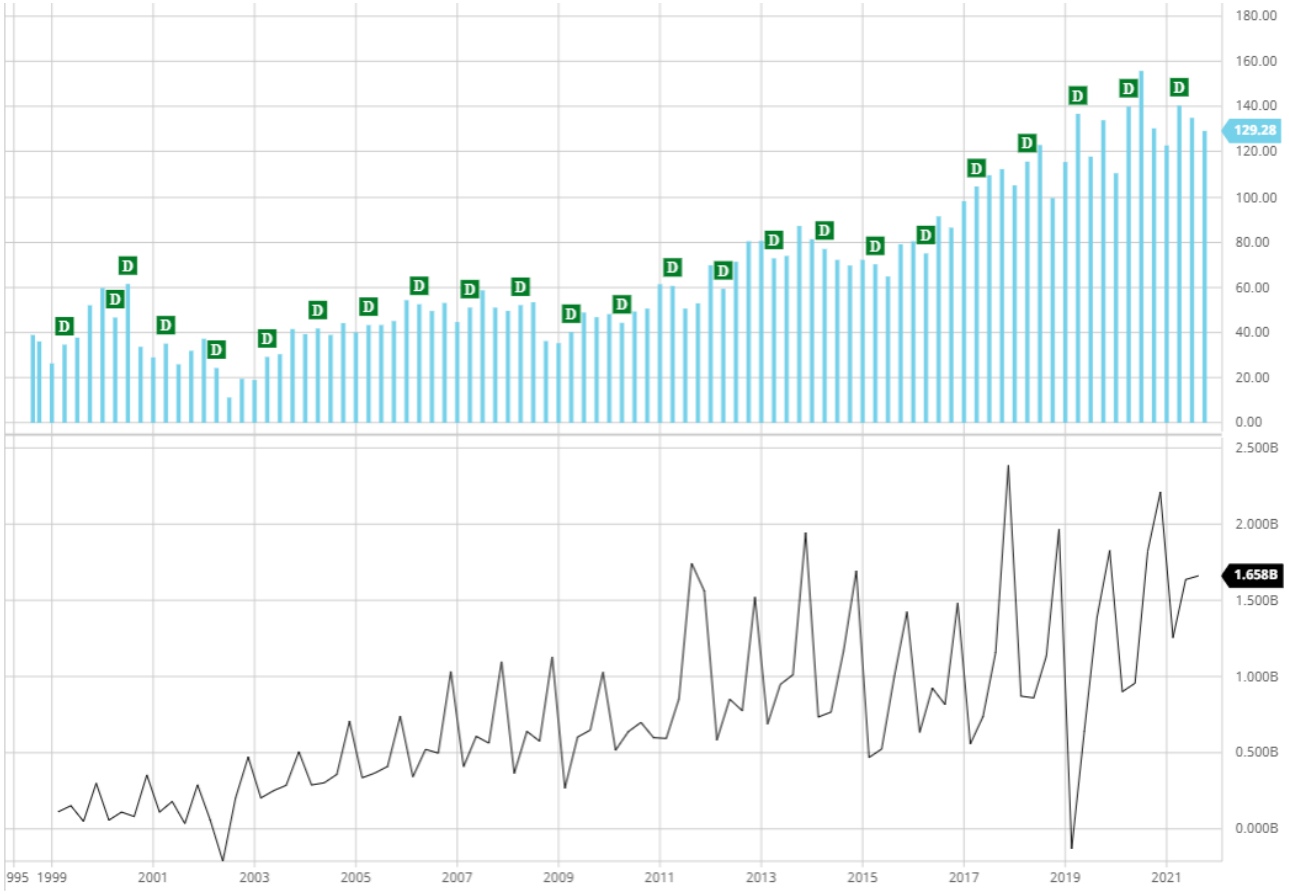


FIGURE 23 PRICE PER SHARE (ABOVE) AND EARNINGS (BELOW) OF SAP

[19] https://www.barchart.com/stocks/quotes/SAP/interactive-chart

Not to invest

Ford[20]: is one of the most know car manufacturer that owns an high number of famous car brands. This industry highlights some weaknesses that probably make these companies a not safe investment. Some shortcomings are: low margins, large capital demand, durable products (if a person is in financial difficulty, lengthens the period of use of that car), high competition.

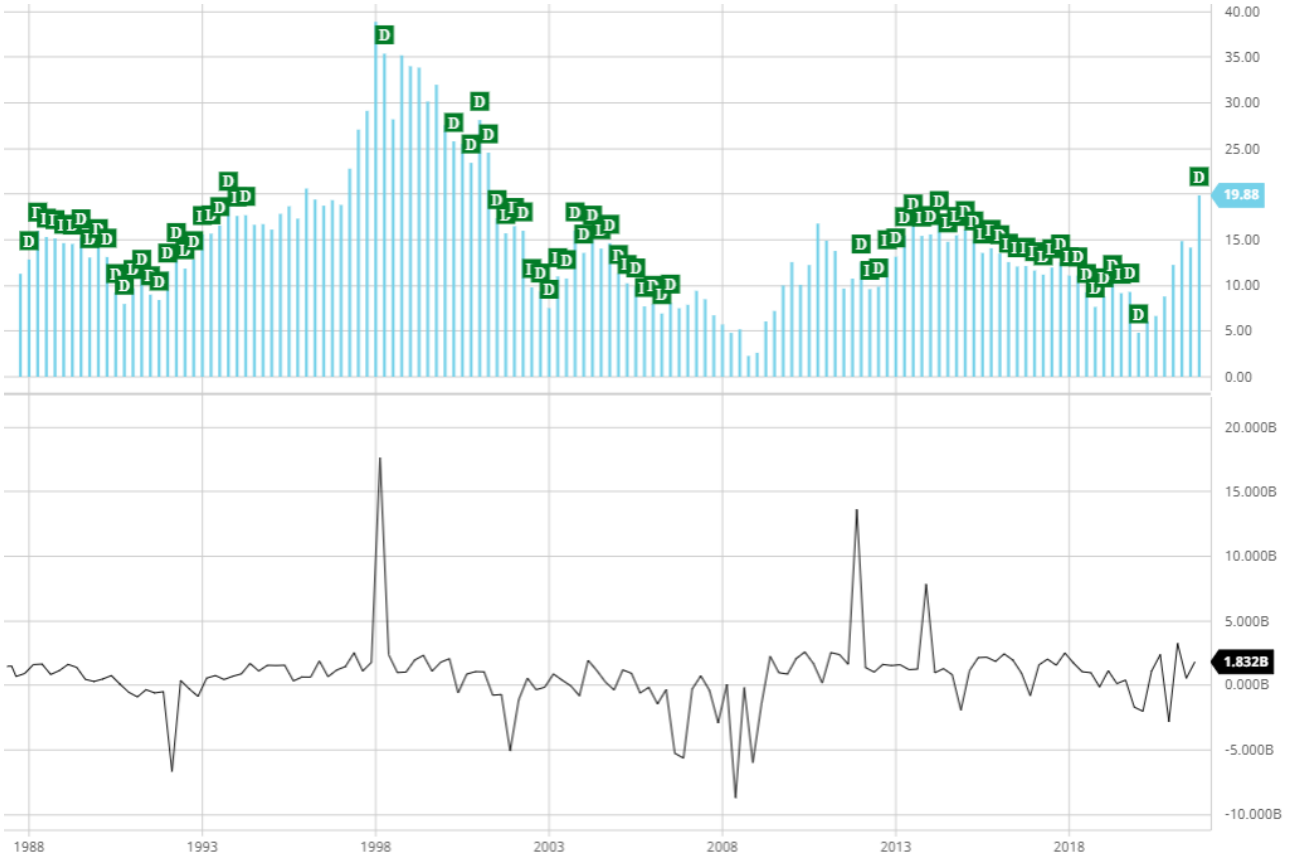


FIGURE 24 PRICE PER SHARE (ABOVE) AND EARNINGS (BELOW) OF FORD

[20] https://www.barchart.com/stocks/quotes/F/interactive-chart

AT&T[21]**=** is a global provider of communication, entertainment, and internet services to individuals and companies. The company shows some problems of profitability of this industry, affected mainly by its high request of capital, difficulties in managing remote working and network security.

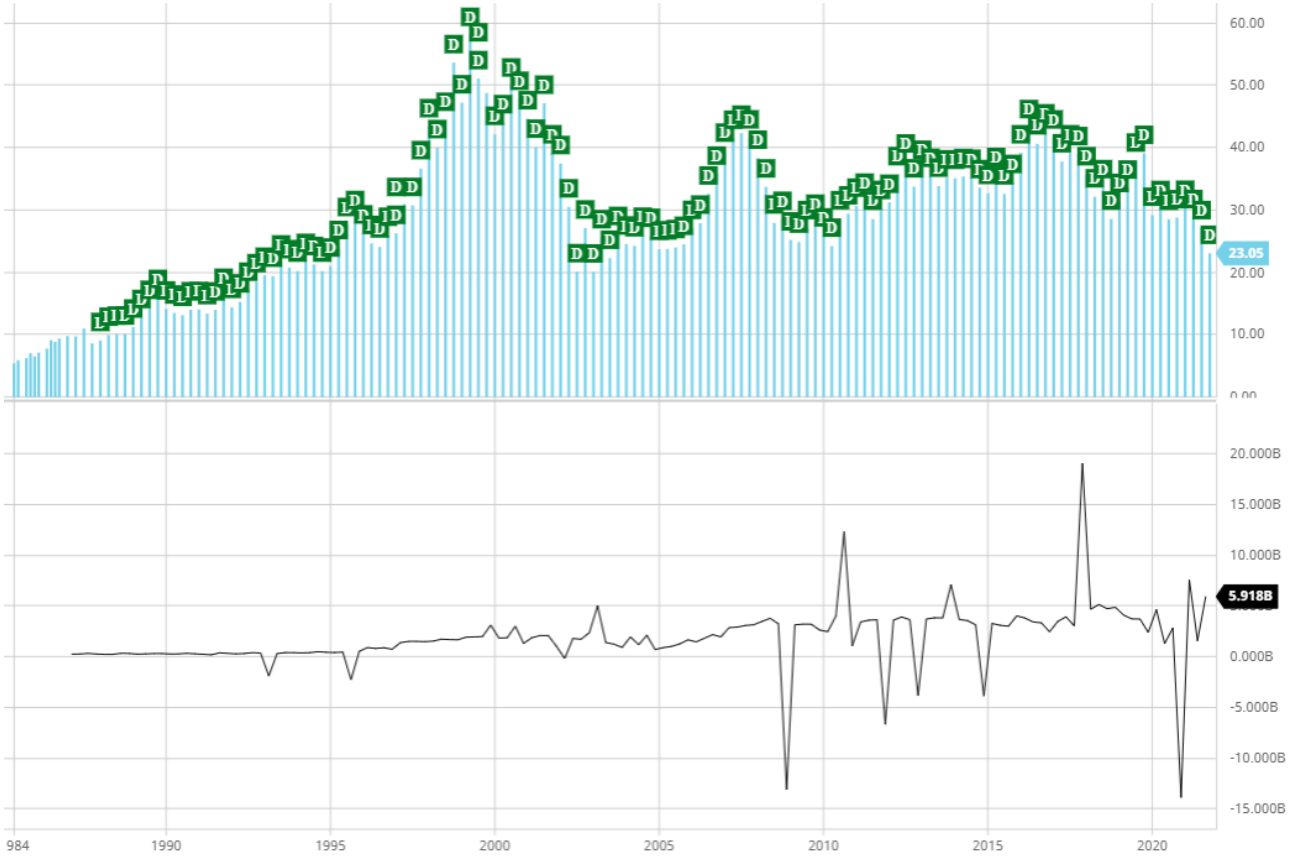


FIGURE 25 PRICE PER SHARE (ABOVE) AND EARNINGS (BELOW) OF AT&T

[21] https://www.barchart.com/stocks/quotes/T/interactive-chart

SHORT PERIOD:

- In the short period, the continuous and sometimes huge fluctuations of the prices are not supported by similar movements of the earning of the company. But, generally speaking, this volatility most of the times is not in relation with any element that really represent or affect the value of the company. What we see can be led back to the so called "random walk" or "drunk walk" in which the prices move without any rational or foreseeable pattern, and especially doesn't have any connection with variables in the past. On the other hand, over a longer period, the market will adjust the price in accordance with the quality of the business, that can be represented by the level of earnings reached and its trend.

  This price variation in the short term is to be connected also to problems in the actual method of companies' evaluation. Indeed, the method tries to predict what will be the earnings or cash flow of the future. When the forecast turns out wrong, the market should update to what is really happened (either positively or negatively as the case of stock crashes). This is the game of going forward to then going back and adjusting the shot.

  The factor that usually determines this volatility has to reconnected to the perception that the investors have and consequently the decisions that put in place, most of the time not based on the evaluation of the intrinsic value of a company. The elements that affects the price's movement in the short term are:

  - ETFs and Index funds. Both create market distortions: when a company is included in the index, the funds and ETFs that replicate that index buy shares of that company, causing its price to rise (strong pressure on demand). The same is true for the process of exclusion from the index where there is an increase in sales and therefore supply which drives down the price. This happens and has an impact in the short term.
  - Financial news about a company in the quarterly reports. Sometimes it happens that a company doesn't respect the forecasts done by analysts or reveals some information related to its business. This causes reactions by the investors that rush to sell or to buy.
  - Statements of persons that cover an institutional role or have high influence on people way of thinking. This situation has been worsening with the spread of social media interaction where a decision/sentence done by one individual can affect the following actions of people.
  - Movements of retail investors that create communities with the purpose of convey financial decisions in contrast with the positions taken by institutional investors.
  - High media exposure around one topic or industry that drives up or down the interest and the price of the companies belonging to it. This point is linked with the term "speculators"

- Relation between the value traders and technical traders: considering that the value traders thinks that a company is undervalued, they start to buy it, raising the prices. This leads to an uptrend. At this point the technical traders, following the trend, buy these stocks, increasing the prices even more. But shortly later, the market seems overvalued and consequently the value traders start to sell the stocks and in succession the technical traders do the same thing. Is evident the presence of a cycle. The impact and the size of this cycles depend on the number of value traders and technical traders.

  So, the value traders have a behavior that stabilize the market moving the price in a more rationale direction, contrary the technical traders increase the volatility.

- Some psychology elements of the investors:
  - Overconfidence: belief that one knows more than one actually does
  - Sensation seeking: investing compared to gambling
  - Familiarity: tendency to overweight familiar stock in their equity portfolio
  - Reinforcement learning: people tend to replicate actions for which in the past obtained positive results (e.g.: buy a stock that belongs to the same industry in which previously she obtained a capital gain)
  - Attention: amount of time dedicated for finding information on her investment. Could impact both positively (avoid over reaction) and negatively (delayed reaction)

In conclusion we can affirm that: In the long-term total returns and earnings are linked, the risk of my investment to obtaining returns will depend on the quality of the earnings. What volatility does on the stock prices in the short term should be disregarded and can be avoided by investing long term.

Risk assessment for the investment

Determinants of the Risk

Recalling what we have previously said, we emphasized the strict connection between the total returns (price of a share + dividends) and earnings of the company (quality of the business) over the long term. Whit this premise, now we want to list the factors that affect the risk for an investor.

What an investor wants is not lose money, so everything that connects with this possibility should be considered in an evaluation method for the definition of risk.

We can group the determinants of the risk in two clusters:

1. ***QUALITY OF THE BUSINESS*** = commonly, analysts and investors focus too much of their attention on financial indicators and complex formulas, that represent the past performances and could be affected by different accounting decisions by companies' managers and countries. Following what the results say, can lead to a wrong definition of the realty. Instead, the main aspect of concern, is to monitor the quality of the business and consequently the elements that build the bottom line values (earnings, cash flow) of the future. For sure some basic quantitative aspects must be taken into consideration to have a more complete picture of the actual situation. The factors considered have been already mentioned in the previous section, hence here we will provide the explanation of our choices.

   Industry level=

   - Peculiar characteristics of the industry that affect its profitability. The lower is the level of competition, the better it is. A company that is a monopolist or inside an oligopoly, due to high enter barriers such as the so called "moats" (grade of protection of the industry) or due to state policies, will find less constraints to its daily work and expansion. The bargaining power of the customers/suppliers is a critical issue for the profitability of the industry. Capital needed to start the business, switching costs and threat of substitutes are elements to consider.
   - External capital dependency. Industries in which the companies seek continuously money to run their business are not so stable and are exposed to third party capitals and the consequently leverage effect (in which the volatility, seen as a short-term element, plays an important role). Utilities and telecommunications industries in addition to the high amount of money needed for the initial infrastructures, must bear maintenance, upgrades and expansions that require a remarkable and constant injection of capital. Similar is for the banking industry in which the core business is based on borrowing and lending money.

Airlines and large manufacturing companies utilize mainly debt financing to run their businesses.

- Industry predictability and future perspectives of growth. Will depend both on the easiness to predict the movements of the industry and the magnitude of possible future growth.

Company level=

- Importance of solid competitive advantage, a company that has a business model that is difficult to replicate and consistent competitive advantages will find more favorable conditions to survive and obtain good results.
- ESG compliance= measured by the achievements of the goal fixed by the company and regulators. Nowadays there are several firms that provide ESG ratings identifying a final value that is characterized by the level of exposure and management of environmental, social and governance issues. E.g., Sustainalytics.
- Longevity of a company in the market. Usually, companies that faced in the past tough situations and bad economic moments, keeping the business alive and maintaining a solid position in the market thanks to continue innovation, are for sure to be positively considered by an investor.
- Presence of the founder or family descendants in the capital of the company. Higher attachment and capability to explain the main idea behind. Long term view perspective for the investments and results.
- Managers'/ directors' valuation and main shareholders' ownerships. This evaluation starts with the definition of the stability of the management team and the independent directors. How long the CEO is present in the company and the average experience in the current role/company of the management team. The same analysis on the experience should be done for the directors. In addition to that is important to monitor the ownerships of the previous figures in the capital of the company. This can give a hint if the personal objectives are aligned with the ones of the company. In the end the shareholders' composition can help to see the distribution power among different shareholders.

Product and service level=

- Importance of the image of the brand. Companies that have brands in the top 2/3 positions in a specific industry are destined to achieve solid results. Is very important to have a relevant position in the costumers' mind. The market share can give a hint in this direction.

- Yearly cyclicity of the product/service and its components. Companies that sell products that have huge demand fluctuations during the year and have problems along the supply chain (e.g: shortage of particular components) may suffer more respect the others.
- Product/service's repurchase time by customers. In turbulent economic periods persons prefer not to substitute/buy a new product but maintain the previous one. This led to a decrease in revenues for the company.
- Predictability of the product/service performances. This is quite evident if we talk about products that require a patent, in which is difficult to forecast the duration of the protection period. Another aspect to consider is the effectiveness of the R&D expenses in term of level of innovation and profitability in the market. (e.g.: in the biotechnology sector, is difficult to do reliable forecasts. Quite often happen that very promising drugs do not pass the medical studies of Phase 3 because they cannot reduce the mortality rate or due to unexpected toxic collateral effects).

Financial statement elements=

- Level of margins. If a company can sell the products at a high price and maintain the costs low, having for example an outstanding gross and operating margin, will bear less problems during troubled periods.

  The *gross margin,* (Revenues- COGS)/Revenues, indicates how much profit a business earns on its cost of goods sold, or COGS. To put it another way, it shows how well management employs labor and resources in the manufacturing process.

  The operating margin, EBIT/Revenues, of a firm is a strong measure of how effectively it is run and how efficient it is at making money from sales. Investors and lenders pay special attention to it because it reveals the proportion of revenues available to cover non-operating expenditures such as paying interest. However, *EBITDA margin* is often preferred than *EBIT margin* since it seeks to minimize the accounting decisions that are specific to each organization and have a greater impact in certain industries. For this reason, non-considering the "depreciation and amortization" voice permits to compare the profitability between different organizations.
- Cash conversion ratio= Operating cash flow/ EBITDA. It puts in relation operating cash flows of a company with its profitability. It reveals capacity of firm to convert profits into cash. If these two elements are similar means that the P&L statement is a good proxy of the reality. The objective is to find companies in which the earnings are a real representation of the cash that is flowing inside the company in the same year. Economic cycle must be equal to the financial cycle.

It is a good measure of efficiency and flexibility (less reliance on external debt). It reflects the performance in managing the working capital. Is a measure of the ability to pay people more slowly respect to what you are paid.

- Capability to increase/ maintain a good level of ROCE.

  ROCE= EBIT/ (Shareholders' equity + Long term debt).

  A continuous reinvestment is necessary for the growth of the company. Its purpose is to demonstrate how well a firm uses its available capital by examining the net profit made per dollar of capital used by the company. In general, a greater ROCE indicates a company's successful growth and, as a result, larger future EPS. It considers also the ability to reinvest the retained earnings (main component of shareholders' equity) .

  When evaluating the performance of firms in capital-intensive industries like utilities and telecoms, ROCE is extremely valuable. This is because, unlike return on equity (ROE), which only looks at profits connected to a company's stock, ROCE also looks at debt and other obligations. This gives a more accurate picture of a company's financial performance when it has a lot of debt.

  Moreover, is quite intuitive that more capital you employ, higher is the difficulty to have a substantial return on this capital (importance to maintain a stable ROCE to the increase of the capital used). Businesses require cash to run their day-to-day operations, expand, and invest in new prospects. Capital used is useful since permits to estimate how effective management is at capital placement.

- The cash flow-to-debt ratio compares a company's operating cash flow to its total debt (short and long). This is a form of coverage ratio that may be used to estimate how long it would take a firm to pay off its debt if it utilized all its cash flow. Cash flow is preferred over earnings because it offers a more accurate picture of a company's capacity to meet its commitments.

  The higher the cash flow-to-debt ratio, the better a company's ability to pay back the debt.

2. **HOW MUCH I HAVE PAID THE SHARE (P) .** Owning a share, gives you the right on its earnings. The purpose of an investor is to have back more money respect what he has invested and this can be obtained through dividends distribution and appreciation of the price per share. With the aim of keeping the stock for a long period, you cannot apply the rule of pay a high price knowing that there is someone else that will overpay even more than you. For this reason, the price plays an important role to guarantee a satisfying compensation. What you pay will affect the returns that you can get from the investment and so the right price should depend on the level of confidence that a person has on the quality of the business, that in the end will be translated in positive performances in the future.

An investor, for this reason, should minimize the risks on the firm in which is investing money. As a general rule, considering the uncertainty of the future, is always preferable to maintain a certain "margin of safety", that can be described as an assurance for the possible unpredictable events. If an investor is optimistic or have reliable information on the favorable forthcoming results of a company, can accept a higher price respect the opposite situation in which there are some uncertainties on the measure of growth.

Now, a question can emerge: a margin from what?

The answer is that to assess if a company is overvalued or undervalued, it must be compared with the performances of:

- Other similar companies (peers) (what differentiate the evaluation of a company to another one?)
- the industry of belonging (what is the average evaluation of the industry respect the company under analysis?)
- the reference index (what is the evaluation of the index that include the company respect the company itself?)
- the whole market [what is the evaluation of the global market (expansion or recession) respect the company?)

The comparison should check if the current price for that company is fair respect the valuation shown in the previous elements (quality side).

An important sentence that explains pretty well this concept is that: "the price is what you pay, the value is what you get". The objective is to connect the price with something that can identify the quality of a company and consequently will permits to obtain with higher probability a value in the future. There are many metrics that represent this relationship, even if there is not a single best.

PE ratio

The most known is the **Price to Earnings (P/E)** ratio that considers as numerator the price paid for a share and as denominator the annual earnings per share.

This measure has gained a lot of success thanks to its simplicity but at the same time effectiveness in the detection of a quite accurate snapshot of the company valuation respect to what is the underlying quality. Obviously, taken individually, this ratio doesn't say much about a company, and for this reason, to extract relevant information from it, has to be compared with something else.

Broadly speaking, the goal is to buy a healthy company with growing earnings that trades at low values of P/E. This condition, that probably will assure a good deal, is hard to find because companies that show or are thought to have a fast growth, usually display higher P/E.

A common knowledge is to divide companies in:

- Value shares: have a low P/E caused by a variety of factors such as some years of business difficulty, not outstanding future perspectives, long presence on the markets that results in stable economic situation, etc. Typically, in this category there are companies that belong to oil, finance, utilities, and industrial sector.
- Growth shares: have high P/E arising from prominent future perspectives for the growth rate of its earnings and the revenues of the entire sector. Within this group we can find computer science, telecommunication, pharmaceutical and high technology companies.

However, the usage of this metric, can lead to possible misjudgments.

First of all is important to mention that both the components of this ratio can be affected by wrong variables. In fact, the price (P) is defined by the market considering the possible psychological/emotional elements that gravitate around the company under evaluation. Moreover, being the earnings (E) an accounting value, it can be subject to possible changes in the final result due to extraordinary events (e.g.: one-time accounting gains or losses) during different years. Moreover, this voice can be manipulated by managers leveraging on the accrual computation method.

A second aspect to highlight is that the P/E is affected by the events that occur in the economy.

During a recession, stocks fall, but corporate earnings fall sharply as well, which can temporarily raise the P/E ratio. Since we want to buy when the P/E is low, this gives us a false signal that the market is expensive, that we shouldn't buy, when instead it's the best time to buy.

On the contrary if we consider strong economies or period of booming, the P/E could be lower respect the actual value that the company presents. This because the earnings (E) will grow favored by the raise of the prices level and not because of improvements in the company business model. Subsequently the price (P) will show an increase but not that much as the earnings growth.

Moreover, the PE ratio overlooks the company's growth rate entirely.

Throughout their life cycles, various firms expand at different speeds. Growth rates during the initial phase are typically higher than those during the mature phase. If investors merely look at the PE ratio, firms that expand slowly appear to be more appealing since their stocks have lower PE multiples.

High-growth firms, on the other hand, would appear to be more costly since their multiples would be larger. This just considering the value of the earnings and not the potential growth of the company.

Looking just to the P/E, you will see a ratio that is influenced by short term conditions. In this time span, the price (P) will try to reflect with some difficulty the earnings (a thing that will happen more

correctly in the long run) and knowing that these latter can change according to particular circumstances in the economy, P/E doesn't give the most rationale picture.

Trailing PE and Forward PE

The price (P) is the mirror of the actual situation/sentiment and so it has to be taken as it is, without including it in mathematical computation with the aim of extrapolating a more precise number. The only way left to have a clearer view is to compare the price with a denominator that reflects the real quality of the business, to say something about the convenience or not to invest in a company.

Have been some upgrades to the P/E trough two versions, one that includes the past four quarters of earnings (**trailing P/E**) and another one that considers the earnings expected for the following four quarters (**forward P/E**). Even here, some comments can be done. The trailing P/E considers a too short period for not having any interference of extraordinary events or cyclicity of the economy/product sold. The forward P/E instead has the problem that rely on the optimistic or pessimistic interpretation that the analysts do on a specific company.

PEG ratio

A further metric used frequently is the **PEG (Price Earnings to Growth)** that, factoring the actual P/E with the earnings' growth (expected or historical), permits to compare companies in different industries. Lower is the value, the better it is. The shortcomings are that penalizes mature and stable companies at the expenses of the ones with a higher growth rate, furthermore this last percentage for the forward PEG is just estimated and so subject to mistakes.

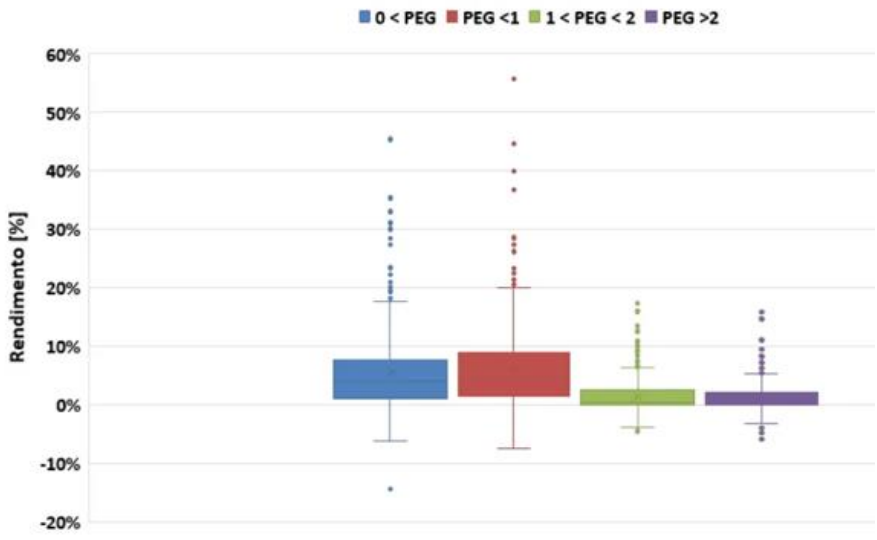


FIGURE 26 PEG VS PERFORMANCES; S&P FROM 2000 TO 2018

Both the P/E and PEG ratios have advantages and disadvantages. The PEG ratio corrects a significant fault in the P/E ratio and facilitates comparisons across firms of all sizes and industries, but it is dependent on precise growth forecasts.

CAPE ratio

Taking into account what we have stated, a possible solution comes from Robert Shiller, an American economist that won the Nobel Prize in 2013 and currently is a Sterling professor of Economy at Yale university, that considers a more reliable version of the P/E. He uses at denominator the average of real (inflation-adjusted) earnings over a ten-year period to level substantial changes in profits that occur over an economic cycle and that make the Price to Earnings ratio to look unnaturally inflated or depressed right away.The relevance of this measure has been proven by Robert Shiller through 130 years of back-tested data on the S&P 500's returns. He demonstrated that the returns over the following 15 years are substantially inversely correlated with the CAPE ratio at any particular moment. To put it in another way, when the market's CAPE ratio is high, equities are overpriced, and returns over the following 15 years are expected to be low. When the ratio is low, however, the stocks are undervalued, and returns over the following 15 years are expected to be favorable.

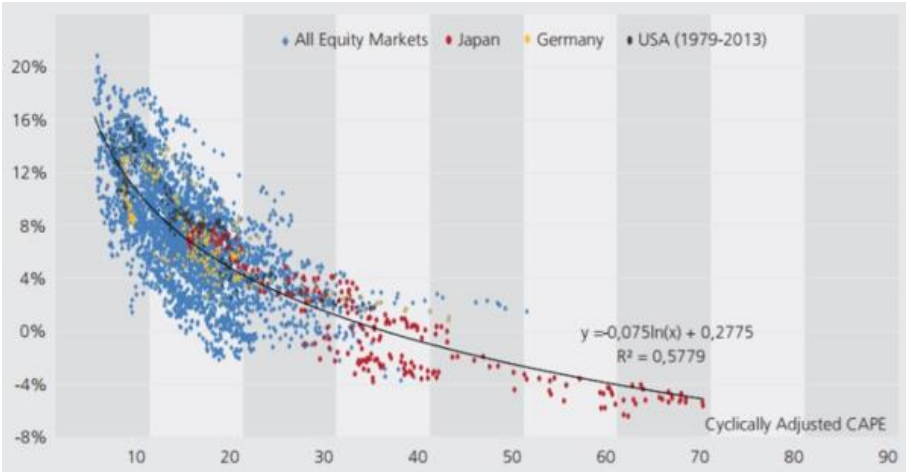


Figure 2: Connection between the CAPE and the returns of the 15 following years in the period 1881-2013 (US) and 1979-2013 (other markets). The USA, Japan and Germany are highlighted as examples in a single period 1979-2013. All returns inflation-adjusted, in local currency, incl. dividend income and annualized. Source: S&P 500: Robert J. Shiller, other countries: Worldscope, Thomson Reuters and own calculations.

FIGURE 27 CONNECTION CAPE VS REAL RETURN OF THE FOLLOWING 15 YEARS

Furthermore, the CAPE ratio's ability to foresee two future crises, as the dot-com bubble (2002) and the housing bubble (2007–2009), has made it particularly appealing.

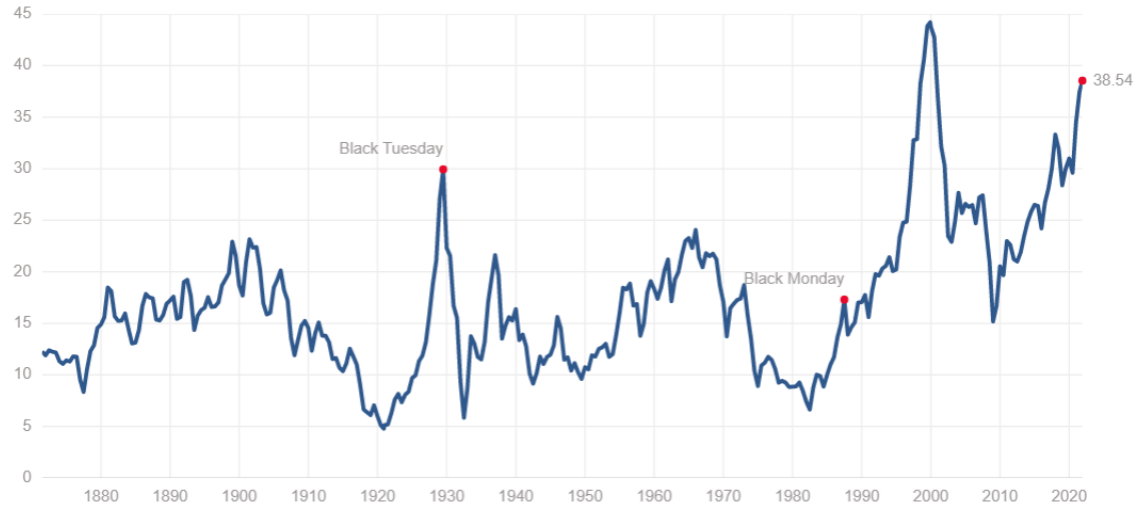


FIGURE 28 VALUE OF CAPE DURING THE YEARS

Considering that the market often does a mistake in defining the correct price, usually it will correct the price looking at what really happened in the past period of forecast and according to it, will adjust the expectations for the future. In the long term, the increase of information that come out from a company, will align the price of a stock with its real value (determined by the quality of the business).

For this reason, the Shiller P/E ratio could be an appropriate and effective measure because compare the actual price with the normalized performances obtained by the company during these years.

As the other indicators, the CAPE embeds some problems. It compares the share price that discounts future expectations, with past values of earnings (even if are being actualized). Another example is that adjusting the earnings just with the inflation is not particularly correct, because during the years the corporate tax rate has changed and the buybacks have increased, changing earnings per share value.

From the graph is evident that the actual valuations are high respect the past and reach the same levels reached during previous bubbles situations.
Anyway, for example, the situation is completely different respect the dot com bubble, where the evaluations of the firms didn’t have anything linked with the underlying value.

- Today the percentage profits/revenues has more than duplicated, passing from 5% to 12%.
- The corporate tax rate decreased a lot during the years.
- The brand or employer skills are not present in the accounting values, even if are fundamental nowadays.

P/B ratio

The **price-to-book ratio** compares the market value of a corporation with its book value. A company's market value is calculated by multiplying its share price by the number of outstanding shares. A company's net assets are its book value and is calculated subtracting total liabilities from total assets. When book value is less than market value, the stock is said to be overvalued. If the book value exceeds market value, the stock may be undervalued. It could, however, indicate that the business under analysis has some intrinsic problems.

This, like other ratios, differs by industry. The P/B ratio also tells you if you're overpaying for what would be left if the company failed tomorrow. If the firm goes bankrupt, the stockholders will get this amount. The book value of equity is an accounting metric that incorporates the price paid at the first issuance of the stocks, increased by any profits or losses, and lowered by dividends and share buybacks. It is based on the historic cost concept.

P/S ratio

P/S permits to determine how much an investor should pay for a dollar of the company's sales. Is a useful ratio especially for growth stocks that have low/negative profits or companies that recently faced some troubles. But beside that, it allows to determine if the growth of the sales is being paid fairly.

P/FCF

Considering that the returns for an investor are characterized by the dividends and the appreciation of the price of a company, the convenience to acquire a particular stock should consider the amount of cash remained in the company (from this value the company can decides the quantity to be destined for debt repayment, dividends, buyback strategies and the reinvestment in projects for the company's growth). The voice that includes the previous description corresponds to the Free Cash Flow.

At this point is interesting to identify how much money an investor can claim from the holding of a single share. The division between the free cash flow and the number of shares outstanding can reveal the value.

The last step is to compare this number with the price paid per share in order to find what is the expense to bear to assert the right on this free cash flow per share.

Free cash flow yield %= levered free cash flow per share / price per share

$$FCF = \text{Cash Flow from Operations} - \text{CAPEX}$$

Cash generated from operations, popularly known as cash flow from operations (CFO), takes into account the cash that has been generated by a company's core business activities.

Capex or capital expenditures is the investment a business does to acquire, upgrade, and maintain physical assets such as property, plants, buildings, technology, or equipment.

A high result will mean that a shareholder will pay a low price compared to the cash flow potentially available. This cash flow will permit to increase the total returns for the investor. This reasoning becomes evident if the previous ratio is turned→ **P/FCF**

The higher is the FCF the higher will be the market value of a company. Higher is the amount of cash that the company is able to generate, higher will be the valuation. While earnings can hide the strengths and weakness of a company, cash flow cannot hide anything.

When a comparison is done between two companies that belongs to different industries, the Free Cash Flow should be used, even if in a particular industry the amount of debt raised is more respect the other. This type of aspect is already treated in the quality analysis under the industry level and financial indicators risk factors.

In an economic downturn, companies with free cash money can be more resilient and are in a better position to ride out the economic slump.

In the IT industry the FCF is positive because they generate high revenues that do not have to put back in the company (capex). The mainly have employees' expenditures.

In cycle businesses, that make a lot of reinvestments inside the company (capex), the FCF is negatively affected.

The important thing is to look in the long term (continuation of positive FCF yield over the years in order to assess the strength of a business). Pay attention that a company with high FCF yield could means also that is not investing in the future. Or the contrary a company that has a low FCF yield is investing strongly in the future and with this ratio would be penalized.

The risk assessment is composed by two steps; the first one will need to do a sort of screening for the second step:

1. The initial path starts with the evaluation of the risk of a company through a qualitative point of view, identifying a grade for each level of the analysis. To the elements that compose the different levels is assigned a score that goes from 0 (worst case) to 5 (best case) and a weight depending on the relevance brought to the discussion. The final outcome, Quality Evaluation (QE) will give the definition of the quality of the company and at the same time the risk that an investor will bear (risk

seen as the possibility of the company to not be profitable and consequently for the investor to lose money). The higher the evaluation, lower will be the risk. The threshold for considering a good company that is probably able to provide a return for the future is the intermediate value of 2. A lower result will claim that the company will have some problem to be profitable for the investor.

The quality of a company is an effective judgment because can be used to predict the future developments. This because it considers elements that are and will be at the base of the company for its near future. The qualitative model of risk tries to describe the business at 360 degrees and gives a result that is broader respect the risk assessment through the fluctuation of historical prices.

2. After having considered that, the analysis should include the price evaluation. This step must be done comparing the Qualitative Evaluation of each company with the price convenience. Here we decided to consider a price ratio that we believe being effective in giving a snapshot of the possible returns (dividends or price appreciation) for an investor, P/FCF. The FCF is useful because is the amount of money that the company obtain after having managed its operating activities and capex. This amount will be destinated to repay debts, distribute dividends, do changes in shareholder capital and retain the remaining part for investments inside the company. The capability to repay the debts and using them in a profitable way is already considered in the qualitative analysis.

   This phase is characterized by research to see if the current price paid in the market permits to have some possible future returns on the investment. For this reason, the assessment of the actual price becomes fundamental.

This first step is the base for the selection of the company. If the final evaluation under the qualitative point of view is not satisfying/insufficient, means that the company embeds a high level of risk and for this reason is not optimal to invest in it, even if the price to pay is low.

Benjamin Graham: "it's far better to buy a wonderful company at a fair price than it is to buy a fair company at a wonderful price."

To emphasize this, can be created a table that shows the possible different outcomes (total returns) in accordance with alternative scenarios.

On the columns is pointed out the Quality Evaluation given to the company.

On the rows is indicated the price paid for the acquisition of the shares compared with the other companies' prices.

Caption:

- rate from - - to ++.
- 0+ means that you obtain slightly positive or null results, 0- is its specular.

	Low quality	Intermediate quality	High quality
High price	--	0-/0+	+
Intermediate price	-	0+/+	++
Low price	0-	+/++	+++

TABELLA 1 PRICE-QUALITY RELATION

Is evident here that even if an investor selects a company that has a worth business, the price plays an important role. If the investor has overpaid the shares, she will probably obtain not satisfying results. On the contrary the case in which the amount of money spent is convenient, the investment will guarantee the minimization of the losses (risk) and at the same time the maximization of the gains.

Obviously, higher is the uncertainty on the successfulness of a company, higher will be the margin of safety and therefore, the lower must be the price accepted.

In conclusion we can say that the returns are characterized first off all by the elements that affect the quality of the company and subsequently by the price paid, for this reason the risk should be measured on these two determinants.

Evaluation and Rating

To sum up the previous sections we created a model that comprehends all the different components that impact on the investor profitability. The idea is to define a scoring system that analyze the quality of the business and defines a first hint of the level of risk of the firm. Then the company must be assessed according to the actual price.

INDUSTRY LEVEL		
EVALUATION CRITERIA	**SCORE SYSTEM**	**WEIGHT**
Peculiar characteristics of the industry that affect its profitability	Negative=1 Intermediate=3 Positive=5	33,3%
External capital dependency	High=1 Medium=3 Low=5	33,3%
Industry predictability and future perspectives of growth	Negative=1 Average=3 Positive=5	33,3%
TOTAL SCORE	Weighted average of the previous factors	

COMPANY LEVEL		
EVALUATION CRITERIA	**SCORE SYSTEM**	**WEIGHT**
Competitive advantage	Low=1 Medium=3 High=5	35%
ESG compliance	Low=1 Medium=3 High=5	25%

Longevity of a company in the market	After the 2000= from 1 to 2 Between 1940 and 2000= from 2 to 3 Before 1940= from 4 to 5					10%
Presence of the founder or family descendants in the capital of the company	No presence=0 Presence of some descendants=3 Presence of the funder=5					10%
Managers' valuation (under experience in the field; presence in the capital ownership), Board of directors experience and main Shareholders' ownership	Low=1 Medium=3 High=5	Low=1 Moderate=3 Strong=5	Low=1 Medium=3 High=5	Monopoly=1 Intermediate distribution=3 Fair distribution=5	Tot:	20%
TOTAL SCORE	Weighted average of the previous factors					

PRODUCT AND SERVICE LEVEL		
EVALUATION CRITERIA	**SCORE SYSTEM**	**WEIGHT**
Brand image	Weak=1 Moderate=3 Strong=5	40%
Cyclicity of the product/service and its components	High=1 Medium=3 Low=5	20%
Product/service's repurchase time by customers	High=1 Moderate=3 Low=5	20%

Predictability of the product/service performances	High uncertainty=1 Moderate uncertainty=3 Confidence=5	20%
TOTAL SCORE	Weighted average of the previous factors	

FINANCIAL STATEMENT ELEMENT		
EVALUATION CRITERIA	**SCORE SYSTEM**	**WEIGHT**
Level of margins	Low=1 Medium=3 High=5	30%
Cash conversion	Low=1 Medium=3 High=5	20%
Capability to increase/ maintain a good level of ROCE.	Low=1 Moderate=3 High=5	30%
Cash flow to debt ratio	Low=1 Medium=3 High=5	20%
TOTAL SCORE	Weighted average of the previous factors	

$$\text{Quality Evaluation (QE)} = \frac{\text{industry level+company level+product and service level+financial statement level}}{4}$$

The outcome will be an assessment based on a grading system ranging from 0 to 5. The lower the number, the higher the concern (low quality), until it reaches 5, which indicates the lowest degree of risk (higher quality).

EVALUATION METHOD

We have said that to determine the possible convenience of an investment, in addition to the quality, has to be considered also the price at which the shares are traded. The price obviously will have a lower weight in the overall evaluation, that will be leaded by the four levels that characterize the QE.

We decided to adopt the P/FCF, for the reasons previously mentioned, and this ratio for each company must be compared to the different ratios obtained by the firms under evaluation [22](better if compared with the overall companies in the market). The aim is to assign a grade from 0 to 5 to each ratio obtained and compare this result with the ones obtained in the different levels of the QE.

$$\mathrm{FV} = \frac{\frac{\mathrm{P}}{\mathrm{FCF}}\,\mathrm{grade} + \mathrm{industry\ level} + \mathrm{company\ level} + \mathrm{product\ and\ service\ level} + \mathrm{financial\ level}}{5}$$

Higher will be the outcome of the Final Value, more convenient will be the purchase of those shares. This metric could be useful for a comparison with any company, this because the numerator is already comprehensive of the distinction of attractiveness among different industries.

Using this metric could be also useful for the comparison of the P/FCF of a company in relation to its quality evaluation (QE) during the course of the years and reflect on the reason of the possible components' ratio changes.

[22] In the "practical application" will be shown how to calculate it.

Practical application

Premises:

- The application of the model is done for the year 2011 and 2021. This for seeing the changes of the company and for prove the model against the results reached in the past decade
- All the information present in this analysis is taken from the companies' annual reports and from other sources that are cited in the text.
- When the data for the two different years were the same, it was decided to unify the years' evaluation.

PROCTER & GAMBLE

1. **Quality of the Business**

INDUSTRY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Peculiar characteristics of the industry that affect its profitability	4	33,3%
External capital dependence	4.25	33,3%
Industry predictability and future perspectives of growth	4	33,3%
TOTAL SCORE	4.08	100%

Peculiar characteristics of the industry that affect its profitability=

FIGURE 30 MARKET CONCENTRATION; SOURCE: MORDOR INTELLIGENCE

FIGURE 29 MARKET CONCENTRATION; SOURCE: MORDOR INTELLIGENCE

- In the business segments that can be included in the household and personal care products industry (fabric and home care, family care, beauty, grooming, and healthcare) there are few big competitors (like P&G, Unilever, L'Oreal SA and Colgate-Palmolive) and many smaller international/local players. A relevant position is taken by the big retailer stores (e.g. Walmart, Costco), that sell their own products at lower price respect the companies in the industry. For these reasons a quite high competition present in the industry determines a possible diminishing of profitability.
- Low switching costs means that customers can buy products from other firms without incurring in any consequence. Is difficult to be perceived different from the point of view of the product's quality. Marketing (perception of the brand) and some specific characteristics are the focal points. Possible decrease in profitability.
- Entering this market requires a moderate capital in order to face the already structured incumbents in term of economies of scale, distribution, visibility and know how. This is considered a possible entry barrier that protects the industry profitability.
- The scarcity of substitutes restricts the intensity of company's consumers bargaining power. Furthermore, because of the great total market demand, the impact of individual customer purchasing decisions on the company's profitability is minimized. Individual suppliers' influence on the organization is limited due to the high total level of supply. This characteristic protects the profit of this industry.

External Capital dependency= the industries in which Unilever is present are traditionally not capital intensive and do not require high debt capital to run the business (anyway specific situations can be found even in these sectors depending on the capital structure of the single firm in consideration).

Industry predictability and future perspectives of growth = the emerging markets are driving the boost of demand for this industry. The higher incomes with an increase in the standards of living are the reason for this enhance.

"We believe growth in mature markets will remain relatively stagnant, and growth in emerging economies such as China, Brazil, and India will be insufficient to offset declines in developed countries. Total sales in the global household and personal products industry are expected to reach $424.1 billion by 2013, reflecting an annual growth rate of 3.3%" by Morningstar.

Apart from this analysis, considering the recurrence of the purchases by the customers in the industry, in the future periods there should not be unexpected surprises.

COMPANY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Competitive advantage	4.5	35%
ESG compliance	3	25%
Longevity of a company in the market	5	10%
Presence of the founder or family descendants in the capital of the company	2.5	10%
Managers'/ directors' valuation and main shareholders' ownerships	3.5	20%
TOTAL SCORE	3.9	100%

Competitive advantage=

- Its longevity in the market permitted to gain expertise in adapting to different scenarios and evolve in a profitable way thanks to its strong infrastructure and connections all over the world.
- The company has spent in R&D 60% and more respect its main competitors. The continuous innovation process is one of the keys for its competitive advantage. "In 2010, P&G launched eight of the top 25 most successful new products in the consumer products industry in North America, as measured by SymphonyIRI Group (which recognized us last year as one of the most innovative manufacturers in the U.S. Consumer Packaged Goods Industry for the past decade, presenting us with an Outstanding Achievement in Innovation Award)" from annual report.
- High efforts in employees' training to spread in a clear and unique way the culture and the goals of the company.
- The company owns the most known brands (Tide, Pampers, Head and Shoulders, Oral-b) in the industry in which operates. This achievement has been reached due to a differentiation strategy supported by high quality products combined with an effective communication with the audience. It is the company that invest more in marketing. "In 2011, P&G along with our agencies brought home a record-setting 32 Cannes Lion awards (which recognize the world's best advertising and communications) at the Cannes Lions International Festival of Creativity (formerly known as the International Advertising Festival). This was nearly double our previous record of 17—and more than double the combined number of Lions awarded to our six closest competitors. We were also

awarded the title of Most Effective Marketer in the World by Effie Worldwide" from annual report.

- P&G generates over two-thirds of its sales from developed markets, whereas Unilever's revenue comes mostly from faster-growing emerging economies. One of P&G's biggest issues is that it's concentrated on slow-growing markets, whereas rivals like Unilever are focusing on growing and selling in new and developing markets.

ESG compliance=

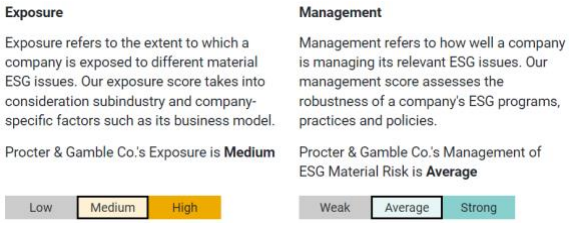


FIGURE 31 RISK EXPOSURE AND MANAGEMENT RATING

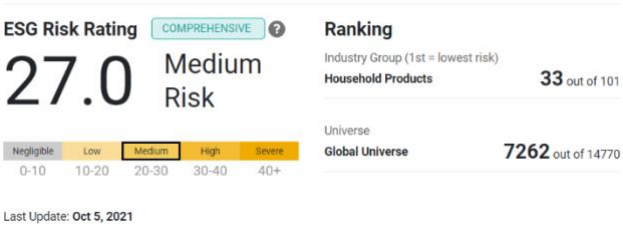


FIGURE 32 ESG RISK RATING

Longevity of the company in the market= P&G is an old company that was founded in 1837.

Presence of the founder or family descendants in the capital of the company= considering the age of company's foundation, the descendants of the two cofounder Procter and Gamble are not present in the main positions of the board or capital of the company. Anyway, heirs till the third generations covered the role of president of the company.

Managers'/ directors' valuation and main shareholders' ownerships = The CEO Robert McDonald joined Procter & Gamble in 1980 and covered different roles as Chief Operating Officer, and Vice Chair during his carrier inside the company where he developed an outstanding experience in the United States and international markets. After 30 years of career in the company he became president and Chief Executive in 2009. The current Vice Chairman in charge of Global Operations Werner Geissler joined the company in the late 1979 and as Robert McDonald occupied several positions in the company during his years of permanence. Nancy K. Swanson in 1980 arrived in P&G where she scaled different positions till arriving to Vice President-Corporate in 2002. A role that she is currently occupying.

Executive Officers of the Registrant

The names, ages and positions held by the executive officers of the Company on August 10, 2011, are:

Name	Position	Age	First Elected to Officer Position
Robert A. McDonald	Chairman of the Board, President and Chief Executive Officer Director since July 1, 2009	58	1999
Jon R. Moeller	Chief Financial Officer	47	2009
Werner Geissler	Vice Chairman-Global Operations	58	2007
E. Dimitri Panayotopoulos	Vice Chairman-Global Business Units	59	2007
Bruce Brown	Chief Technology Officer	53	2008
Robert L. Fregolle, Jr.	Global Customer Business Development Officer	54	2009
Christopher D. Hassall	Global External Relations Officer	57	2009
Deborah P. Majoras	Chief Legal Officer and Secretary	48	2010
Moheet Nagrath	Global Human Resources Officer	52	2008
Filippo Passerini	Group President-Global Business Services and Chief Information Officer	54	2003
Marc S. Pritchard	Global Brand Building Officer	51	2008
Valarie L. Sheppard	Senior Vice President & Comptroller	47	2005
Ioannis Skoufalos	Global Product Supply Officer	54	2011

All of the Executive Officers named above, excluding Ms. Majoras, have been employed by the Company for more than five years. Ms. Majoras held the following positions within the Company during the past five years: Chief Legal Officer and Secretary (February 1, 2010 - present), Vice President and General Counsel (June 24, 2008 - January 31, 2010). Ms. Majoras was Chairman of the Federal Trade Commission from 2004 until joining the Company in 2008.

FIGURE 33 LIST OF EXECUTIVE OFFICIERS

In this report presented by the SEC website there is written that the average experience of each executive officers in each position is more than 5 years. Two years of tenure is considered the threshold for a person expert in a single role (according to SimplyWallStreat financial analysis website).

All the members of the Board of directors have at least 25 years of experience in complementary fields and are CEO of the most important companies in the world. They have a wide knowledge of consumer industry. The manager's compensation is mainly a performance based with a distinction between long term and short-term objectives in order to align the managers and shareholders' perspectives. In this remuneration program are present stock options.

No data available for shareholders' ownership division.

PRODUCT AND SERVICE LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Brand image	4.5	40%
Yearly cyclicity of the product and its components	5	20%
Product's repurchase time from customers	4.5	20%
Predictability of the product performances	4	20%
TOTAL SCORE	4.5	100%

Brand Image = in the previous 16 years P&G placed 132 products on the top 25 New Products Pacesetters list, a result that is greater than the aggregation of the six biggest company's competitors.

The brands owned by the company are well know from the customers considering that the underline products have the highest market shares in the segments of belonging.

P&G has relevant market shares [23]in every business segment in which is present, emphasizing further space for improvement:

- Beauty: global market leader in retail Hair care (20%); Skin care (10%)
- Grooming: 70%
- Health care: Oral care (number two global producer with 20%); personal health care leader in some categories (heartburn medications, respiratory treatments)
- Snack and Pet care: Snacks (10%), Pet care (10% in North America)
- Fabric and Home care: global market leader for Fabric care (30%); Home care (15%)
- Baby, Feminine & Family care: global market leader in Baby care (35%); global market leader in Feminine care (30%); Family care business in North America (70%)

Yearly cyclicity of the product and its components= the products sold do not suffer from huge fluctuation during the year, are quite stable. Shortage of raw materials is not an issue that emerged in the past years.

Product's repurchase time by customers= considering that these products have a short life because are being used daily, their necessity and continuous repurchase are characteristics that do not make suffer the company of reductions in demand. A mention should be done for the increase of the raw materials and commodities costs that can impact on the final price paid by the costumer. There could be the possibility that an increase in the price can reduce the demand for specific products that are not vital for the daily life, moving to low cost (low quality) products.

Predictability of the product performances= P&G owns or has rights to patents and registered trademarks that are utilized in all aspects of the company's operations. Some of these patents or licenses cover key aspects of product formulation and manufacturing processes. The trademarks are critical to the product's entire marketing and branding. The presence and continuous protection of certain trademarks, patents, and licenses is in part the reason for the company's success.

FINANCIAL STATEMENT ELEMENT		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Level of margins	3.5	30%
Cash conversion	4	20%
Capability to increase/mantain the level of ROCE	3	30%
Cash flow to debt ratio	4.25	20%
TOTAL SCORE	3.77	100%

	N° of firms considerd	**Gross Margin**	**EBITDA margin**	**EBIT margin**
Household Products (US market)	26	49.70%	20.58%	17.38%
Total Market (US market)	5891	40,23%	22,68%	17,24%

Margins by industries by Stern University Jan.2012

Level of margins = Gross margin: 50.6%; EBITDA margin: 23%; Operating margin: 19.2%

Considering the result in the table above, the results reached by P&G in 2011 are to be considered slightly above the average both in its industry and considering total markets.

Cash conversion ratio = 13,231/18,333= 0.72 The value from cash flow statement is similar to the economic value. So, the final evaluation is an intermediate result considering that the numerator is lower respect the denominator.

Capability to increase/maintain a good level of ROCE = The level of ROCE for the year 2011 is 17.2% (15,818/90,034) and is slightly decreased respect the previous two years (19% in 2010 and 18,2 % in 2009) due to an increase in Shareholder's equity. In general, according to most financial investor, is considered a good level of ROCE a value higher that 15%.

Cash flow to debt ratio = amount of time necessary to pay back the debt (the months are calculated dividing 1 by the ratio found).

Ability to cover short term debt with the operating cash flow: less than 10 months in 2011 while in the past years is present a fluctuation that goes from 7 months to 13 months. Ability to cover short- and long-term debt with operating cash flow: less than 2 years and half for 2011 and the previous periods.

Considering that with the cash obtained from company's operations is possible to repay the whole short-term debt and in less than 3 years even the long-term debts, without incurring to external capital, it identifies a quite good situation.

Price Evaluation

We applied the same Quality Evaluation to 20 companies and the results obtained with the respective analysis is present in the Appendix B. The convenience of the price respect the quality was done considering the P/FCF of every company and assigning a grade from 0 to 5. In order to do this, we created 10 different P/FCF ranges among the values obtained from the companies analyzed and we gave a mark starting from 0 and moving up by 0.5 till arriving to 5.

P/FCF ranges	P/FCF grades
Above 42.42	0
From 42.42 to 32.474	0,5
From 32.473 to 24.465	1
From 24.464to 20.689	1,5
From 20.688 to 18.897	2
From 18.896 to 16.496	2,5
From 16.495 to 13.888	3
From 13,887 to 11.29	3,5
From 11.28 to 9.627	4
From 9.626 to 4.516	4,5
Below 4.515	5

TABLE 3 RANGES AND GRADES OF THE COMPANIES' P/FCF

Company name	P/FCF	P/FCF grades
Microsoft	8,86	4,5
Google	19,07	2
Visa	19,25	2
Nike	28,9	1
Starbucks	26,1	1
Novo Nordisk	16,7	2,5
Kone	20,06	2
P&G	18,31	2,5
Sap	12,85	3,5
American Airlines	negative FCF	0
Ford	9,63	4
Coca-Cola	21,25	1,5
Unilever	23,81	1,5
At&T	12,25	3,5
Barclays	0,17	5
Wynn Resorts	10,39	4
Vale Sa	14,96	3
Tenaris	16,01	3
Mt	42,42	0,5
Oxy	19,32	1,5

TABLE 4 GRADES OF THE P/FCF OF THE COMPANIES

Results obtained

We decided that would be useful to apply our model retrospectively, and monitoring the results obtained in this time span. We opted to choose 2011 because we noticed that many companies didn't have annual reports before that year.

The results shown here refer to an evaluation of the companies in the year 2011.

The total returns were calculated considering an investment of 1000$ in each company at the end of the 2011 and monitoring the price change in 10 years (end of 2021), taking into account all the dividends distributed during this period, in accordance to the number of shares bought with 1000$ at the share price of end of 2011.

COMPANY NAME	TOTAL RETURNS	P/E	P/FCF	Beta	QE	FV
Microsoft	$ 12.541,60	7,62	8,86	0,87	4,73	4,69
Google	$ 7.970,55	20,71	19,07	1,32	4,5	4
Visa	$ 7.969,27	17,47	19,25	1,01	4,26	3,84
Nike	$ 6.101,41	18,21	28,9		4,35	3,69
Starbucks	$ 4.605,22	23,29	26,1	0,96	4,25	3,62
Novo Nordisk	$ 4.314,20	16,78	16,7	0,63	4,10	3,76
Kone	$ 3.161,65	8,29	20,06	0,92	4,08	3,67
P&G	$ 1.861,37	14,42	18,31	0,45	4,06	3,65
Sap	$ 1.848,24	11,62	12,85	1,13	3,95	3,85
American Airlines	$ 1.669,30	Negative Earnings	Negative FCF	1,66	2,6	2,1
Ford	$ 1.360,59	1,44	9,63	1,43	2,53	2,84
Coca-Cola	$ 1.081,05	16,13	21,25	0,49	3,66	3,22
Unilever	$ 1.073,35	23,16	23,81		3,73	3,18
At&T	$ 435,19	25,45	12,25	0,6	2,88	3
Barclays	$ 216,77	5,38	0.17	2,38	2,44	2,95
Wynn Resorts	$ 152,05	16,93	10,39	1,46	2,33	2,66
Vale Sa	$ -12,48	2,97	14,96	1,43	1,98	2,19
Tenaris	$ -217,32	12,42	16,01	1,87	1,79	2,03
Arcelormittal	$ -382,63	13,95	42,42	2,34	2,12	1,82
Occidental Petroleum	$ -432,23	7,31	19,32	1,57	1,99	1,99

TABLE 5 COMPANIES' RESULTS

First of all, we wanted to check if the price ratios (P/E and P/FCF), known for being different in accordance to the future expectations, could give a hint of the possible returns reached in the 10 following years (2011-2021). Higher the price ratios, higher should be the expectations and consequently brighter results should come. What we found is a great dispersion of results that display in both multiples used a flat trend curve. This is a signal of the difficulties of the market to price correctly the companies in relation to the fundamental values (cash flow and earnings).

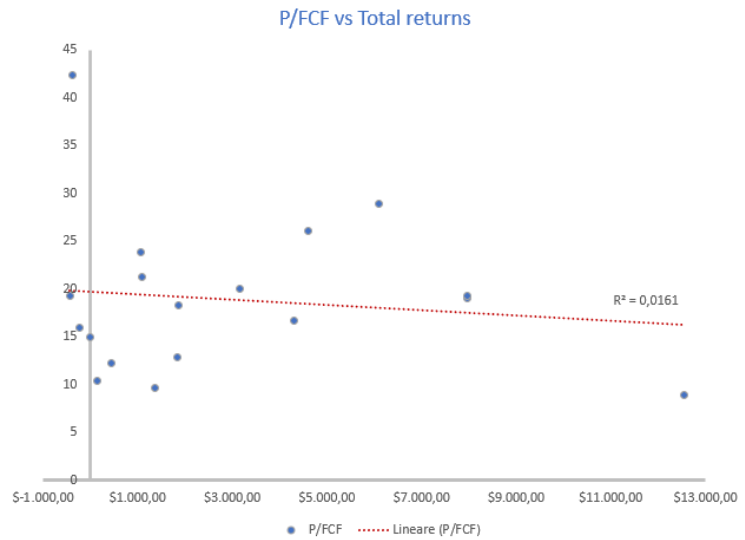


FIGURE 35 P/FCF (ON THE VERTICAL AXIS) COMPARED TO THE TOTAL RETURNS (ON THE HORIZONTAL AXIS)

FIGURE 34 P/E (ON THE VERTICAL AXIS) COMPARED TO THE TOTAL RETURNS (ON THE HORIZONTAL AXIS)

The second and more important aspect that we wanted to analyze was the linear relation that, according to the CAPM, should be evident between the Beta and the expected return. To a higher level of Beta should correspond an higher return.

We calculated the Beta using historical data (price and percentage of changes) of the year 2011[24] for both the companies under the evaluation and the market index [25]of reference.

The results obtained show that, contrary to the theory, the companies with higher Betas in 2011, in the following 10 years obtained lower results respect the opposite situation.

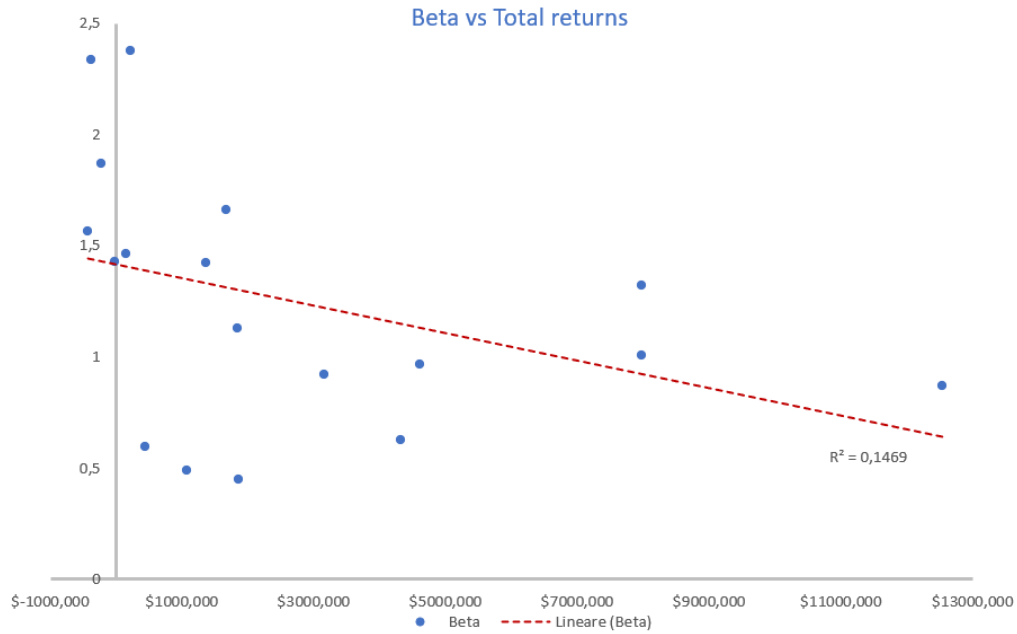


FIGURE 36 BETA (VERTICAL AXIS) COMPARED TO TOTAL RETURNS (HORIZONTAL AXIS)

[24] Only for Google we considered the data of 2014 due to lack of values in the previous years.
[25] S&P 500 for all the companies except for KONE

At this point we wanted to consider the evaluation that we did about the quality of a company, and for this reason we plotted two graphs. The first one considering only the Quality Evaluation (QE) in order to monitor if just the quality, without the price evaluation, could be a valid way to foresee the possible future returns for an investor. The second graph was built with the intention to correct the lack of information given by the P/FCF in relation to the Total returns.

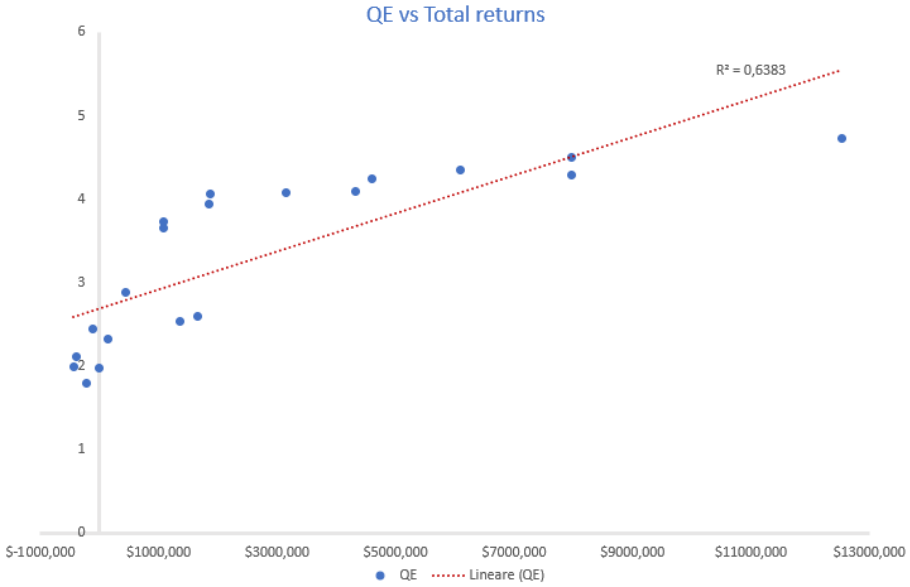


FIGURE 37 QE (ON THE VERTICAL AXIS) COMPARED TO TOTAL RETURNS (ON THE HORIZONTAL AXIS)

The disposition of the results shows a correlation between the QE (2011) and the total returns obtained in the following 10 years. The coefficient of determination is consistent and can prove the correlation between these two variables.

A similar but stronger demonstration (higher R^2) is given by the following graph that, differently from the one above, considers in the evaluation also the value given to the P/FCF. Including it in a Final Value (FV) that takes into account the results obtained in the different levels of the Quality Evaluation, giving the same weight to the different factors.

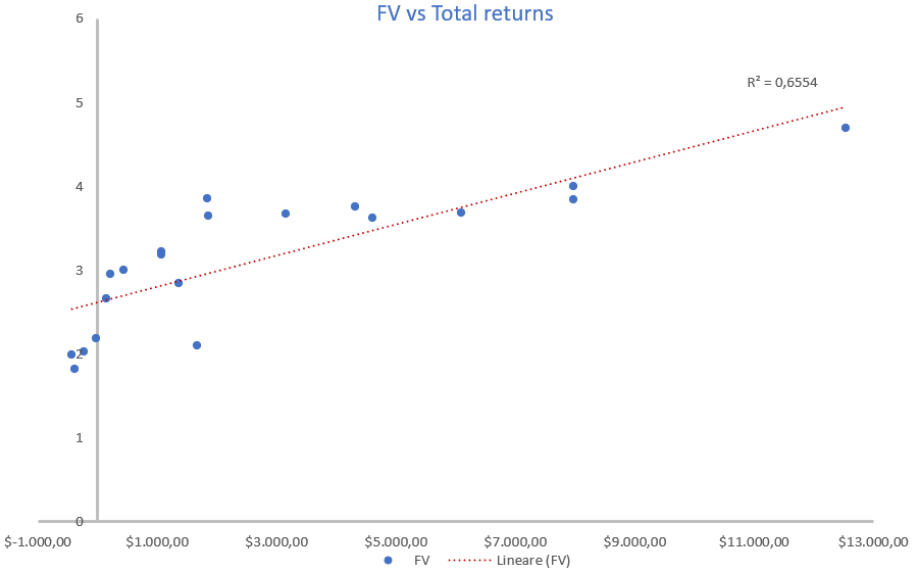


FIGURE 38 FV (VERTICAL AXIS) COMPARED TO THE TOTAL RETURNS (HORIZONTAL AXIS)

What is volatility and how to exploit it

The volatility seen as the standard deviation of the prices respect an expected value should be taken into consideration only if the period of investment is the short-term. Even if the past volatility is not a guide for the future volatility, in the short term if the investor has to sell its holdings, must be subject to this fluctuation of the stock price. This to recall the concept previously cited in the thesis that the volatility is the capability of the market to price correctly the stocks of a company. In the short-term, an investor is exposed to this irrationality of the market.

If you invest on leverage (taking money from third parties or through short selling), you expose yourself to the inefficiency of the market in the short term (high volatility). And considering that the previous two operations must be managed and closed in a short period of time, you can be forced to invest more money (margin calls) in order to maintain open the positions (because in the long term you have identified that is gaining value or loosing value).

Volatility seen as the fluctuation of asset prices cannot describe the riskiness of an investment. This because the volatility can be defined only ex post and cannot be a good predictor of possible future returns due to political and environmental changes, financial events.

If instead a long-term perspective is adopted, is evident that the level of changes in the historical prices is not influent because other aspects more related to the quality of the company can emerge.
An example is that during period of bull markets, the prices increase stably, and the standard deviation is low, but this doesn't mean that the risk of the market is low (when the prices are at the highs).
At the same time when there is a market crash, the prices drops instantly and there is a high standard deviation. This would mean a high level of risk, but it is true when the prices are at the bottom?
[26]For example, when the market is right before the beginning of a crisis (the worst moment to buy), according to the academics, the risk is at the bottom level.

[26] VIX is called "fear index" and measure the volatility in the market. Is a useful tool for identifying the overall sentiment of the market.

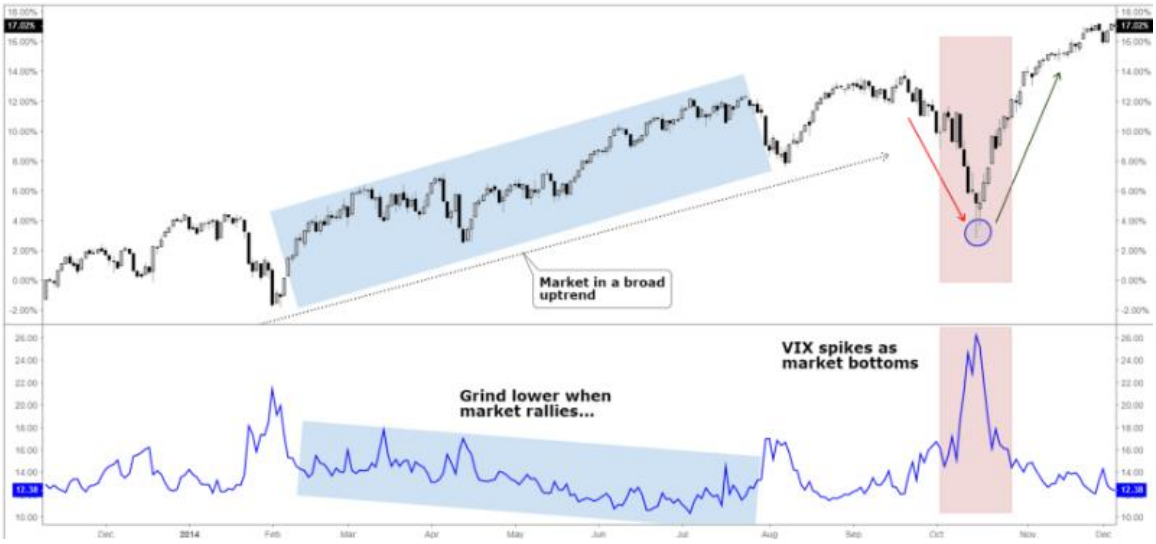


FIGURE 39 S&P (ABOVE CHART) VS VIX (BOTTOM CHART)

It is a well-known empirical regularity that volatility tends to be negatively correlated with current and past asset returns. In other words, volatility is generally much higher when asset prices fall than during market upturns. The traditional interpretation of this asymmetric relationship is the so-called leverage effect. According to this interpretation, a fall in share prices would generally lead to an increase in the leverage of firms, thereby increasing the riskiness of a given stock. An alternative explanation relates to the negative correlation with changes in risk attitudes: since low volatility is associated with a higher propensity to take risks, it is likely to be accompanied by an increase in asset valuations. Recent economic theory emphasizes the endogenous nature of volatility. A prolonged period of low volatility could paradoxically lead to risk accumulation over time.

So, the volatility can be seen just as how the prices of a stock react to the market movements and information.

The real risk for an investor is losing money. If we take this perspective, and we compare the results of maintaining the same amount of money invested in the stock market (e.g. S&P), bond market and keeping the sum in cash for a common long term period, is possible to notice that the returns for an investor are inversely proportionate with the volatility in each segment.

FIGURE 40 S&P 500 PRICE MOVEMENTS BETWEEN 1872 AND 2018

In the graph above is represented the fluctuation and long-term movements of the S&P index, an interesting thing can be noted: is not possible to notice all the crisis that happened during these 150 years. Only the main ones are evident, but even in these cases, the recovery time was brief.

Volatility instead should be seen as a possible opportunity for a long-term investor. In fact, leveraging on periods where the prices crash for increasing a position or buying new stocks is a profitable move. If we want to valid the risk- return linear relation, during periods where the volatility decreases (upwards prices' trend), we should reduce the expectation of future returns, this will diminish the necessity to run to buy stocks. On the contrary when the volatility increases (stock crashes), we should expect that the future returns increase, not lowering our expectations and selling at the low.

The boom-bust model by George Soros

Prices in the market doesn't move towards an equilibrium (like the supply and demand theory tells), but rather moves over the equilibrium for a time, after that there is a period of recognition that correct the prices downward, but it doesn't stop at the equilibrium, it goes far below it. After a while the market recognize that is too low the level of the prices and so moves back upward, but also in this time, moves far over the equilibrium. So, most of the time, the market is wrong/inefficient, but there are points in which it tends to rationality and comes back to its decisions, adjusting them. Basing the judgment on what can produce (value) with a more calibrate vision of the future.

"In the short run, the market is a voting machine," Ben Graham used to remark, "but in the long run, it's a weighing machine." As investors realize a company's true worth (market correct its inefficiency), the gap between share price and business value tends to cut over time.

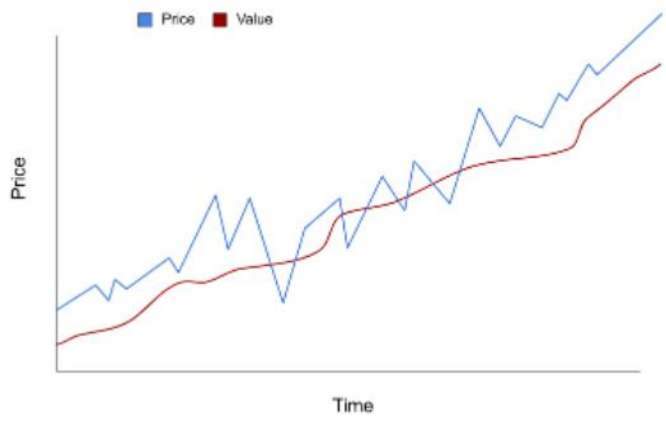


FIGURE 41 FLUCTUATION OF PRICE RESPECT THE VALUE

The model used to describe the market should comprehend the interaction and the influence that investors have each other's.

Relation between the value traders and technical traders: considering that the value traders thinks that a company is undervalued, they start to buy it, raising the prices. This leads to an uptrend. At this point the technical traders, following the trend, buy these stocks, increasing the prices even more. But shortly later, the market seems overvalued and consequently the value traders start to sell the stocks and in succession the technical traders do the same thing. Is evident the presence of a cycle. The impact and the size of this cycles depend on the number of value traders and technical traders (creating periods of boom and periods where the bubble bursts).

So, the value traders have a behavior that stabilize the market, contrary the technical traders increase the volatility.

Conclusion and future developments

The results achieved are in line with our expectations, the premise that we made was that in the long term the price will move in relation to the quality of the company (before we linked the long-term price movements with the long term trend of the earnings).

Starting from that concept we wanted to identify what can describe the quality of a company, a series of factors that unified can determine an ending result. We divided the analysis in four main levels, each one containing different elements of evaluation. The aim was to end up with a number that can predict the future direction of the company under a qualitative point of view and consequently give a hint to the movements of the total returns for the shareholders (translated in appreciation of price per share and dividends distribution). The objective for an investor is to see a profit over the money invested and avoid possible losses. The result reached is the Quality Evaluation (QE), a number that ranges in a scale from 0 (worst scenario) to 5 (best scenario) passing through an average threshold of 2.5. Every element in each level is evaluated in accordance with this pattern.

In the previous examples is evident that the firms with a final Quality Evaluation higher than the average threshold, have been a brighter perspective respect the ones with a negative evaluation.

After having noticed it, the focus should be reserved to the expensiveness of the company (how much an investor should pay for the level of quality of the firm). The answer for this question can be found in a ratio that gives a good snapshot of the actual price valuation of the company, the price to free cash flow. This permits to put in relation how much the company can save after having incurred in all the operating expenses and capex with the total market capitalization.
We wanted to also consider the price for two reasons:

- Show that how the market values the different companies is not correct, the P/FCF or P/E do not tell anything about the future returns of the company/investors→ flat relation
- An investor on the other side must consider how the market values the shares (even if irrationally) to take decisions in which companies is better to invest with the lowest risks.

The objective is to correct or better, give a more detailed vision of the QE result.

For concluding, if the price is connected with the quality of the company, is better to invest in a company that display a good or excellent level in the “Qualitative Evaluation” instead that paying a lower price for a company that will suffer in the future or will not be able to give returns to shareholders. So, a company that demonstrated to be qualitatively good will deliver higher returns to its shareholders.

This for saying that what really matters is the intrinsic value of the company, the first thing that should be checked and that has most of the weight in the investment decision, is how the company can be described qualitatively. Then, if you detect a good company the evaluation of the price should be considered.

What we wanted to demonstrate in our thesis is the importance of having different perspectives on a topic to give the possibility to have a broader view and to create a debate around theories that tries to describe social sciences (like finance).

The aim of our model is to give everyone the possibility to have its own evaluation based on the capability of the individual to gather information. This is a novelty respect the CAPM in which, instead, is assumed that everyone has the access to the same sources of data. Moreover, this model is applicable to every company not only the listed ones, considering that the historical stock prices are not taken into account.

Further developments can include the application of the model to a higher range of companies to have a superior fairness in the price evaluation and proving the reliability of the model.

Another aspect to consider is to have the possibility to analyze the companies over more than 10 years. This time span is the minimum to not being affected by the short-term irrationality of the market (included in the volatility).

Our expectations are that our way of analyzing companies can be improved and find better results with the passing of time. This because in the past years there was a more and more openness and availability of data to retail investors, that can find precious information that before was not accessible.

Bybliography

Ang, Andrew, Robert J. Hodrick, Yuhang Xing, e Xiaoyan Zhang. «High Idiosyncratic Volatility and Low Returns: International and Further U.S. Evidence». *Journal of Financial Economics* 91, n. 1 (gennaio 2009): 1–23. https://doi.org/10.1016/j.jfineco.2007.12.005.

Ang, Andrew, Robert J. Hodrick, Yuhang Xing, e Xiaoyan Zhang. «High Idiosyncratic Volatility and Low Returns: International and Further U.S. Evidence». *Journal of Financial Economics* 91, n. 1 (gennaio 2009): 1–23. https://doi.org/10.1016/j.jfineco.2007.12.005.

Ang, Andrew, Robert J Hodrick, Yuhang Xing, e Xiaoyan Zhang. «The Cross-Section of Volatility and Expected Returns». *The Journal of Finance*, s.d., 41.

Aparicio, Felipe, e Javier Estrada. «EMPIRICAL DIS TRIBUTIONS OF S TOCK RETURNS : EUROPEAN SECURITIES MARKETS, 1990-95», s.d., 25.

Asness, Cliff, Andrea Frazzini, e Lasse H Pedersen. «Low-Risk Investing Without Industry Bets», s.d., 27.

Baker, Nardin L., e Robert A. Haugen. «Low Risk Stocks Outperform within All Observable Markets of the World». *SSRN Electronic Journal*, 2012. https://doi.org/10.2139/ssrn.2055431.

Barber, Brad M., e Terrance Odean. «The Behavior of Individual Investors». In *Handbook of the Economics of Finance*, 2:1533–70. Elsevier, 2013. https://doi.org/10.1016/B978-0-44-459406-8.00022-6.

Black, Ervin L. «WHICH IS MORE VALUE RELEVANT: EARNINGS OR CASH FLOWS? A LIFE CYCLE EXAMINATION», s.d., 50.

Black, Fischer. «Noise». *The Journal of Finance* 41, n. 3 (luglio 1986): 528–43. https://doi.org/10.1111/j.1540-6261.1986.tb04513.x.

Black, Jensen, Scholes, «The Capital Asset Pricing Model: Some Empirical Tests», *Studies in the Theory of Capital Markets*, Michael C. Jensen, ed., Praeger Publishers Inc., 1972.

Blitz, David C, e Pim van Vliet. «Lower Risk without Lower Return.», 2007, 14.

Blitz, David, Eric Falkenstein, e Pim van Vliet. «Explanations for the Volatility Effect: An Overview Based on the CAPM Assumptions», 2014, 18.

Blitz, David, Matthias X Hanauer, Milan Vidojevic, e Pim van Vliet. «Five Concerns with the Five-Factor Model», s.d., 17.

Blitz, David, Juan Pang, e Pim van Vliet. «The Volatility Effect in Emerging Markets», s.d., 31.

Board of Governors of the Federal Reserve System (U.S.), Jon Danielsson, University of Chile, DII, Marcela Valenzuela, Board of Governors of the Federal Reserve System (U.S.), e Ilknur Zer. «Learning from History: Volatility and Financial Crises». *Finance and Economics Discussion Series* 2016, n. 093 (novembre 2016). https://doi.org/10.17016/FEDS.2016.093.

«Barclays PLC Annual Report 2011». *Risk Management*, 2011, 286.

Caldentey, Esteban Pérez, e Matías Vernengo. «Modern Finance, Methodology and the Global Crisis», s.d., 17.

Carvalho, Raul Leote de, Majdouline Zakaria, Xiao Lu, e Pierre Moulin. «Low-Risk Anomaly Everywhere»:, s.d., 25.

Clarke, Roger, Harindra de Silva, e Steven Thorley. «Minimum-Variance Portfolios in the U.S. Equity Market», 2006, 14.

Damodaran, Aswath. «Equity Risk Premiums (ERP): Determinants, Estimation and Implications – The 2012 Edition», s.d., 107.

Engle, Robert. «Risk and Volatility: Econometric Models and Financial Practice». *The American Economic Review* 94, n. 3 (2004): 405–20.

Fama, Eugene F., e Kenneth R. French. «Common Risk Factors in the Returns on Stocks and Bonds». *Journal of Financial Economics* 33, n. 1 (febbraio 1993): 3–56. https://doi.org/10.1016/0304-405X(93)90023-5.

Fama, Eugene F, e Kenneth R French. «The Capital Asset Pricing Model: Theory and Evidence», s.d., 57.

Fama, Eugene F, e Kenneth R French. «The Cross-Section of the Expected Stock Returns », 1992.

Fifield, Suzanne GM, David G McMillan, e Fiona J McMillan. «Is There a Risk and Return Relation?», s.d., 46.

Harkavy, Oscar. «The Relation Between Retained Earnings and Common Stock Prices for Large, Listed Corporations», 2021, 16.

Haugen, Robert A, e Nardin L Baker. «Forthcoming in The Handbook of Portfolio Construction: Contemporary Applications of Markowitz Techniques», s.d., 27.

Haugen, Robert A., e A. James Heins. «On the evidence supporting the existence of risk premiums in the capital market», 1972.

Haugen, Robert A., e Nardin L. Baker. «The Efficient Market Inefficiency of Capitalization–Weighted Stock Portfolios». *The Journal of Portfolio Management* 17, n. 3 (30 aprile 1991): 35–40. https://doi.org/10.3905/jpm.1991.409335.

Haugen, Robert A., e A. James Heins. «Risk and the Rate of Return on Financial Assets: Some Old Wine in New Bottles». *The Journal of Financial and Quantitative Analysis* 10, n. 5 (dicembre 1975): 775. https://doi.org/10.2307/2330270.

Kahneman, Daniel, e Amos Tversky'. «Prospect Theory: An Analysis of Decision under Risk», 2021, 30.

Keppler, Michael. «Risk Is Not The Same as Volatility», s.d., 9.

———. «Risk Is Not The Same as Volatility», s.d., 9.

Markowitz, «Portfolio Selection», The Journal of Finance, Vol. 7, No. 1. (Mar., 1952), pp. 77-91.

Meyfredi, Jean-Christophe. «History of the Risk Concept and Risk Modeling», s.d., 12.

Robinson, Paul, e Paul Robinson. «Historical Volatility: A Timeline of the Biggest Volatility Cycles». DailyFX. Consultato 29 settembre 2021. https://www.dailyfx.com/education/volatility/historical-volatility.html.

Sewell, Martin. «History of the Efficient Market Hypothesis», s.d., 14.

Shiller, Robert. «Do Stock Prices Move Too Much to Be Justified by Subsequent Changes in Dividends?» Cambridge, MA: National Bureau of Economic Research, febbraio 1980. https://doi.org/10.3386/w0456.

Szyszka, Adam. «From the Efficient Market Hypothesis to Behavioral Finance: How Investors' Psychology Changes the Vision of Financial Markets». *SSRN Electronic Journal*, 2007. https://doi.org/10.2139/ssrn.1266862.

Taleb, Nassim N., e Daniel G. Goldstein. «The Problem Is beyond Psychology: The Real World Is More Random than Regression Analyses». *International Journal of Forecasting* 28, n. 3 (luglio 2012): 715–16. https://doi.org/10.1016/j.ijforecast.2012.02.003.

«The Distribution of Stock Returns», 2022, 7.

«The (Mis)Behavior of Markets: A Fractal View of Risk, Ruin, and Reward». *Choice Reviews Online* 42, n. 06 (1 febbraio 2005): 42-3541-42–3541. https://doi.org/10.5860/CHOICE.42-3541.

Vos, Edward A. «Differences in Risk Measurement for Small Unlisted Businesses», 1992, 14.

Appendix A

Better to invest:

P&G[27]: Consumer good company present since 1837, it controls the most important brands in each segment in which it operates. The volumes of sales of its products are not too much affected by period of crisis considering that are considered essential for the daily life of people.

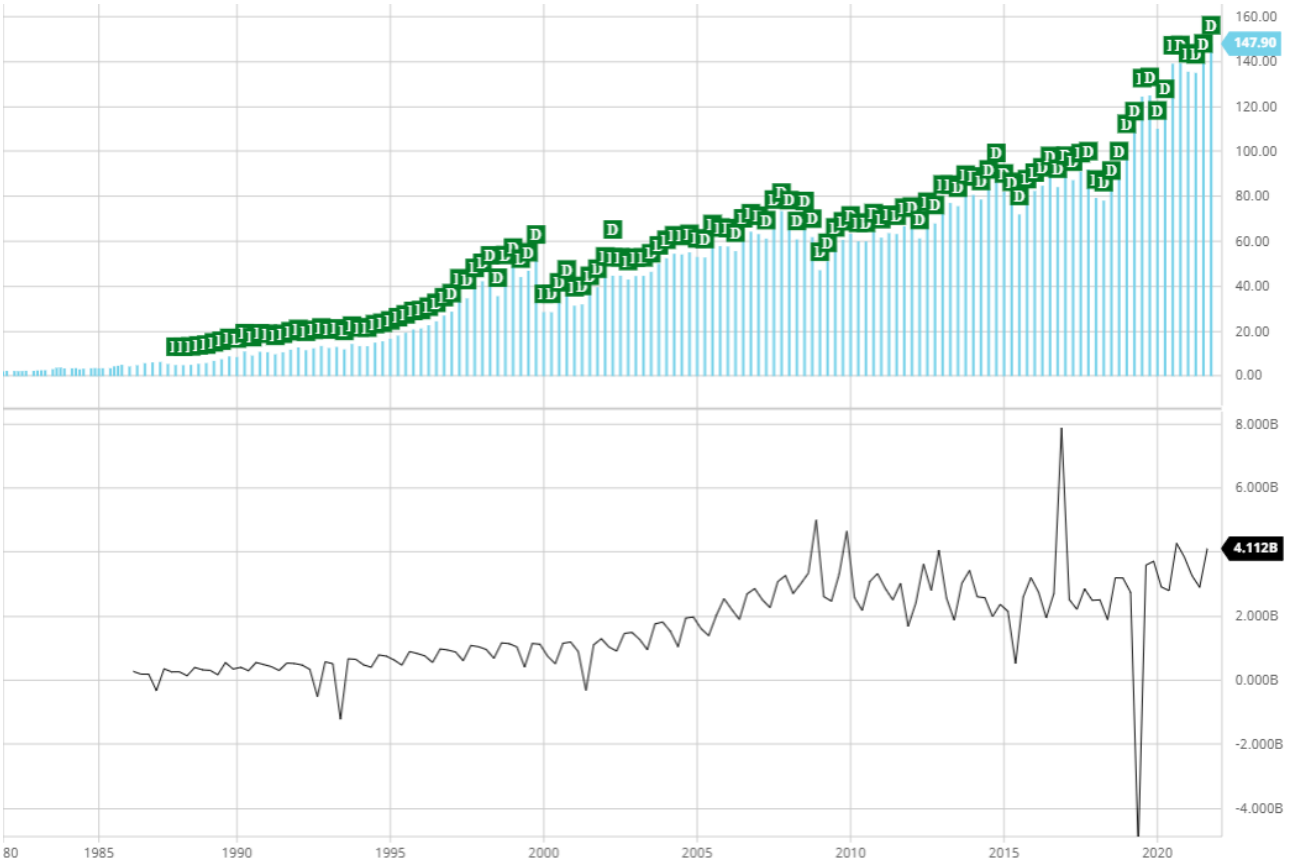


FIGURE 42 PRICE PER SHARE (ABOVE) AND EARNINGS (BELOW) OF P&G

[27] https://www.barchart.com/stocks/quotes/PG/interactive-chart

NOVO NORDISK[28]**=** It is a world leader in the market of insulin, diabetes care and glp-1, with respectively 47%, 30% and 22% of the worldwide market share in each segment. It has high level of margins in addition to the positive perspective for a future growth of the global insulin pen market, and this place the company in the spotlight.

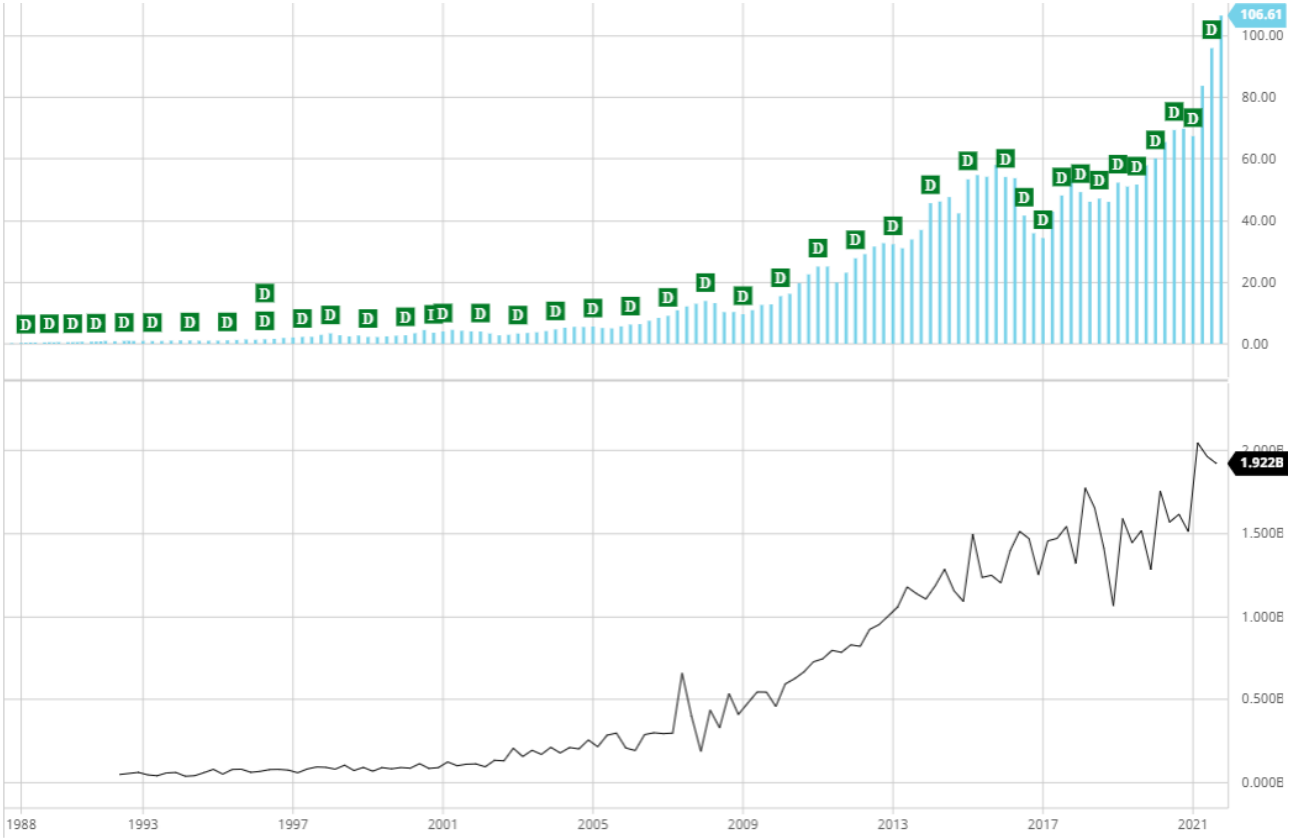


FIGURE 43 PRICE PER SHARE (ABOVE) AND EARNINGS (BELOW) OF NOVO NORDISK

[28] https://www.barchart.com/stocks/quotes/NVO/interactive-chart

KONE[29]= it is a Finnish company that produces elevators, escalators, and automatic doors. It has the fourth largest market share worldwide in this industry and these four companies detain a strong domain in the market. The positive trend of growth reached in the past years should be further emphasized due to huge investment in the modernization of infrastructure of the cities and with the constructions of skyscrapers in developing countries.

[29] http://www.nasdaqomxnordic.com/aktier/microsite?Instrument=HEX29981

Not to invest

American Airlines[30]: is the US major airline and operates all over the world. The aviation industry, as it is evident from the graph of this company, has suffered a lot even before the pandemic surge. The main problems related to this industry are: high capital needed, fuel availability and costs, global economy condition that affects the number of passengers, continuous technological innovation and high maintenance costs.

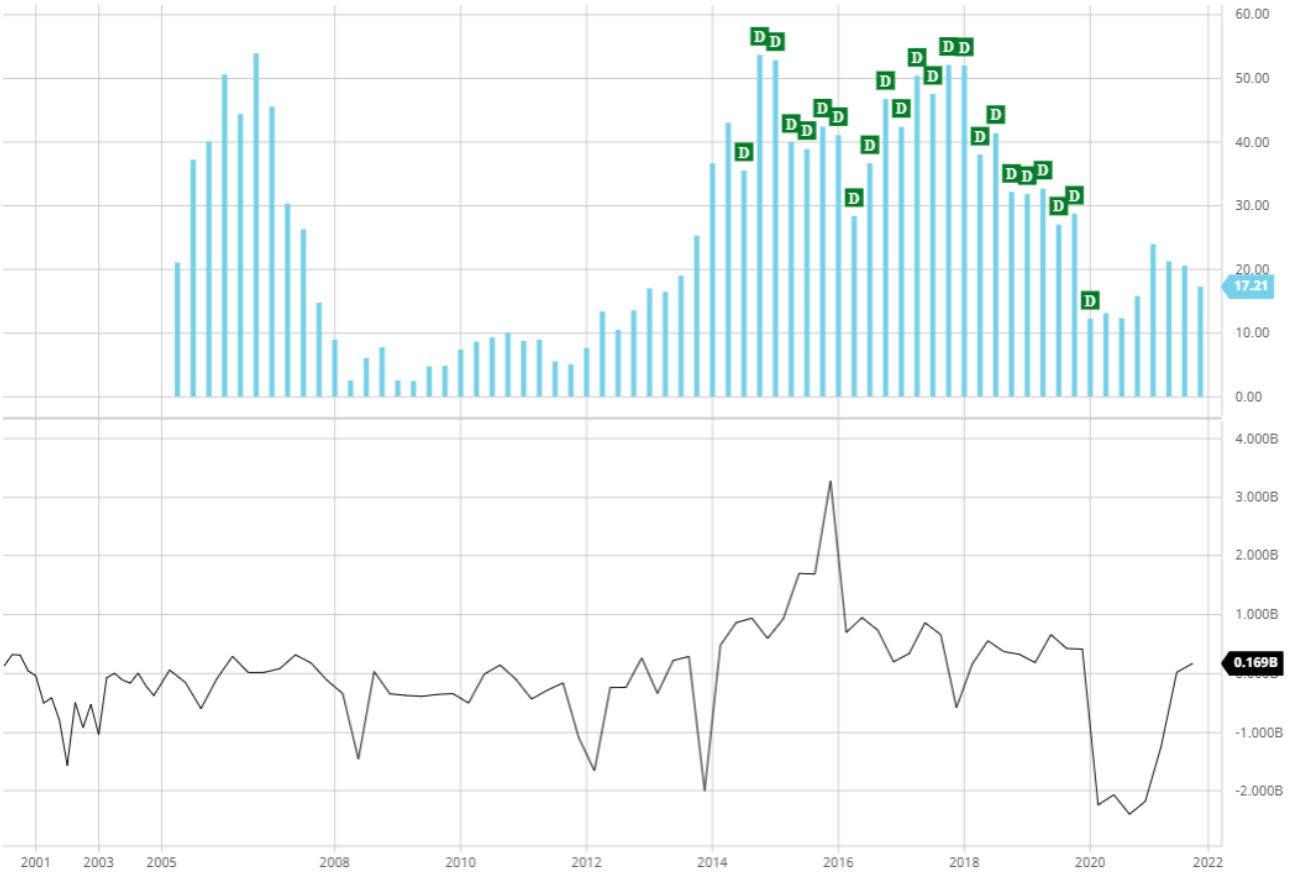


FIGURE 44 PRICE PER SHARE (ABOVE) AND EARNINGS (BELOW) OF AMERICAN AIRLINES

[30] https://www.barchart.com/stocks/quotes/AAL/interactive-chart

BARCLAYS[31]= it operates in commercial and investment banking, insurance, financial and other related services. It has over 325 years of history and covers 40 countries with its services. Financial sector in a general way is affected by: the current situation in the economy, technology improvements that introduce innovative solutions and services, regulations by the states and high capital needed.

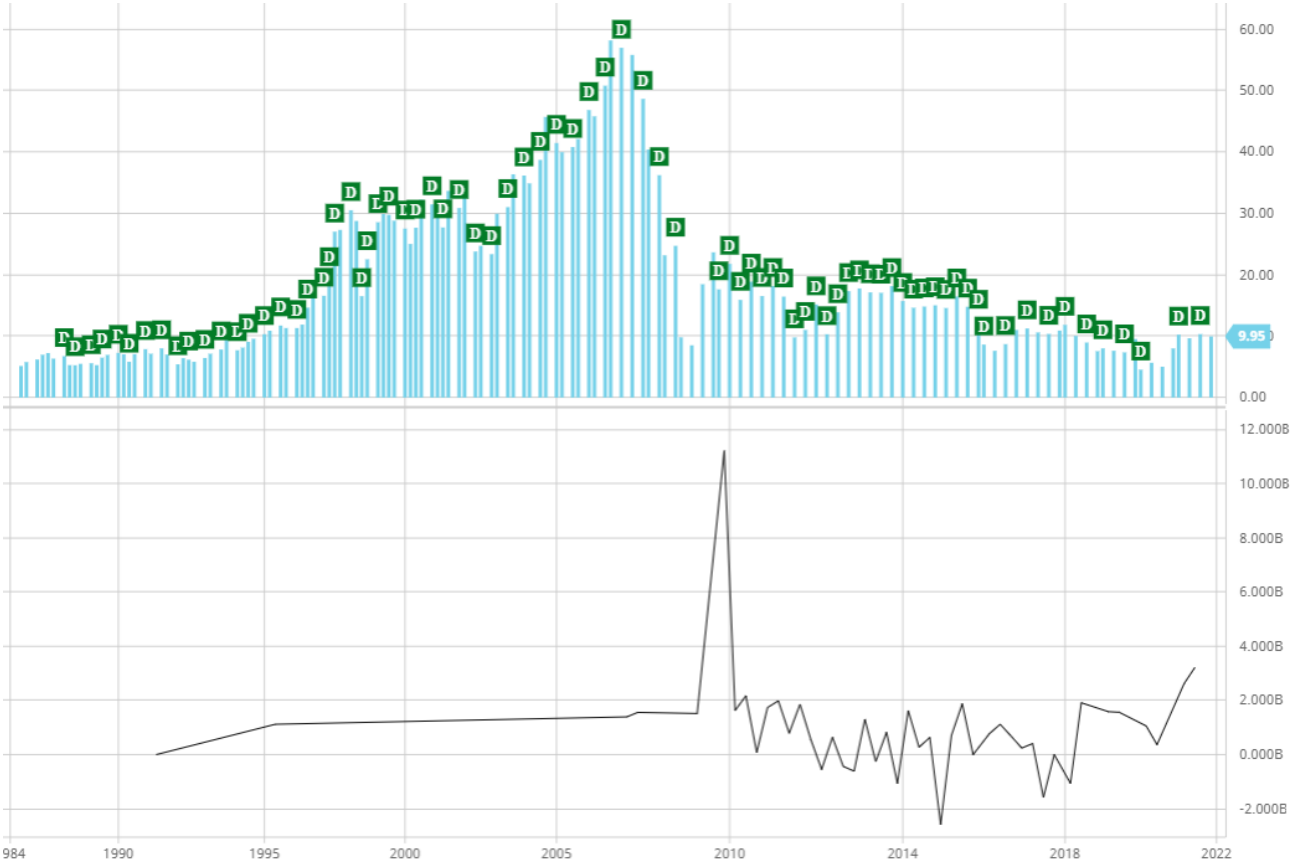


FIGURE 45 PRICE PER SHARE (ABOVE) AND EARNINGS (BELOW) OF BARCLAYS

[31] https://www.barchart.com/stocks/quotes/BCS/interactive-chart

ING GROUP[32] = is a global financial institution of Dutch origin offering banking, insurance and asset management to over 50 million private, corporate and institutional clients in 65 countries.

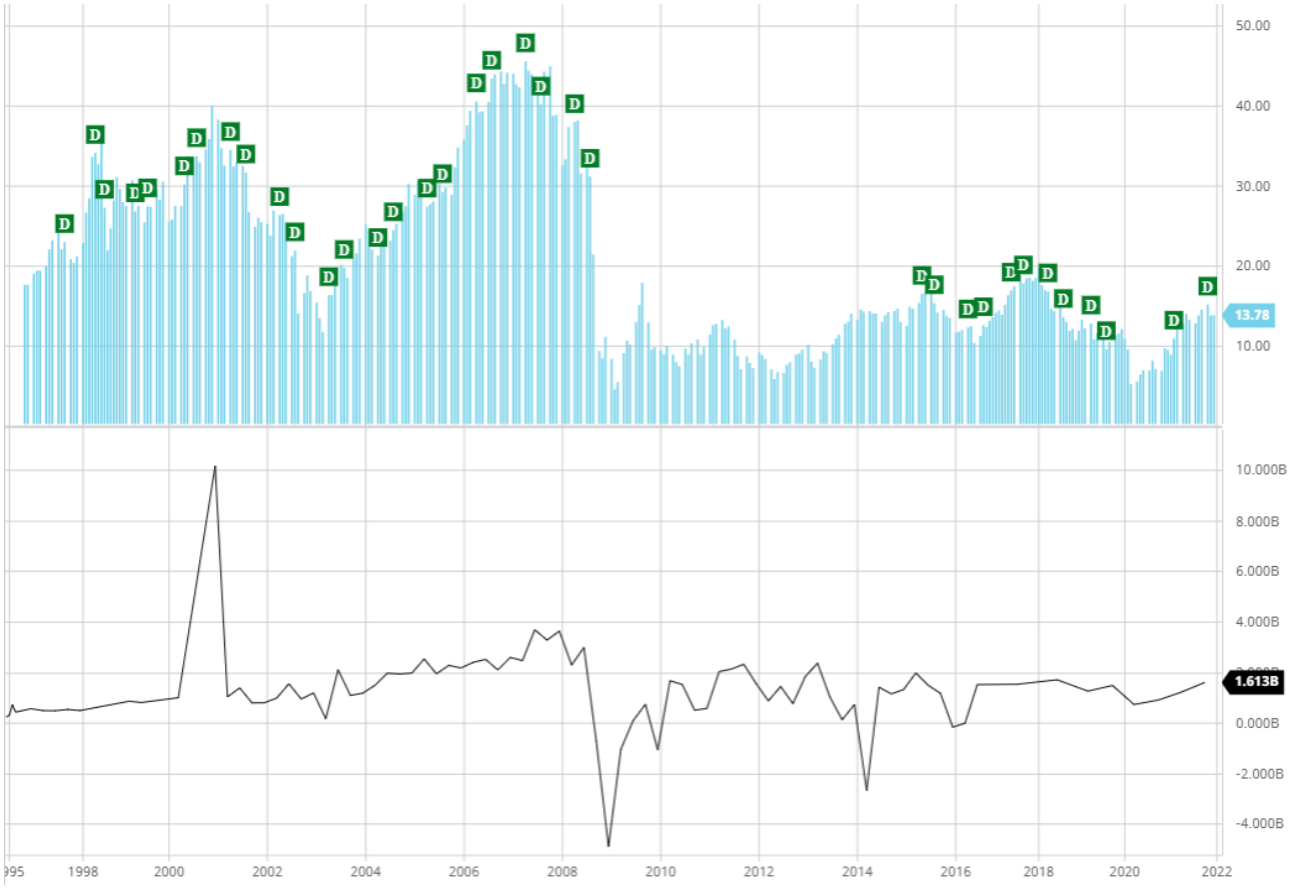


FIGURE 46 PRICE PER SHARE (ABOVE) AND EARNINGS (BELOW) OF ING GROUP

[32] https://www.barchart.com/stocks/quotes/ING/interactive-chart

Appendix B

VALE

INDUSTRY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Peculiar characteristics of the industry that affect its profitability	0.75	33,3%
External capital dependence	1.75	33,3%
Industry predictability and future perspectives of growth	1.5	33,3%
TOTAL SCORE	1.33	100%

- The company operates in the Diversified metals industry (iron ore, nickel, coal) and is one of the world's largest producer. In the industry there are different players that distribute the extraction's material all over the world, keeping a controlled price that affect the industry's profitability (medium-high industry concentration). In fact, it depends strictly on the demand from the customers that can change the supplier for their final products, bearing the only constraint of the contract restrictions (high customer bargaining power accompanied by medium-low switching cost). Being the first mile of the production process, the suppliers can be identified as the companies that provides machineries for the extraction (low suppliers' bargaining power). Newcomers have to face consistent investments for entering the industry (high initial investments). There are alternative products that can be used instead of Iron (high threat of substitutes).

- The maintaining of the machines is a relevant part of the investments of the company. For this reason, the need of external capital is required.

- Predict the future movements of the industry is not so easy considering the dependence on the economic conditions (demand for products composed by raw material) and the finding of new "artificial materials" that can reduce the demand of the product. The growth is not robust as compared to other industries.

COMPANY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Competitive advantage	1	35%
ESG compliance	1	25%
Longevity of a company in the market	3	10%
Presence of the founder or family descendants in the capital of the company	0	10%
Managers'/ directors' valuation and main shareholders' ownerships	0.5	20%
TOTAL SCORE	1	100%

- The company adopts the same business model of the other companies in the industry, but instead of the other local and some international competitors, distributes its products over more than 30 countries. It extracts iron, nickel and coal having a diversification of the business over these three segments.

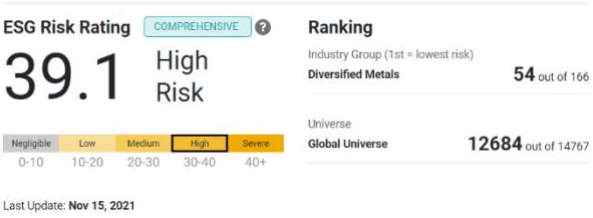


FIGURE 47 ESG RISK RATING

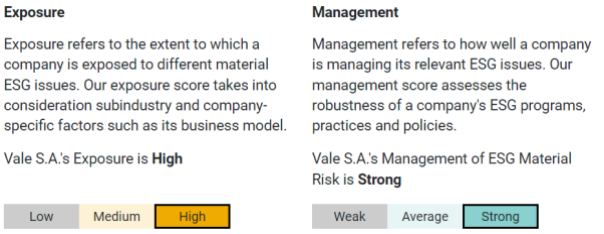


FIGURE 48 RISK EXPOSURE AND MANAGEMENT

- The company was founded in the 1942.
- The company was born from the selling to the Brazilian government of a steel company founded by an American businessman. No more present in the company capital.
- Murilo Pinto de Oliveira Ferreira, the CEO of the company undertook this role from this year, previously occupied different leading role in all the segments of the company. overall executive officers are not so experienced. The current members of the Board of Directors have been appointed recently, consequently their experience is not relevant. Shares' compensation is not incentivized; the figures own less than 1% of the shares outstanding.

The company is controlled by the Brazilian government that is the major shareholder with more than 55% of shares. For this reason, the company is partially privatized and the decision are taken or confirmed by one player.

PRODUCT AND SERVICE LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Brand image	2	40%
Yearly cyclicity of the product and its components	2.5	20%
Product's repurchase time from customers	1.75	20%
Predictability of the product performances	1	20%
TOTAL SCORE	1.85	100%

- Companies in this industry have difficulties in making emerge their products from the point of view of the brand, instead the quality of the materials is a differential element. However, the Vale SA is known worldwide and is considered a reliable supplier for the manufacturing companies.
- The product is sold to other companies as a component of their own production. While the iron ore has a more stable demand during the year, the selling of coal is influenced by an higher request during cold seasons.
- The product repurchase is based on the necessities of the downstream companies, usually due to the b2b relation, the products are sold in great quantities upon request.
- There is no patent or license that distinguish the products sold by different mineral extracting companies. Vale SA, being controlled by the Brazilian government has the assurance to be selected for country's works on the railways and other internal projects.

FINANCIAL STATEMENT ELEMENT		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Level of margins	4.5	30%
Cash conversion	1.5	20%
Capability to increase/maintain the same level of ROCE	4	30%
Cash flow to debt ratio	4.5	20%
TOTAL SCORE	3.75	100%

	N° of firms considered	Gross Margin	EBITDA margin	EBIT margin
Metals & Mining (Div.)	73	40,93%	38,91%	31,57% (US)
Total Market (US market)	5891	40,23%	22,68%	17,24%

- Gross margin= 59,17%; EBITDA margin 56,86%; EBIT margin= 50,48%
- Cash conversion= 0,68
- ROCE (2011) = 59,11%; ROCE (2010) = 20,8%; ROCE (2009) = 27,39%
- Cash flow to debt: Short term debt = 0,34 years; Overall debt = 1,27years

TENARIS

INDUSTRY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Peculiar characteristics of the industry that affect its profitability	1.5	33,3%
External capital dependence	1	33,3%
Industry predictability and future perspectives of growth	1.5	33,3%
TOTAL SCORE	1.33	100%

- The steel pipe industry is characterized by a consistent number of companies that operate worldwide, providing tubes for the transportation of material for the oil and gas companies. It's a b2b industry in which the bargaining power with the customers and suppliers plays an important role. In the first case the industry is in a subordinate position, in fact oil and gas companies can obtain pipes from different companies, in the latter case the industry can obtain a relevance position towards the suppliers. Level of substitutes is low, while the switching cost are present with contracts to maintain the relation between the firms in the supply chain.
- The maintaining of the machines and tubes is relevant, for this reason an high amount of debt is raised to sustain the business.

- The customer industry is under the regulatory pressure for the reduction of the polluting activities and the individuation of alternative sources of energy. The hydrogen could be the alternative, but its efficiency and convenience in term of costs it is slowing the process of transition.

COMPANY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Competitive advantage	1.5	35%
ESG compliance	3	25%
Longevity of a company in the market	2	10%
Presence of the founder or family descendants in the capital of the company	5	10%
Managers'/ directors' valuation and main shareholders' ownerships	1.75	20%
TOTAL SCORE	2.32	100%

- Tenaris is among the marker leaders in the production of steel pipes for the oil and gas industry, its operations are spread in more than 20 countries

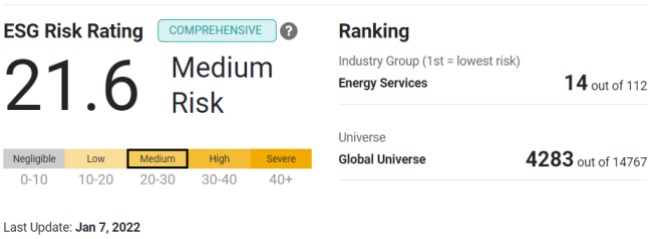


FIGURE 49 ESG RISK RATING

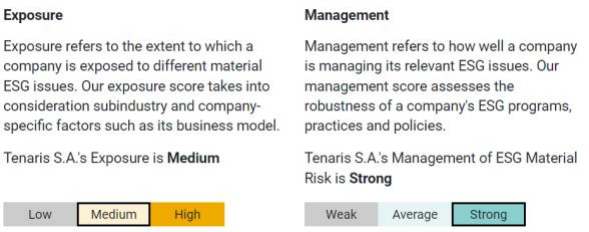


FIGURE 50 RISK EXPOSURE AND MANAGEMENT

- The company was founded in 2001
- The founder (CEO) and member of his family are present in the company
- Managers and directors have a lot of experience in the company, many of them have been employed since the foundation. The CEO covered other important positions in other companies in the field. The company is owned for the 60% by the family company Rocca & Partners SA

PRODUCT AND SERVICE LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Brand image	2	40%
Yearly cyclicity of the product and its components	1	20%
Product's repurchase time from customers	1.75	20%
Predictability of the product performances	1	20%
TOTAL SCORE	1.55	100%

- Tenaris' solutions are among the most widely used by oil firms in the most difficult applications, including as deep-water offshore and horizontal shale wells.
- The steel production is dependent on the upstream demand and from the downstream raw materials' fluctuations.
- Customers buy products depending on the economic conditions and demand of the final customers (companies or private citizens).
- Considering that the brand in not perceived a differential element for the customers, the product sold is similar (if not equal) to the competitors' one (no brand protection with patents). The predictability of the products built by the company can be assured only through pre-defined contracts.

FINANCIAL STATEMENT ELEMENT		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Level of margins	2	30%
Cash conversion	1	20%
Capability to increase/maintain the same level of ROCE	2.5	30%
Cash flow to debt ratio	2	20%
TOTAL SCORE	1.95	100%

	N° of firms considered	Gross Margin	EBITDA margin	EBIT margin
Oil/Gas Distribution	13	39,89%	28,25%	18,45%
Total Market (US market)	5891	40,23%	22,68%	17,24%

- Gross Margin= 37.52%; EBITDA Margin= 24.55%; EBIT Margin= 18.99%
- Cash conversion= 0.52
- ROCE (2011) = 16.32%; ROCE (2010) = 13.87%; ROCE (2009) = 17.44%
- Cash flow to debt: Short term debt= 1.87 years; Overall debt= 2.87nyears

WYNN RESORTS

INDUSTRY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Peculiar characteristics of the industry that affect its profitability	1	33,3%
External capital dependence	2.5	33,3%
Industry predictability and future perspectives of growth	1.5	33,3%
TOTAL SCORE	1.66	100%

- The hospitality and gaming industry Is characterized by many operators, with the main ones that adopt their brand image to be recognizable. The industry bear low switching cost, in fact the customers can change company without incurring in limitations. Moreover, the substitute products, identified with the online gaming or other entertainment industries is really strong. On the contrary the customers and suppliers bargaining power do not pose a threat to the industry. Huge costs to start the business that are related to the building and the licenses.
- The maintaining of the business requires a considerable amount of money, especially for the biggest players and for the luxury resorts that need constant flow of money to enter in the business.

- The higher threat is the online gaming that is gaining more success, but the positive news is the increased adoption and legalization of gaming in the different countries as a source of profit for the state itself. The last years' cagr tells that the industry has a slow pace of growth

COMPANY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Competitive advantage	3	35%
ESG compliance	2.5	25%
Longevity of a company in the market	1.75	10%
Presence of the founder or family descendants in the capital of the company	5	10%
Managers'/ directors' valuation and main shareholders' ownerships	1.75	20%
TOTAL SCORE	2.7	100%

- The company is well known for its expensive buildings and innovative attractions. Moreover, the founder can be recognized as one of the most influential person in the hotel/casinos of Las Vegas. Other differentiation characteristics are not relevant.

FIGURE 51 ESG RISK RATING

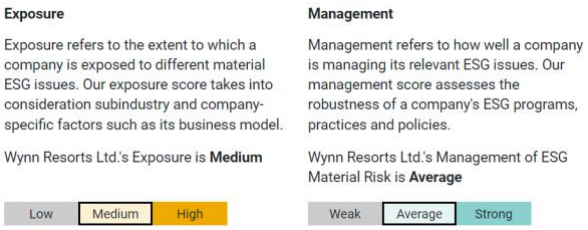


FIGURE 52 RISK EXPOSURE AND MANAGEMENT

- Founded in 2002 by Stephen A. Whynn.
- The founder is still at the head of the company
- The funder is the CEO of the company, but the average tenure of the managers is quite low. The company is mainly controlled (60%) by different institutional shareholders, more than 25.

PRODUCT AND SERVICE LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Brand image	3	40%
Yearly cyclicity of the product and its components	1.5	20%
Product's repurchase time from customers	1.5	20%
Predictability of the product performances	2.5	20%
TOTAL SCORE	2.3	100%

- The company has a brand image that is recognizable in the industry.
- The products and services offered are especially used during the holiday periods.
- Customers will use these products and services depending on the general economic condition.
- There are gambling licenses that are difficult to obtain, these protect the business profitability. Is difficult to predict the success of investments in innovations.

FINANCIAL STATEMENT ELEMENT		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Level of margins	3.25	30%
Cash conversion	3.5	20%
Capability to increase/maintain the same level of ROCE	2	30%
Cash flow to debt ratio	2	20%
TOTAL SCORE	2.67	100%

	N° of firms considered	**Gross Margin**	**EBITDA margin**	**EBIT margin**
Hotel/Gaming	51	34,67%	20,74%	12,61%
Total Market	5891	40,23%	22,68%	17,24%

- Gross Margin= 37.18%; EBITDA Margin= 27.06%; EBIT Margin= 19.13%
- Cash conversion= 1.06
- ROCE (2011) = 18.95%; ROCE (2010) = 10.8%; ROCE (2009) = 3.41%
- Cash flow to debt: Short term debt= 1.04 years; Overall debt= 3.13 years

OCCIDENTAL PETROLEUM

INDUSTRY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Peculiar characteristics of the industry that affect its profitability	1.5	33,3%
External capital dependence	0.5	33,3%
Industry predictability and future perspectives of growth	1.5	33,3%
TOTAL SCORE	1.16	100%

- In the industry operates different typologies of companies: the big private companies that are present in the last mile of the industry supply chain, the ones involved in the oil and gas exploration and production and the national companies that control the oil and gas reserves. So many companies in the field. The newcomers are not incentivized to entry in the industry considering the huge initial costs and the necessity of economies of scale. The threat of substitutes is not high because alternative way of producing energy is too costly and cannot satisfy the whole demand. Buyers cannot affect the oil prices but this one is dependent on the amount of the offer and economic situations. Instead, the bargaining power of the suppliers is more present mainly for the companies that are integrated in the whole oil and gas supply chain and countries that control the highest quantities of reserves.
- Maintenance and upgrades costs impact consistently on the profitability of the industry and force the companies to rely on external capital, exposing to leverage effects.
- There are new ways of producing energy that are starting to being tested but will require some time to substitute the current sources. The impact of political or environmental problems could affect the future profits of the industry. The revenues growth pace is statistically not so high.

COMPANY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Competitive advantage	1.5	35%
ESG compliance	0.5	25%
Longevity of a company in the market	4	10%
Presence of the founder or family descendants in the capital of the company	0	10%
Managers'/ directors' valuation and main shareholders' ownerships	2.5	20%
TOTAL SCORE	1.55	100%

- Company that tries to implement innovative process of production and extraction, it has plants in different part of the world including OPEC's countries and US. It doesn't have a particular competitive advantage apart from the previous one cited.

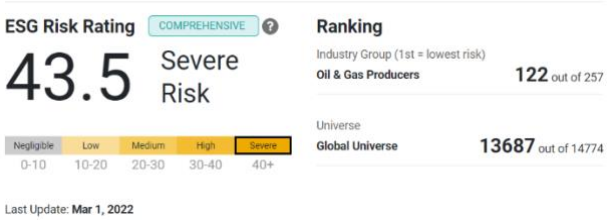


FIGURE 54 ESG RISK RATING

FIGURE 53 RISK EXPOSURE AND MANAGEMENT

- The company was founded in 1920.
- The founder or descendants are not inside the companies.
- Managers and directors have compensations that includes also stocks, aligning personal interests with the ones of the company. The average tenure in the current role in the company is more than 2 years, showing a positive result. The top 25 shareholders own more than 70 % of the company.

PRODUCT AND SERVICE LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Brand image	2	40%
Yearly cyclicity of the product and its components	2	20%
Product's repurchase time from customers	2	20%

Predictability of the product performances	2.5	20%
TOTAL SCORE	2.1	100%

- Occidental Petroleum is one of the largest gasoline producers in Texas, and the first in California. According to market value in 2013, Oxy is the world's fourth largest gas and oil corporation. No brand image makes difference in this industry
- The demand for oil and gas is higher during cold seasons, the company being in the upstream position in the supply chain doesn't suffer of inputs' shortage problems.
- The relation between customers and oil and gas providers is regulated by contracts. For this reason higher quantities of products are sold in specific moment (not every day).
- Even here contracts and patents can regulate the performances. The results in R&D investments are difficult to be predicted.

FINANCIAL STATEMENT ELEMENT		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Level of margins	4.5	30%
Cash conversion	2.25	20%
Capability to increase/maintain the same level of ROCE	2.75	30%
Cash flow to debt ratio	2.75	20%
TOTAL SCORE	3.17	100%

	N° of firms considered	**Gross Margin**	**EBITDA margin**	**EBIT margin**
Petroleum (Producing)	176	44,46%	39,33%	25,74%
Total Market	5891	40,23%	22,68%	17,24%

- Gross Margin= 69.15%; EBITDA Margin= 60.68%; EBIT Margin= 45.687%
- Cash conversion= 0.84

- ROCE (2011) = 21%; ROCE (2010) = 20%; ROCE (2009) = 15.26%
- Cash flow to debt: Short term debt= 0.67years; Overall debt= 3.07 years

STARBUCKS

INDUSTRY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Peculiar characteristics of the industry that affect its profitability	4.75	33,3%
External capital dependence	4.5	33,3%
Industry predictability and future perspectives of growth	4	33,3%
TOTAL SCORE	4.42	100%

- If we consider the whole beverage and snack industry, we can say that there are a lot of competitors. But referring more specifically to the coffee and snack industry, the competition decrease, although remaining quire relevant. Is worth to notice that in this industry is characterized by a monopolistic structure, leaded by two main firms (Starbucks Corporation and Dunkin's brands). There is a dependence on the price of coffee beans, and the bargaining power will depend on the size of the company, even if the number of suppliers is high. The bargaining power of the customers can be discussed in relation to their capability to influence the price, a thing that is not possible. The price is given by the company, while the customers can decide to change brand/company without incurring in any switching cost, but the customers in the premium drinks are not sensitive to price changes. The substitute products are a lot.
- The capital needed to maintain the business are well covered by the operating revenues, so low need to external capital. Even the initial stage doesn't require an high amount of money.
- The demand is quite stable during the year and the level of growth is moderate. Great opportunities of growth in developing countries.

COMPANY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Competitive advantage	5	35%
ESG compliance	3.5	25%
Longevity of a company in the market	2.5	10%
Presence of the founder or family descendants in the capital of the company	5	10%
Managers'/ directors' valuation and main shareholders' ownerships	4	20%
TOTAL SCORE	4.18	100%

- The company adopts a franchisee business model, with a well-recognized brand and great expansion in different countries. It also leverages on the economies of scale for production's supply. The positions of the stores is strategic and high visible close to the most crowded parts of the cities. Moreover, all its locations provide quite places where online workers can spend the whole day with a safe Wi-Fi connection. The company strategy of differentiation with products/locations that satisfy different necessities and tastes, is a strong competitive advantage

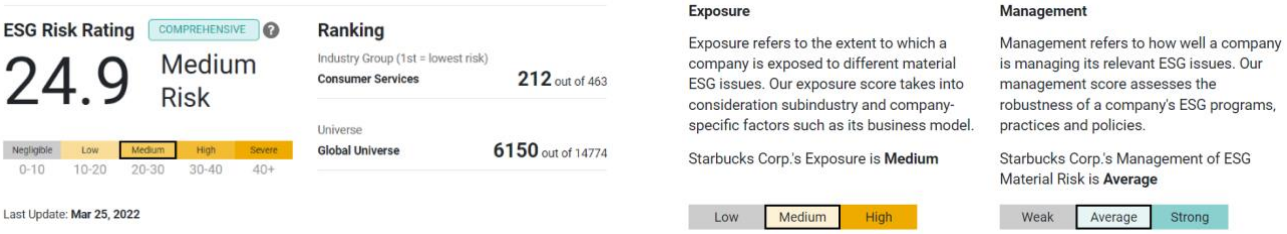


FIGURE 55 RISK EXPOSURE AND MANAGEMENT

- Founded in 1971
- The founder Howard Schulze is still present at the lead of the company.
- The average tenure of the managers and board of directors is consistent, without considering the huge experience of the president and CEO Howard Schulze. The institutional investors have an ownership of approximately 50%, influencing the board.

PRODUCT AND SERVICE LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Brand image	5	40%
Yearly cyclicity of the product and its components	4.25	20%
Product's repurchase time from customers	3.75	20%
Predictability of the product performances	4.5	20%
TOTAL SCORE	4.5	100%

- The company is spread over 60 countries, with its own stores or licensed stores. It has the highest market share in the coffee and snack industry (more than 30%).
- The consumption of company's products take place constantly during the year, in fact the company provides fresh and cold products that satisfy the needs of the customers. Because coffee beans are the key input, market costs and profit margins are determined by current variable coffee bean prices.
- The demand for coffee and snack items is determined especially by level of income, health attitudes, global coffee pricing. This industry is extremely vulnerable to macroeconomic factors that influence the amount that people dedicate to products. Anyway, in average, people consume coffee or similar products every day and the premium coffee customers are less sensitive to changes in prices.
- Licenses protect the brand from other copies, Starbucks is known for its innovative products that deliver in the market at a regular base.

FINANCIAL STATEMENT ELEMENT		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Level of margins	3.5	30%
Cash conversion	3	20%
Capability to increase/maintain the same level of ROCE	4.25	30%
Cash flow to debt ratio	5	20%
TOTAL SCORE	3.93	100%

	N° of firms considered	Gross Margin	EBITDA margin	EBIT margin
Beverage	34	59,01%	25,15%	20,45%
Total Market	5891	40,23%	22,68%	17,24%

- Gross Margin= 57.98%; EBITDA Margin= 29.47%; EBIT Margin= 24.77%
- Cash conversion= 0.72
- ROCE (2011) = 35%; ROCE (2010) = 33%; ROCE (2009) = 15.6%
- Cash flow to debt: Short term debt= 0.15years; Overall debt= 0.35 years

KONE

INDUSTRY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Peculiar characteristics of the industry that affect its profitability	4.25	33,3%
External capital dependence	4.5	33,3%
Industry predictability and future perspectives of growth	4	33,3%
TOTAL SCORE	4.25	100%

- The elevators and escalators industry is composed by few big participants that divide the worldwide market share. The main players are: Kone Corporation, Schindler Group, Otis Elevator Company, Fujitec, ThyssenKrupp AG and Mitsubishi Electric Corporation. Everyone covers a consistent slice of demand and are specialized in particular product's features that permit to not clash among each others. This is a form of protection of the companies' profitability. The bargaining power of the customers is not a problem due to the low number of products suppliers. At the same time the relationship with the suppliers is solid due to the higher amount of material asked to them. Huge expenditures in R&D to enter in the market, doesn't attract newcomers. Switching cost are important because a client that acquire an elevator in order to amortize the costs (including also maintenance and modernization) require time. Moreover, the design of the solutions is, for most of the time, personalized according to the needs of the client. Is possible to say that substitute products are not

present or have a tiny impact on the profitability of this industry. There are few companies that own the majority of the market, so they can sell them at a good margin.

- It is not required a great dependence on the external capital because the companies have constant and consistent inflows that can assure a safe continuation of the business.
- There is a growing demand due to: increase of salaries in developing countries with the consequence construction of buildings, increased construction of skyscraper worldwide, ageing people will require more solutions, modernization of smart cities. China during the years had the highest demand for new equipment, while EU and USA have been more exposed to a higher maintenance demand and soon a modernization one.

COMPANY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Competitive advantage	4	35%
ESG compliance	4.25	25%
Longevity of a company in the market	4	10%
Presence of the founder or family descendants in the capital of the company	4.25	10%
Managers'/ directors' valuation and main shareholders' ownerships	3	20%
TOTAL SCORE	3.88	100%

- Kone is a Finnish company that produces elevators, escalators, and automatic doors. It is a reliable supplier that invest huge sums in R&D providing new/update products. The business model is based on a continuous relation with the client, assuring constant amount of money.

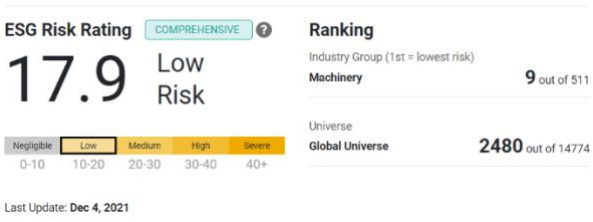


FIGURE 56 ESG RISK RATING

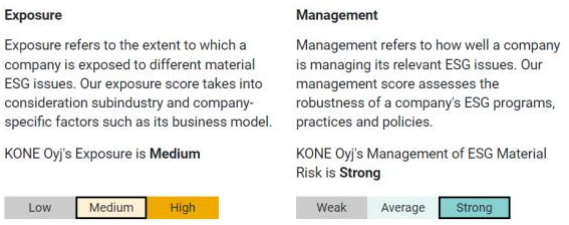


FIGURE 57 RISK EXPOSURE AND MANAGEMENT

- Founded in 1918

- The company that started as an importer of another elevator company (Graham Brothers), was acquired in 1924 by the Herlin family, a wealthy Finnish family, whose members covered and passed among their heirs the role of president/chairman of the board of the company till nowadays. Is the Herlin family that built the success of the company.
- The chairman of the board is the heir of the "founder" and has many years of experience (since 1991). The president and CEO Matti Alahuhta, former president of Nokia, has covered this role since 2003. All the members of the board are experienced. Antii Herlin detains the 51% of the shares and 62% of voting rights. The remaining part is divided among institutional shareholders and other companies.

PRODUCT AND SERVICE LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Brand image	4.25	40%
Yearly cyclicity of the product and its components	4	20%
Product's repurchase time from customers	4	20%
Predictability of the product performances	4.5	20%
TOTAL SCORE	4.2	100%

- It has the fourth largest market share worldwide in this industry
- Here we cannot talk about yearly cyclicity of the product's demand, it depends on the requests and maybe can be connected to construction of new buildings.
- This industry is strictly linked with the maintenance or replacement of the equipment already sold that assure constant revenues over the years. The maintenance and modernization cannot be avoided even in bas economic periods
- The huge investments in R&D with the development of innovative products that are protected by patents and licenses, assure a protection and a certain predictability of the efforts employed.

FINANCIAL STATEMENT ELEMENT		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Level of margins	3.75	30%
Cash conversion	3.25	20%
Capability to increase/maintain the same level of ROCE	4.25	30%
Cash flow to debt ratio	5	20%
TOTAL SCORE	4.05	100%

	N° of firms considered	**Gross Margin**	**EBITDA margin**	**EBIT margin**
Machinery	100	36,55%	15,10%	11,05%
Total Marke	5891	40,23%	22,68%	17,24%

- Gross Margin= 46.3%; EBITDA Margin= 15.13%; EBIT Margin= 13.87%
- Cash conversion= 0.76
- ROCE (2011) = 31.57%; ROCE (2010) = 40.9%; ROCE (2009)= 37.28%
- Cash flow to debt: Short term debt= 0.12years; Overall debt= 0.34 years

VISA

INDUSTRY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Peculiar characteristics of the industry that affect its profitability	4.25	33,3%
External capital dependence	4.5	33,3%
Industry predictability and future perspectives of growth	4	33,3%
TOTAL SCORE	4.25	100%

- The financial services industry is composed by a dominance of few players that create a sort of monopoly of this industry, the most known are: Visa, Mastercard, American Express. In addition to them that are adopted by the single banks, there is the presence of alternatives payment systems that fulfill the same needs of communication between two parts (Pay-Pal; Apple Pay). These technologies are used as an alternative to the main payment circuits. Moreover, cash and checks are the alternatives to the card payments, but their use has been decreasing. Is difficult to give a judgment to the switching costs, considering that the different methods are more or less equal and without costs. From the point of view of the merchants instead a slightly different on fees can emerge. The bargaining power of suppliers is low. This because in the market there are many different companies that provide software, electronic chips, raw materials. Entering in this industry is complicated under the point of view of the trust and the capability to create a solid network.

- The costs are mainly related to the software and human resources. There maintenance costs are not so relevant and can be covered by the operating profits.

- There is a great opportunity for enlarging the customer base in the emerging countries, important news will come from the decentralized payment circuits, like the ones on block-chain. Moreover, opportunities may arise in the development solutions on smartphone instead that using a physical card.

COMPANY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Competitive advantage	4.75	35%
ESG compliance	4.5	25%
Longevity of a company in the market	3	10%
Presence of the founder or family descendants in the capital of the company	2	10%
Managers'/ directors' valuation and main shareholders' ownerships	4.25	20%
TOTAL SCORE	4.14	100%

- The company works worldwide and is the most used circuit of payment. It is trusted by all the major banks and permits to move money electronically from one pier to another. Its success is due to its network.

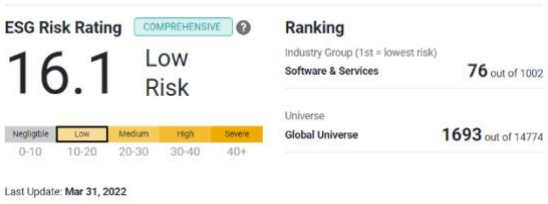


FIGURE 59 ESG RISK RATING

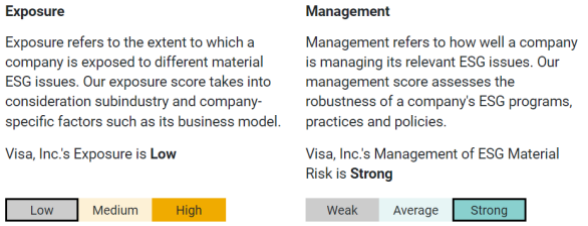


FIGURE 58 RISK EXPOSURE AND MANAGEMENT

- The company born from the first credit card emitted by the Bank of America, changed its name in Visa in 1976, till becoming a joint venture of thousands financial institutions in 2007 under the name of Visa Inc. The CEO Joseph Saunders had a relevant role in this last company structure. Anyway the founder Dee Hock is not present in the company board.

- Since the transition in 2007, the company appointed new figures in its managerial and directors' roles, everyone with many years of experience in the financial field. The shareholdings is spread among different financial institutions.

PRODUCT AND SERVICE LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Brand image	5	40%
Yearly cyclicity of the product and its components	5	20%
Product's repurchase time from customers	5	20%
Predictability of the product performances	4	20%
TOTAL SCORE	4.8	100%

- VISA is the world leader in the credit card market in 2011, accounting for 50.1 percent of total transaction value, compared to 33.5 percent for MasterCard. It has 76.9% of the debit card market, ranking it ahead of MasterCard, which has 18.9%.

- There is no cyclicity, the usage of payment services is constant during the year and provision of human resources or software are not problematic

- The usage of the payment services is necessary in every economic condition, but people may do less transactions.

- Regulations protect the brand from other companies and its position in the market permits to convert the R&D expenses in revenues. Possible ideas can be copied and improved by competitors.

FINANCIAL STATEMENT ELEMENT		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Level of margins	5	30%
Cash conversion	2.5	20%
Capability to increase/maintain the same level of ROCE	3.25	30%
Cash flow to debt ratio	5	20%
TOTAL SCORE	3.98	100%

	N° of firms considered	**Gross Margin**	**EBITDA margin**	**EBIT margin**
Financial Svcs. (Div.)	225	89,25%	46,41%	43,49%
Total Market	5891	40,23%	22,68%	17,24%

- Gross Margin= 100%; EBITDA Margin= 82.97%; EBIT Margin= 59.38%
- Cash conversion= 0.5
- ROCE (2011) = 20.6%; ROCE (2010)= 18.3%; ROCE (2009)= 15.2%
- Cash flow to debt: the company paid all its outstanding debt in September 2011. Short term debt= 0 years; Overall debt= 0 years

COCA-COLA

INDUSTRY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Peculiar characteristics of the industry that affect its profitability	4	33,3%
External capital dependence	3.5	33,3%
Industry predictability and future perspectives of growth	4	33,3%
TOTAL SCORE	3.83	100%

- The competition inside the beverage industry can be defined as medium-high, considering that the there are two main brands (Coca-Coal and Pepsi) that together with other few big names cover the majority of the market. Moreover, is worth to notice the other brands have less appeal respect the two main ones. There is no switching cost and the capital needed to start a business in this sector is not so relevant, an important thing for the newcomers is the fundamental weight that has the brand/image. Both the bargaining power of the buyers and the suppliers is low.
- Apart from the machineries for the production and the distribution through a network, there are not huge costs. This lessens the dependence on external capital.
- The future trends to pay attention are related to the quality of the ingredients and consequently to their healthiness. Many firms are trying to enter in this market with an appealing brand and message embedded to its products. The marketing will play a relevant role.

COMPANY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Competitive advantage	4.75	35%
ESG compliance	2	25%
Longevity of a company in the market	5	10%
Presence of the founder or family descendants in the capital of the company	1	10%
Managers'/ directors' valuation and main shareholders' ownerships	4	20%

TOTAL SCORE	3.56	100%

-

- Is probably the largest and most known company in the industry. It is characterized by a catchy packaging that is well recognizable. The effective marketing is another strategy used by the company to spread its name, associating its brand with different companies, personal brands and events. One of the strengths of the company is to have a high range of products with different flavors, this thanks also to the numerous acquisitions undertaken.

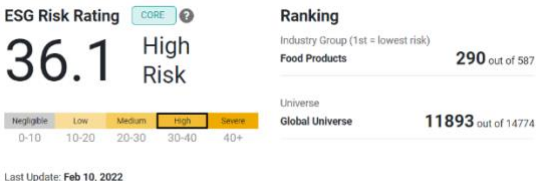


FIGURE 60 ESG RISK RATING

FIGURE 61 RISK EXPOSURE AND MANAGEMENT

- The Coca-Cola as a beverage was invented by a pharmacist called John Stith Pemberton in 1886, then he sold the receipt to an American entrepreneur, Asa Griggs Candler who in 1892 founded The Coca-Cola Company and brought to success the company.

- No presence of the founder or descendants.

- The CEO appointed in 2009 Ahmet Muhtar Kent, worked since 1978 in the Coca-Cola company ì, first in its home country, Turky, and then in the USA with leading positions. All the directors and executive officers of the group have an ownership of 5.49% of the company, this is positive because share a common goal in the benefit of the company.

PRODUCT AND SERVICE LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Brand image	4.5	40%
Yearly cyclicity of the product and its components	2.5	20%
Product's repurchase time from customers	4	20%
Predictability of the product performances	4.5	20%
TOTAL SCORE	4	100%

- In 2011 Coca-Cola US has a market share of 43.7% [33]. Even in the other countries the brand is really strong, and its network and partnership further increase its visibility in the eyes of the customers. The only negative notice is the perception of unhealthy product that has
- The beverage is consumed mainly during warm seasons and during the whole year in countries where the average temperature is high.
- The level of consumption is important, anyway can suffer in periods of crisis.
- The company is protected with patents and licenses, moreover its secret receipt is one of the most valuable assets that the firm have. Investments are well repaid in term of increased sales due to its strong marketing effectiveness.

FINANCIAL STATEMENT ELEMENT		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Level of margins	2	30%
Cash conversion	2.75	20%
Capability to increase/maintain the same level of ROCE	4	30%
Cash flow to debt ratio	4.5	20%
TOTAL SCORE	3.25	100%

	N° of firms considered	**Gross Margin**	**EBITDA margin**	**EBIT margin**
Beverage	34	59,01%	25,15%	20,45%
Total Market	5891	40,23%	22,68%	17,24%

- Gross Margin= 40.30%; EBITDA Margin= 9.65%; EBIT Margin= 5.49%
- Cash conversion= 0.78
- ROCE (2011) = 22.32%; ROCE (2010)= 21.5%; ROCE (2009)= 26.96%
- Cash flow to debt: the company paid all its outstanding debt in September 2011. Short term debt= 0.2 years; Overall debt= 1.44 years

[33] https://www.statista.com/statistics/225388/us-market-share-of-the-coca-cola-company-since-2004/#:~:text=In%202019%2C%20Coca%2DCola's%20U.S.,shares%20may%20be%20found%20here)

NIKE

INDUSTRY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Peculiar characteristics of the industry that affect its profitability	4	33,3%
External capital dependence	4.25	33,3%
Industry predictability and future perspectives of growth	4.5	33,3%
TOTAL SCORE	4.25	100%

- The competition can be defined quite high, there are many international businesses that operates in the Softline retail industry (Adidas, Nike, New balance, Reebok) and many minor businesses that launch their own clothing line. Is not required an high capital to enter the business. The threat of substitutes is null because the items sold (footwear, caps, sportswear) cannot be changed with another item that fulfill the same need. The bargaining power of customers and suppliers depends on the size of the latter.
- No external capital needed for this industry.
- The predictability of this industry is not a problem historically. The trend is positive considering the increased awareness for health that push people to do some sport activity requiring an adequate dressing. Marketing plays an important role.

COMPANY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Competitive advantage	5	35%
ESG compliance	4.5	25%
Longevity of a company in the market	2.75	10%
Presence of the founder or family descendants in the capital of the company	5	10%
Managers'/ directors' valuation and main shareholders' ownerships	4.5	20%
TOTAL SCORE	4.55	100%

- The company is present worldwide, dress the most known athletes and is famous for its high-quality products with an attractive design. It has many stores in all the countries that permits to cover the area.

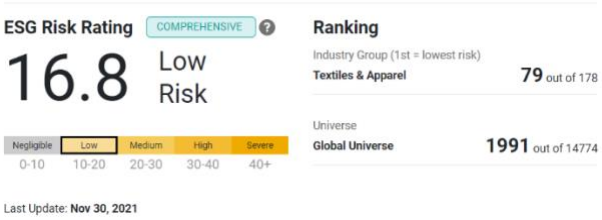


FIGURE 63 ESG RISK RATING

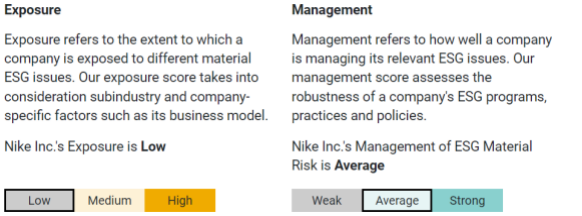


FIGURE 62 RISK EXPOSURE AND MANAGEMENT

- The company was founded in 1964 under another name, only in 1971 starts the Nike Inc.
- The founder was president and CEO till 2004 and then kept the presidential role.
- The current CEO Mark Parker entered the firm in 1979, covered many roles with higher responsibility till becoming CEO in 2004. The shareholder ownership is split among many institutional investors

PRODUCT AND SERVICE LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Brand image	5	40%
Yearly cyclicity of the product and its components	4.25	20%
Product's repurchase time from customers	4	20%
Predictability of the product performances	4.75	20%
TOTAL SCORE	4.6	100%

- The Nike logo is perfect to be recognized instantly. This permitted to be positioned at top of the brands in this industry, reaching approximately more than 50% of market share in sportswear.
- Is not evident a particular fluctuation of demand during periods of the years. The same for its raw materials.
- The repurchase time is based on the experience that the customer perceived. It has to be seen as a long-time affiliation.
- Investments in innovative products are well received by the market response thanks to its qualitative reputation. Anyway materials used are not exclusive for Nike.

FINANCIAL STATEMENT ELEMENT		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Level of margins	4	30%
Cash conversion	3	20%
Capability to increase/maintain the same level of ROCE	4	30%
Cash flow to debt ratio	5	20%
TOTAL SCORE	4	100%

	N° of firms considered	**Gross Margin**	**EBITDA margin**	**EBIT margin**
Retail (Softlines)	47	38,82%	12,76%	9,39%
Total Market	5891	40,23%	22,68%	17,24%

- Gross Margin= 45.74%; EBITDA Margin= 15.91%; EBIT Margin= 14.12%
- Cash conversion= 0.67
- ROCE (2011)= 22.45%; ROCE (2010)= 23.98%; ROCE (2009)= 20.15%
- Cash flow to debt: the company paid all its outstanding debt in September 2011. Short term debt= 0.11 years; Overall debt= 0.3 years

UNILEVER

INDUSTRY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Peculiar characteristics of the industry that affect its profitability	2	33,3%
External capital dependence	4	33,3%
Industry stability and future perspectives growth	3.75	33,3%
TOTAL SCORE	3.25	100%

- In the business segments that can be included in the Beauty and Personal Care, Foods and Refreshment, and Home Care there are few big competitors (like P&G, Unilever, Mars, GSK, Johnson & Johnson, Nestle) and many smaller international/local players. A relevant position is taken by the big retailer stores (e.g. Walmart, Costco), that sell their own products at lower price respect the companies in the industry. For these reasons a quite high competition present in the industry determines a possible profitability diminishing. Low switching costs means that customers can buy products from other firms without incurring in any consequence. Is difficult to be perceived different from the point of view of the product's quality. Marketing (perception of the brand) and some specific characteristics are the focal points. Possible decrease in profitability. Entering this market requires a moderate capital in order to face the already structured incumbents in term of economies of scale, distribution, visibility and know how. This is considered a possible entry barrier that protects the industry profitability. The scarcity of substitutes for the personal and home care industry restricts the intensity of company's consumers bargaining power. Furthermore, because of the great total market demand, the impact of individual customer purchasing decisions on the company's profitability is minimized. Individual suppliers' influence on the organization is limited due to the high total level of supply. This characteristic protects the profit of this industry. Substitute products pose a significant danger to the food and refreshment industry. In the market there are different alternatives that satisfy the same customer need as chocolates, soft drinks, and confectionery. There are other people who prefer home-cooked meals for health reasons. Snack makers are also required to offer their products through the same retail and distribution channels as manufacturers of other alternative items. It is difficult for them to compete successfully considering that customers can choose among different alternatives. For this industry the consumer and supplier bargaining power is not relevant.

- The industries in which Unilever is present are traditionally not capital intensive and do not require high debt capital to run the business (anyway specific situations can be found even in these sectors depending on the capital structure of the single firm in consideration)
- The emerging markets are driving the boost of demand for these industries. The higher incomes with an increase in the standards of living are the reason for this enhance. "We believe growth in mature markets will remain relatively stagnant, and growth in emerging economies such as China, Brazil, and India will be insufficient to offset declines in developed countries. Total sales in the global household and personal products industry are expected to reach $424.1 billion by 2013, reflecting an annual growth rate of 3.3%" by Morningstar analysis. Taking the revenues CAGR of 6.8% [21]reached from 2011 to 2015 in the food and beverages industry, we can affirm that this industry is more prominent respect the other two.

COMPANY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Competitive advantage	4.25	35%
ESG compliance	4.25	25%
Longevity of a company in the market	4	10%
Presence of the founder or family descendants in the capital of the company	0	10%
Managers'/ directors' valuation and main shareholders' ownerships	4	20%
TOTAL SCORE	3.75	100%

- Global market presence, with worldwide brand recognition. The company operates in 190 Countries. Wide portfolio of brands with well diversified products which address different consumers' needs across the various Countries all over the world. Changing preferences of consumer are met also due to the high investments the Company is pursuing in Research & Development. Strong expertise in distribution channels allows Unilever to reach every corner of the World. Unilever exploits economies of scale and synergies coming from its different manufacturing facilities allowing cost reductions. The Company pursue both a global and local strategy in order to maintain its worldwide brand image and addressing local needs of consumers.

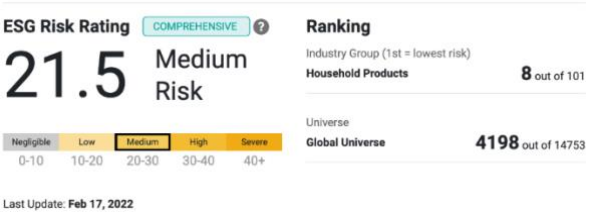


FIGURE 65 ESG RISK RATING

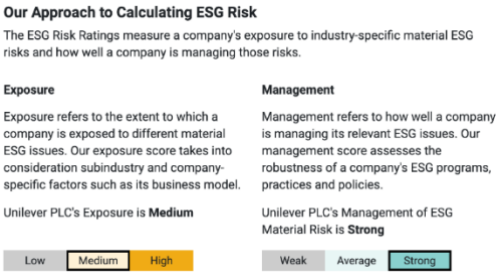


FIGURE 64 RISK EXPOSURE AND MANAGEMENT RATING

- Unilever PLC was founded and incorporated in 1929 in London.
- The company is not a family business. The descendants of the founders are no more present in the ownership and top management.
- Unilever Leadership Executive is composed by members with many years of experience inside the Company: most of them joined Unilever in the 80'. They have a deep knowledge of the Brand and its history, values and mission. The CEO Paul Polman was appointed in in 2009. Before he worked for many years for the competitor P&G, building a strong knowledge of the sector. Managers are

"*required to invest at least 25% and up to 60% of their annual bonus in shares of Unilever and receive a corresponding award of performance-related shares*". This allow the company to align the goals of the top management with the goals of the company.

PRODUCT AND SERVICE LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Brand image	4.25	40%
Cyclicity of the product	4.5	20%
Product's replacement time from customers	4.75	20%
Predictability of the product performances	4	20%
TOTAL SCORE	4.35	100%

- Unilever is present all over the world, reaching 2 out of 7 B people that everyday use its products. From the 2011 annual report is clear that during the previous 10 years the company strongly increased its focus to the Asia and Africa areas while from the product mix is evident a reduction of Refreshment products to the total revenues. Moreover, the sales growth rate shows a constant improvement over the years, meaning that the company is expanding and gaining market shares.
- The products sold do not suffer from huge fluctuation during the year, are quite stable. A mention could be done for the Ice Cream products sold by the company that will increase the sales in summer and a reduction during the cold seasons. Shortage of raw materials is not an issue that emerged in the past years.
- considering that these products have a short life because are being used daily, their necessity and continuous repurchase are characteristics that do not make suffer the company of reductions in demand. A mention should be done for the increase of the raw materials and commodities costs that can impact on the final price paid by the costumer. There could be the possibility that an increase in the price can reduce the demand for specific products that are not vital for the daily life, moving to low cost (low quality) products. Unilever working also in the Food and Refreshment industry will see an even shorter time for product repurchase respect the Personal and Home care products.
- Unilever owns or has rights to patents and registered trademarks that are utilized in all aspects of the company's operations. Some of these patents or licenses cover key aspects of product

formulation and manufacturing processes. The trademarks are critical to the product's entire marketing and branding. The presence and continuous protection of certain trademarks, patents, and licenses is in part the reason for the company's success.

FINANCIAL STATEMENT ELEMENT		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Level of margins	2	30%
Cash conversion	3.5	20%
Capability to increase/maintain the same level of ROCE	5	30%
Cash flow to debt ratio	3.75	20%
TOTAL SCORE	3.55	100%

	N° of firms considerd	**Gross Margin**	**EBITDA margin**	**EBIT margin**
Beverage (US market)	34	59.01%	25.15%	20.45%
Food Processing (US market)	112	25.93%	11.36%	9.08%
Household Products (US market)	26	49.7%	20.58%	17.38%
Total Market (US market)	5891	40,23%	22,68%	17,24%

Margin by Industry by Stern University Jan.2012

- Gross margin: 39.87%; EBITDA margin: 16%; Operating margin: 14.9%
- Cash Flow Conversion = 0.73
- The level of ROCE in 2011 is 6433 / (14293 + 7878*) = 29%. This value is higher with respect to the 2009 value of 5020 / (12025 + 7692) = 25.5% due to an increase in the EBIT and a slightly decrease in shareholders' equity. Considering 15% as a threshold for the average valuation, Unilever obtained a satisfying value.
- Cash flow to debt ratio = short term debt = 11 months; overall debt = 2.5 years

Microsoft

INDUSTRY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Peculiar characteristics of the industry that affect its profitability	4	33,3%
External capital dependence	5	33,3%
Future perspectives and growth rate Future perspective of growth	5	33,3%
TOTAL SCORE	4.67	100%

- Buyers power is low: Windows operating system faces competition by Apple, Google and Linux, but the choices are not many. Moreover, the partnership made by the company with hardware manufacturers who pre-install Microsoft operating systems reduce the bargaining power of buyer. The bargaining power of suppliers is low, since the company develop internally many of the products and services. The threat of substitute products is low, given the peculiar characteristics of an operating system and that every computer needs an operating system in order to work. Threat of new entrance is low since they would have to face high entry barriers given mainly by the high market share of Microsoft. Moreover, customers' loyalty to Microsoft Brand is high. Rivalry among the existing competitors is strong: the industry is dynamic and highly competitive, affected by rapid change in technologies and business models.

- External Capital dependency = Microsoft industries doesn't require external capital to maintain the business.

- Future perspectives of growth 2011= the tech-industry is characterized by a high level of innovation allowing the introduction of new technologies and consequently new products. Smart-devices and Cloud-based services are the main innovations expected to disrupt the market in the following years. General-speaking, the macro-tech-sector in which Windows operates is characterized by one of the highest innovation rates, enabling enormous opportunities for future growth.

COMPANY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Competitive advantage	4.75	35%
ESG compliance	4.5	25%
Longevity of a company in the market	3	10%
Presence of the founder or family descendants in the capital of the company	5	10%
Managers'/ directors' valuation and main shareholders' ownerships	4.5	20%
TOTAL SCORE	4.49	100%

- Most of the software products of Microsoft are internally developed, allowing the company to have a competitive advantage coming from the closer technical control over products and services. The company spent in 2011 13% of the revenues in R&D investments. Innovation is at the base of the company success. The goal of the growth strategy of the company is to be able to embrace and introduce disruptive technologies, entering new markets and drive broad adoption of products and services. The company is able to have a future perspective on the future technology trends, due to the Microsoft Research, one of the largest computer science research organization all over the world, which work in close relation with many top universities. The company operates worldwide having offices in more than 100 countries. Microsoft has one of the strongest brand image around the world

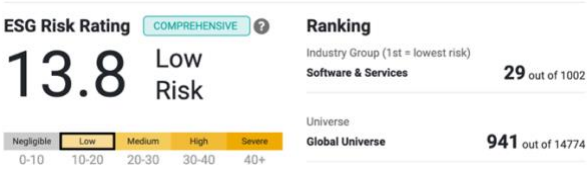


FIGURE 66 ESG RISK RATING

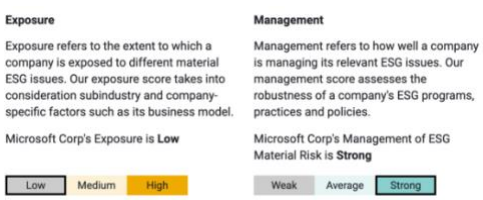


FIGURE 67 RISK EXPOSURE AND MANAGEMENT

- Microsoft is an old company that was founded in 1975
- Bill Gates, the founder, in 2011 was the Chairman.

- The CEO, Steven A. Ballmer joined Microsoft in 1980. The CFO, Peter S. Klein joined Microsoft in 2002. "*Under the Executive Officer Incentive Plan ("EOIP"), the Compensation Committee awards performance-based compensation to executive officers of the Company for specified performance periods. During the periods reported, executive officers were eligible to receive annual awards comprised of cash and SAs (share-awards) from an aggregate incentive pool equal to a percentage of the Company's operating income. For fiscal years 2011, 2010, and 2009, the pool was 0.25%, 0.45%, and 0.35% of operating income, respectively.*"

PRODUCT AND SERVICE LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Brand image	5	40%
Cyclicity of the product	4.5	20%
Product's replacement time from customers	4.5	20%
Predictability of the product performances	5	20%
TOTAL SCORE	4.8	100%

- Microsoft brand is well know from the customers considering that the underline products have the highest market shares in the segments of belonging.
- Products sold do not suffer from huge fluctuation during the year, are quite stable. Some seasonality can be seen during the holiday seasons.
- Microsoft software are usually pre-installed by the hardware manufacturers and changing operating system is hard. People may decide in bad economic conditions to not buy a computer, but will not be influence by the economic condition if changing or not operating systems.
- Microsoft is leader among technology companies in pursuing patents and currently have a portfolio of over 26,000 U.S. and international patents issued and over 36,000 pending

FINANCIAL STATEMENT ELEMENT		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Level of margins	5	30%
Cash conversion	4.75	20%
Capability to increase/mantain the same level of ROCE	5	30%
Cash flow to debt ratio	5	20%
TOTAL SCORE	4.95	100%

	N° of firms considerd	**Gross Margin**	**EBITDA margin**	**EBIT margin**
Computer Software	184	77,44%	35,60%	31,35%
Computers/Peripherals	87	32,83%	17,18%	14,15%
IT Services	60	35,14%	17,98%	14,43%
Total Market	5891	40,23%	22,68%	17,24%

Margins by industries by Stern University Jan.2012

- Gross margin: 77,7%; EBITDA margin: 42,8%; Operating margin: 38,9%
- Cash conversion ratio= 26994/29927 = 0.9
- ROCE= 0.39
- Cash flow to debt ratio= short term debt: the company does not have short-term debts;

  Overall debt = 5 months

Google

INDUSTRY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Peculiar characteristics of the industry that affect its profitability	4	33,3%
External capital dependence	4.5	33,3%
Future perspectives and growth rate Future perspective of growth	5	33,3%
TOTAL SCORE	4.5	100%

- The potential of new entrants is low: the barriers to enter the search engine market are very high, like the amount of initial needed capital. Moreover, Google market share is giant. Bargaining power of consumer is medium-low: the switching costs are low. Nevertheless, Google is able to attract user by having access to their preferences and understanding their behaviors through some access-based tools, increasing the customer satisfaction and loyalty. Bargaining power of supplier is low. The competition among existing competitor is medium-high: Yahoo, Bing are the main search engines competitors, but their shares are far, even if combined together, from the Google market share. Some e-commerce, as Amazon, represent indirect competitors, as users tend to directly redirect to the e-commerce site without using Google search engine. Social Media as well are indirect competitors, since people tend to seek for information through them rather than through general purpose search engine
- The industry is not characterized by external capital dependency.
- Future perspectives of growth 2011 = The use of internet is expected to grow exponentially over the next years.

COMPANY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Competitive advantage	5	35%
ESG compliance	3.5	25%
Longevity of a company in the market	2	10%
Presence of the founder or family descendants in the capital of the company	5	10%

Managers'/ directors' valuation and main shareholders' ownerships	4.5	20%
TOTAL SCORE	4.225	100%

- The main competitive advantages of Google are the customer loyalty and Brand worldwide recognition. The customer loyalty is mainly due to the ability of Google to create an ecosystem by providing to the customer many products and services all through a single Google account, making the using of internet more easy and enjoyable. The ecosystem allows, moreover, to gain data to be able to know the customer needs and preferences and rapidly satisfy their requests or changes in requests. The brand identity has contributed significantly to the success of the business.

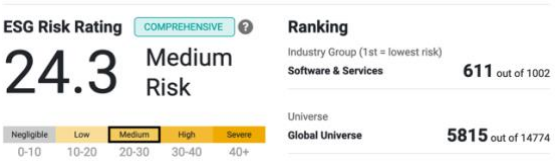


FIGURE 68 ESG RISK RATING

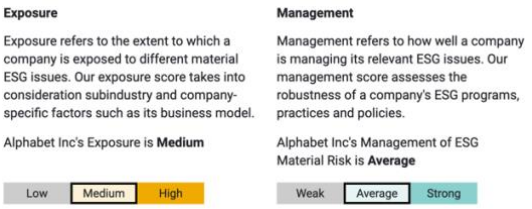


FIGURE 69 RISK EXPOSURE AND MANAGEMENT

- Google was founded in 1998
- In 2011, Larry Page, a Co-Founder, assumed day-to-day operations as Chief Executive Officer
- Larry Page was in google since its foundation.

PRODUCT AND SERVICE LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Brand image	5	40%
Cyclicity of the product	4.5	20%
Product's replacement time from customers	5	20%
Predictability of the product performances	4.5	20%
TOTAL SCORE	4.8	100%

- Google brand image is one of the main factors driving the success of the company.
- Google business is affected by seasonal fluctuations in internet usage which tends to slightly slow during summer months.
- Google products are part of the every-day-life of individuals which uses internet general purpose search engines in the same way, despite any economic turbulent situation. Advertiser will continue to use Google for advertising in every economic situation.
- The level of innovation in the market is high. Nevertheless, Google makes of the investments in R&D one of the main strategies to be able to remain competitive and provide useful products and services.

FINANCIAL STATEMENT ELEMENT		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Level of margins	5	30%
Cash conversion	3.5	20%
Capability to increase/maintain the same level of ROCE	4.5	30%
Cash flow to debt ratio	4.5	20%
TOTAL SCORE	4.45	100%

	N° of firms considered	**Gross Margin**	**EBITDA margin**	**EBIT margin**
Computer Software	184	77,44%	35,60%	31,35%
Internet	186	53,69%	22,91%	18,25%
IT Services	60	35,14%	17,98%	14,43%
Advertising	31	49,98%	14,41%	10,27%
Total Market	5891	40,23%	22,68%	17,24%

Margins by industries by Stern University Jan.2012

- Gross margin: 65.2%; EBITDA margin: 35.86%; Operating margin: 30,98%
- Cash conversion ratio= 1.07
- ROCE= 0.19
- Cash flow to debt ratio= short term debt: 1 month; overall debt: between 3 and 4 moths

SAP

INDUSTRY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Peculiar characteristics of the industry that affect its profitability	5	33,3%
External capital dependence	3	33,3%
Future perspectives and growth rate Future perspective of growth	4	33,3%
TOTAL SCORE	4	100%

- The threat of new entrants is low: high capital investments is needed. Moreover, customer's decision making depends on the ERP of a company, so companies have loyalty to ERP providers which are more trustful. Moreover, once a company buys an ERP, the switching costs are high. The threat of substitute exists in the market is low. The bargaining power of buyers is low: few are the big companies operating in the SAP industry, while many are the possible buyers. Moreover, as already stated before, the switching cost are significantly high. The competition among existing competitors is low-medium: the main competitor of SAP is Oracle. These two firms have the majority of the market share of the industry, like a duopoly.

- External Capital dependency = SAP industry is capital intensive and it can require external capital to run the business.

- Future perspectives of growth 2011= according to Statista, the revenues of the ERP software industry will increase from 23.8B$ in 2011 to 34.36B$ in 2017

COMPANY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Competitive advantage	4.5	35%
ESG compliance	5	25%
Longevity of a company in the market	2.25	10%
Presence of the founder or family descendants in the capital of the company	3	10%
Managers'/ directors' valuation and main shareholders' ownerships	3.5	20%
TOTAL SCORE	4.05	100%

- The main competitive advantages of SAP are the satisfaction of customer, which as a results increase the loyalty. The market share of SAP is high and similar to the main competitor Oracle. The satisfaction of the customers is translated into good reputation and reliability in the industry. This help the brand in increasing the already well established brand image and reputation. Finally, the company is able to maintain its market positioning also due to strategic acquisition and partnerships, in order to be able to provide the most recent innovation to its customers.

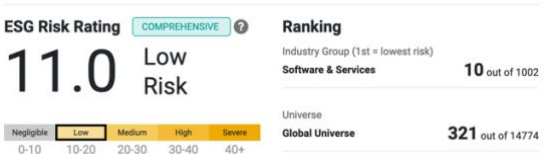


FIGURE 70 ESG RISK RATING

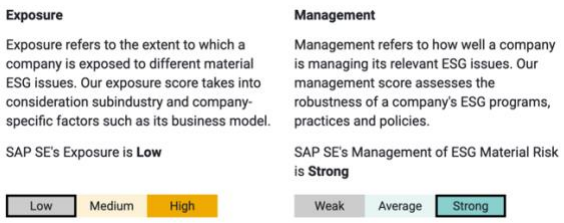


FIGURE 71 RISK EXPOSURE AND MANAGEMENT

- SAP was founded in 1972 by former IBM employees.
- One of the founders, Hasso Plattner, is the Chairman of the Supervisory Board, which advises and supervises the Executive Board.
- The members of the Board were appointed during the early year 00.

Executive Board Compensation
€ thousands

	2011
Short-term employee benefits	20,175.5
Share-based payment	4,015.7
Subtotal	**24,191.2**
Post-employment benefits	1,546.5
thereof defined-benefit	696.2
thereof defined-contribution	850.3
Termination benefits	4,124.9
Other long-term benefits	4,031.0
Total	**33.893.6**

PRODUCT AND SERVICE LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Brand image	4	40%
Cyclicity of the product	5	20%

Product's replacement time from customers	4	20%
Predictability of the product performances	4	20%
TOTAL SCORE	4.2	100%

- SAP brand image is strong in the business and has allowed the company to become one of the main player in the ERP software industry along with Oracle.
- The ERP software of SAP are not affected by cyclicality since they are used on a daily basis by the companies.
- Due to high switching costs the products replacement time is long, but the payments are usually on an annually-base.
- The level of innovation in the market is high. Nevertheless, SAP is investing in strategic partnerships and acquisitions to be able to provide the more innovative products and services to its customers. Patents and licenses allows to protect the future profits.

FINANCIAL STATEMENT ELEMENT		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Level of margins	3.75	30%
Cash conversion	2.5	20%
Capability to increase/maintain the same level of ROCE	4.5	30%
Cash flow to debt ratio	3	20%
TOTAL SCORE	3,575	100%

	N° of firms considered	**Gross Margin**	**EBITDA margin**	**EBIT margin**
Computer Software	184	77,44%	35,60%	31,35%
Total Market	5891	40,23%	22,68%	17,24%

Margins by industries by Stern University Jan.2012

- Gross margin: 69.4%; EBITDA margin: 34.0%; Operating margin: 29.3%
- Cash conversion ratio= 0.72
- ROCE= 0.27
- Cash flow to debt ratio= short term debt: 1.39 years; overall debt: 2.23 years

Novo Nordisk

INDUSTRY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Peculiar characteristics of the industry that affect its profitability	5	33,3%
External capital dependence	4	33,3%
Future perspectives and growth rate Future perspective of growth	4	33,3%
TOTAL SCORE	4.33	100%

- Threat of new entrance is low given the high capital requirements within the industry, mainly driven by R&D investments. Moreover, the government policies within the industry require strict legal requirements and licensing to be fulfilled. The bargaining power of supplier is low: they provide standardized, low differentiated and low switching costs products. The bargaining power of buyers is low as well: the high product differentiation increases the difficulty in switching products. Moreover, buyers give high weight to the quality of pharmaceutical products, reducing their price sensitivity. The number of substitute product is low and by working on delivering high quality products, the company will not face huge problems. Finally, the rivalry among existing competitors is composed by few large companies, each of them with a large market share. The exit barriers are high, due to high initial investments. The industry is growing at a fast pace, making room for market share gaining without affecting others. We can state that the competition is at medium level.
- The industry is high in capital expenditure, mainly related to R&D investments to discover new drugs. But the patents and licenses required to launch a new product on the market, makes the investments in R&D risky and firms prefer to use equity capital rather than debt capital, since they are not sure the investment will bring certain results in order to be able to pay-back debts.

- The market has growing potential and sales at a global level are expected to grow at a CAGR of +4-7% until 2013.

COMPANY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Competitive advantage	4.5	35%
ESG compliance	3.5	25%
Longevity of a company in the market	4	10%
Presence of the founder or family descendants in the capital of the company	1	10%
Managers'/ directors' valuation and main shareholders' ownerships	3.5	20%
TOTAL SCORE	3.65	100%

- Novo Nordisk is one of the biggest companies in the pharma industry. It can rely on a strong dealer community, high skilled workers and strong brand portfolio. Through the merger and acquisition of strategic technological companies, Novo Nordisk has been able to increase automatization of the supply chain and of the operations, increasing also the quality of the products and the flexibility to market demand changes.

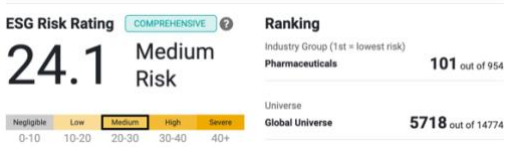


FIGURE 72 ESG RISK RATING

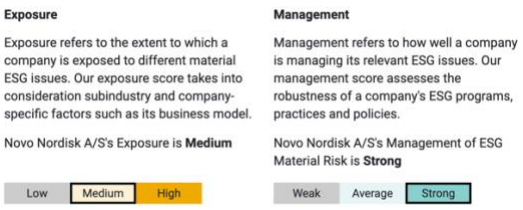


FIGURE 73 RISK EXPOSURE AND MANAGEMENT

- The company was founded in 1923
- The founder has died in 1977. No descendants are present in the company management.
- The CEO, Lars Rebien Sørensen, built his entire career inside the company. The chairman spent 15 years in another pharmaceutical company and around 10 years in a plastic-based manufacturer

company before joining Novo Nordisk. The remuneration of executive management consists of a fixed base salary, a short-term cash-based incentive, a long-term share-based incentive, a pension contribution, and other benefits.

PRODUCT AND SERVICE LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Brand image	4	40%
Cyclicity of the product	5	20%
Product's replacement time from customers	5	20%
Predictability of the product performances	1	20%
TOTAL SCORE	3.8	100%

- Novo Nordisk brand image is strong and mainly associated to the diabetes and insulin products. The company has strong market shares and worldwide recognition.
- The pharmaceutical industry is typical non-cyclical, since drugs are always in demand.
- For the same constant demand characteristic, consumers will not decide to not buy a drugs which is essential for their wealth, even in the worst economic conditions.
- The predictability of product performance is low, since it depends on the duration of the protection of a patent and the level of innovation of the market.

FINANCIAL STATEMENT ELEMENT		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Level of margins	5	30%
Cash conversion	3	20%
Capability to increase/maintain the same level of ROCE	5	30%
Cash flow to debt ratio	5	20%
TOTAL SCORE	4.6	100%

	N° of firms considered	Gross Margin	EBITDA margin	EBIT margin
Pharmacy Services	19	18,75%	6,41%	5,11%
Drug	279	73,12%	30,51%	21,91%
Total Market	5891	40,23%	22,68%	17,24%

Margins by industries by Stern University Jan.2012

- Gross margin: 81.0%; EBITDA margin: 33.7%; Operating margin: 33.7%
- Cash conversion ratio= 0.95
- ROCE= 0.59
- Cash flow to debt ratio= short term debt: 6 days; overall debt: 15 days

Arcelormittal

INDUSTRY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Peculiar characteristics of the industry that affect its profitability	1.5	33,3%
External capital dependence	1.5	33,3%
Future perspectives and growth rate	2	33,3%
TOTAL SCORE	1.67	100%

- Bargaining power of suppliers is high: the iron ore reserve is the major producer of steel and is controlled by the government, introducing strict rules and regulations. The bargaining power of buyers is moderate: steel is one of the main raw materials in many industries and the number of buyer is higher with respect to the number of suppliers. The threat of substitute products is high: aluminum is a valid alternative. Also plastic is an alternative, since its weight is lower. The threat of new entrance is moderate-low: high capital is required to start a business in this industry. Big companies capturing high market share does not allow new entrance to easily achieve economies of scale. The competitiveness in the industry is very high: despite the leading positioning in the industry, many are the big competitors, and increasing is the number of competitors coming from China.

- The industry is capital intensive and companies rely a lot on external capital sources to finance their businesses.
- The future perspectives of growth are not good.

COMPANY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Competitive advantage	3.5	35%
ESG compliance	2	25%
Longevity of a company in the market	1.5	10%
Presence of the founder or family descendants in the capital of the company	5	10%
Managers'/ directors' valuation and main shareholders' ownerships	4	20%
TOTAL SCORE	3.175	100%

- Arcelormittal main competitive advantage is given by the market leadership positioning in the steel industry. The leadership position has helped the company in improving its product mix options being able to satisfy many needs of its customers. The company is presented worldwide with a strong and extensive dealer network.

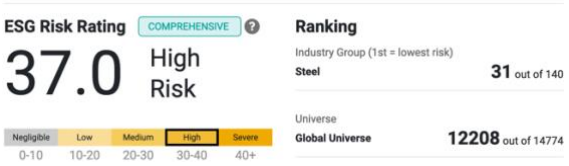


FIGURE 74 ESG RISK RATING

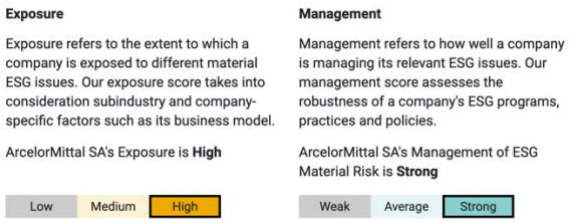


FIGURE 75 RISK EXPOSURE AND MANAGEMENT

- The company was founded in 2006
- The founder Lakshmi Mittal is still nowadays the chairman.

- The CEO, Aditya Mittal, is inside the company since its foundation in 2006. The top management compensation framework is composed by: "*fixed annual salary; short-term incentives: performance bonus; and long-term incentives: stock options (until May 2011), restricted share units and performance share units (after May 2011)".*

PRODUCT AND SERVICE LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Brand image	3	40%
Cyclicity of the product	1.5	20%
Product's replacement time from customers	1	20%
Predictability of the product performances	1.5	20%
TOTAL SCORE	2	100%

- Arcelormittal brand image is strong inside the Steel industry, but cannot be compared to more worldwide recognized brands.
- The steel industry has a cyclical nature, affected by raw materials and macroeconomics trends.
- The consumer in turbulent economic period decide is highly sensitive to changes in prices of raw materials and foreign exchange rates. The substitute products are valid alternatives with not high switching costs.
- Predictability of performance if products is strongly influenced always by the high sensitiveness to macroeconomics trends.

FINANCIAL STATEMENT ELEMENT		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Level of margins	1.5	30%
Cash conversion	1.5	20%
Capability to increase/maintain the same level of ROCE	2	30%
Cash flow to debt ratio	1.5	20%
TOTAL SCORE	1.65	100%

	N° of firms considered	Gross Margin	EBITDA margin	EBIT margin
Steel	32	16,68%	10,96%	5,83%
Total Market	5891	40,23%	22,68%	17,24%

Margins by industries by Stern University Jan.2012

- Gross margin: 9.32%; EBITDA margin: 10.5%; Operating margin: 5.53%
- Cash conversion ratio= 0.18
- ROCE= 0.035
- Cash flow to debt ratio= short term debt: 1.48 years; overall debt: 14.2 years

American Airlines

INDUSTRY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Peculiar characteristics of the industry that affect its profitability	1.5	33,3%
External capital dependence	1	33,3%
Future perspectives and growth rate Future perspective of growth	3	33,3%
TOTAL SCORE	1.83	100%

- Bargaining power of suppliers is high: fuel companies set the prices; aircraft manufacturers have high power since their market is mainly a duopoly composed by Boeing and Airbus. The bargaining power of buyers is moderate: given the high level of competition and the high number of firms, the buyer can easily switch from a company to another if the price set by the airline company is too high. On the other hand, some pricing policies allows airlines company to increase prices when customers have no alternatives. The threat of substitute products is moderate-high: train, bus, cars are examples. The level of threat depends on the distance: the shorter, the higher the possible threat. The threat of new entrance is low: there are high entry barriers, regulations and complex operations. The competitiveness in the industry is very high: the company shares with other 3 big companies a big portion of the US market. Considering all the world, the airlines companies are a lot and they compete from a pricing point of view, reducing the margins.

- The industry is high capital intensive and companies rely a lot on external capital sources to finance their businesses.
- The future perspectives of growth are good: according to the Federal Aviation Administration the number of passenger will grow from 2011 to 2016 with a CAGR of +3.4%

COMPANY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Competitive advantage	4	35%
ESG compliance	3	25%
Longevity of a company in the market	4	10%
Presence of the founder or family descendants in the capital of the company	1	10%
Managers'/ directors' valuation and main shareholders' ownerships	4.5	20%
TOTAL SCORE	3.55	100%

- American Airlines brand is world-recognized and well-established. The legacy carrier of the company provides to the customers higher-quality services with respect to smaller competitors. The company has made the largest aircraft order on the history and is expecting to have the youngest fleet by 2017 improving fuel efficiency and reducing operational costs.

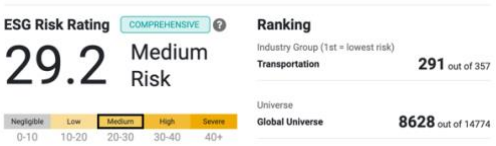


FIGURE 76 ESG RISK RATING

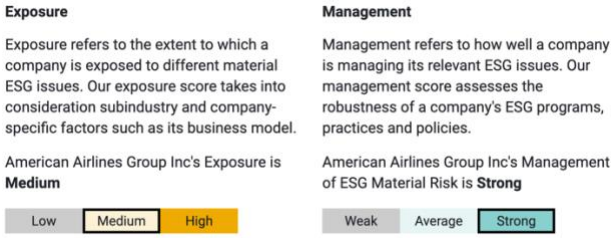


FIGURE 77 RISK EXPOSURE AND MANAGEMENT

- The company was founded in 1929

- There are no descendants of the founder in the top management
- The CEO, Thomas W. Horton joined American Airlines in 1985 and has a deep experience of the sector. The compensation of the top management is a good combination of fixed salary, short term-incentives and long-term shares awards incentives.

PRODUCT AND SERVICE LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Brand image	4	40%
Cyclicity of the product	2	20%
Product's replacement time from customers	2	20%
Predictability of the product performances	2.5	20%
TOTAL SCORE	2.9	100%

- American Airlines brand recognition is strong and well known all over the world.
- Higher demand during warm seasons, the company is affected by the price fluctuation of the fuel due to the uncertainty of the demand and offer changes of this latter.
- The airlines industry is affected by some instability, given the correlation of the traffic demand with economic growth.
- The company can protect itself with patents but is difficult to see returns from the R&D investments.

FINANCIAL STATEMENT ELEMENT		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Level of margins	1	30%
Cash conversion	5	20%
Capability to increase/maintain the same level of ROCE	1	30%
Cash flow to debt ratio	2	20%
TOTAL SCORE	2	100%

	N° of firms considered	Gross Margin	EBITDA margin	EBIT margin
Air Transport	36	26,54%	13,76%	8,78%
Total Market	5891	40,23%	22,68%	17,24%

Margins by industries by Stern University Jan.2012

- Gross margin: 18.24%; EBITDA margin: 0.16%; Operating margin: -4.3%
- Cash conversion ratio= 19.55
- ROCE = negative ebit
- Cash flow to debt ratio= short term debt: 2 years; overall debt: 11 years

AT&T

INDUSTRY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Peculiar characteristics of the industry that affect its profitability	2.5	33,3%
External capital dependence	1	33,3%
Future perspectives and growth rate Future perspective of growth	3	33,3%
TOTAL SCORE	2.17	100%

- Bargaining power of suppliers is low: the company supplies its own data and build its own network. The bargaining power of buyers is moderate: The bargaining power depends on the specifics moment in time; if under contract, the buyers will face high fees for cancellation. If near the end of the contract, the bargaining power increase and the consumer is able to increase his demands to sign a new contract. The threat of substitute products is moderate-high: there are products offering similar services. AT&T has to work on the quality of its offer to maintain a good market positioning. The threat of new entrance is low: high capital investments, regulations, brand name and patents are the main entry barriers. The competitiveness in the industry is extremely intense: the telecommunication industry is one of the most saturated.
- The industry is high capital intensive and companies rely a lot on external capital sources to finance their businesses.

- The future perspective of growth mainly driven by the high level of innovation which could bring new opportunities: "*"mobile broadband market growth is expected to reach a yearly rate of +28% until 2016,* but the market is oversaturated, reducing the opportunities for gaining market shares.

COMPANY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Competitive advantage	3.5	35%
ESG compliance	3.5	25%
Longevity of a company in the market	3	10%
Presence of the founder or family descendants in the capital of the company	1	10%
Managers'/ directors' valuation and main shareholders' ownerships	4	20%
TOTAL SCORE	3.3	100%

- AT&T is the largest provider of broadband in US and can rely on a strong brand image. The portfolio of complementary services and products is wide.

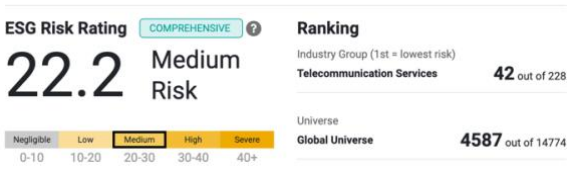


FIGURE 78 ESG RISK RATING

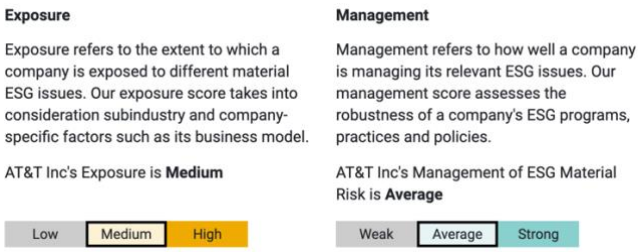


FIGURE 79 RISK EXPOSURE AND MANAGEMENT

- The company was founded in 1983
- There are no descendants of the founder in the top management
- The CEO, Randall Stephenson, has many years of experience in the Telecommunication industry. "*Under our various plans, senior and other management employees and nonemployee directors have received stock options, performance stock units, and other non-vested stock and stock units."*

PRODUCT AND SERVICE LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Brand image	3	40%
Cyclicity of the product	4.5	20%
Product's replacement time from customers	3	20%
Predictability of the product performances	2	20%
TOTAL SCORE	3.1	100%

- AT&T brand image is very strong in US and the brand is well known also all-over the world. Anyway the company doesn't gain new contracts thanks to its brand image.
- The telecommunication services are not affected by cyclicality
- The consumer in turbulent economic period can decide to switch to a more convenient contract, but the ending fees are high. There service provided is continuative during long period of times (continuous flow of money thanks to monthly payments)
- Licenses are fundamental for maintaining and expand the coverage of company's network. R&D expenses have difficulty to be remunerative due to higher investments in new technologies by other important players (Tesla with its satellites).

FINANCIAL STATEMENT ELEMENT		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Level of margins	1.5	30%
Cash conversion	3.5	20%
Capability to increase/maintain the same level of ROCE	2	30%
Cash flow to debt ratio	3	20%
TOTAL SCORE	2.35	100%

	N° of firms considered	Gross Margin	EBITDA margin	EBIT margin
Telecom. Equipment	99	47,37%	14,78%	10,87%
Telecom. Services	74	57,59%	38,57%	22,74%
Telecom. Utility	25	59,85%	32,83%	15,83%
Total Market	5891	40,23%	22,68%	17,24%

Margins by industries by Stern University Jan.2012

- Gross margin: -%; EBITDA margin: 24%; Operating margin: 7.27%
- Cash conversion ratio= 1.14
- ROCE = 0,055
- Cash flow to debt ratio = short term debt: 1 month; overall debt: 1.86 years

Barclays

INDUSTRY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Peculiar characteristics of the industry that affect its profitability	1.5	33,3%
External capital dependence	0	33,3%
Future perspectives and growth rate Future perspective of growth	2	33,3%
TOTAL SCORE	1.16	100%

- Bargaining power of suppliers is low: they provide standardized products with low differentiation. Moreover, suppliers do not provide a reliable threat for forward integration. The bargaining power of buyers is moderate: the high product differentiation. The threat of substitute products is moderate-high. The threat of new entrance is low: there are high entry barriers like regulations, economies of scale hard to be achieved, high capital requirements, high product differentiation. The competitiveness in the industry is very high: this strongly affect the margins of the sector.

- The industry entirely relies on external capital.
- The banking industry probably will suffer a lot during the following periods due to new decentralized solutions and reduced trust of customers.

COMPANY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Competitive advantage	3.5	35%
ESG compliance	3.5	25%
Longevity of a company in the market	5	10%
Presence of the founder or family descendants in the capital of the company	0	10%
Managers'/ directors' valuation and main shareholders' ownerships	2.5	20%
TOTAL SCORE	3.1	100%

- Barclays is the world's third largest bank in terms of assets. The brand has a strong recognition, being also sponsor of the Premier League. The company enjoys economies of scale and due to its global presence is able to well spreading the risk. It has a strong position among many African Countries.

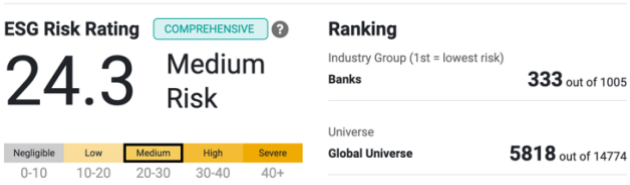


FIGURE 80 ESG RISK RATING

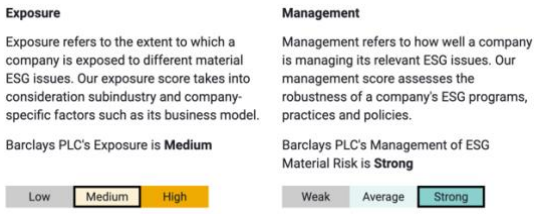


FIGURE 81 RISK EXPOSURE AND MANAGEMENT

- The company was founded in 1690
- There are no descendants of the founder in the top management

- The group chairman, Marcus Agus; after a brilliant career in the investment banking sector entered in Barclays in 2006. The president and chief executive officer, Bob Diamond, joined the company in 1996. There were investigations of his count for the illegitimate incomes in investment banking activities by the WSJ in 2006.

PRODUCT AND SERVICE LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Brand image	4	40%
Cyclicity of the product	3.5	20%
Product's replacement time from customers	3.5	20%
Predictability of the product performances	1.5	20%
TOTAL SCORE	3.3	100%

- Barclays brand recognition is strong and well known all over the world. There are other banks that have a sounder brand.
- The services offered are used at daily base. Anyway assurances demand raises during problematic or catastrophic periods that can be addressed all over the world or by the single individual.
- There is a tendency to move from the traditional (central) way to conserve the savings. This is due to decreasing trust of the central system and born of new decentralized way to save money. Anyway, persons tend to maintain the same bank or assurance for long period of time.
- The licenses give a soft protection to the future performances of the company. The same for R&D investments.

FINANCIAL STATEMENT ELEMENT		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Level of margins	4	30%
Cash conversion	5	20%
Capability to increase/maintain the same level of ROCE	0	30%

Cash flow to debt ratio	0	20%
TOTAL SCORE	2.2	100%

	N° of firms considered	**Gross Margin**	**EBITDA margin**	**EBIT margin**
Total Market	5891	40,23%	22,68%	17,24%

Margins by industries by Stern University Jan.2012

- Gross margin: 76,34%; EBITDA margin: 27.06%; Operating margin: 24.44%
- Cash conversion ratio= 1.14 (2010); the results obtained in 2011 was not realistic
- ROCE= the long term debt accounted as "costumer accounts" and "deposit from banks" is huge respect the operating income
- Cash flow to debt ratio= same problem as above

Ford

INDUSTRY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Peculiar characteristics of the industry that affect its profitability	1	33,3%
External capital dependence	1	33,3%
Future perspectives of growth	2.25	33,3%
TOTAL SCORE	2.33	100%

Peculiar characteristics of the industry that affect its profitability=

- The Automotive industry presents a high level of saturation in the more developed regions worldwide, like the U.S., Europe and China. As a consequence, the companies compete on the basis of price, design, quality, technology, customer safety and several other points. In particular the pricing competition reduces the profit and margin opportunities. Moreover, companies compete on different segments proposing a wide range of possibilities for their customers. This further increase the competition in the market.
- The manufacturing of vehicles requires high initial investments in production lines, machinery and

technology. An important role is played by distribution and expertise in the field. All these factors make the barrier to entry of this industry to be high. However, digitalization of the industry has lowered the barriers to enter the vehicle market. This disruption has intensified competition by increasing the importance of Information Technology (IT) and electronic manufacturing services (EMS) companies, specifically from large technology companies from the USA and China, which have the financial capabilities to invest in the development of vehicle technologies. These companies have the potential to disrupt the market and the more traditional companies. Nevertheless, brand image and reputation can be the major challenge for these new potential players.

- The threat of substitute products is high considering all the alternatives of transportation which are used by potential customers, like bus, tram, train, metro and plane. Anyway, these alternatives do not offer the same level of convenience.
- The high level of competition and substitution, and the limited switching costs represent the factors which increase the power of buyers. In fact, the latter are price sensitive mostly and would switch to another brand that offers a better product at a lower price. An answer to mitigate the power of buyers is a better customer service and a stronger focus on brand loyalty.
- There are a large number of companies supplying the conventional as well as the electric automotive industry. This factor results in a relatively low threat of suppliers. Anyway, possible problems for the profitability of the companies in the industry could arrive from the shortage of fundamental components for modern cars (semiconductors).

External capital dependence= Being a capital-intensive industry the need of external capital is relevant to run the business; this is evident in the high amount of debt present to cover the needs of the companies. A corporation must initially use its operating cash flow to cover capital expenditure obligations before seeking outside finance. This position the companies in a vulnerable situation if we consider possible turbulences in the market that will affect the revenue voice. A decrease in revenues will affect the capability to repay the debt.

Industry stability and future perspectives growth = is present in the market a new direction for the Electric Vehicles that are interesting and challenging at the same time. This initial trend that is asked also considering the sustainability point of view will bring some uncertainties on the future roles of the current players in the market. Anyway, are not perceived huge changes in the overall industries in the next 5/10 years. There will be some movements but will not be radical.

With the possibility to have some main incumbents to be disrupted due to a lack of innovation. Moreover, this industry is little predictable considering the product sold that can be maintained for different years without buying a new one in economic turbulences. So is evident a strict relation between the automotive industry and the overall economy

Globally the automotive sector has recovered the problems incurred in economic crisis, whit an increase of profits that goes from 41 bn€ in 2007 to 54 bn€ in 2012. The future growth is expected to be even better, reaching 79 bn€ in 2020. This shows a CAGR for profits of 5,4% [34].

COMPANY LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Competitive advantage	4	35%
ESG compliance	1.5	25%
Longevity of a company in the market	4.5	10%
Presence of the founder or family descendants in the capital of the company	4	10%
Managers'/ directors' valuation and main shareholders' ownerships	2.25	20%
TOTAL SCORE	3.07	100%

Competitive advantage =

- Has a global market presence, with worldwide brand recognition. The company produces and distributes vehicles in over 200 markets in six continents. "Our dealers are a source of strength in North America and around the world, representing the face of Ford to local communities." From the company's annual report
- Strong market position: fifth largest car manufacturer in 2010 worldwide and second in US.
- Large product portfolio offering, with heavy investments in new products.
- Ford is in leading positions in the fuel economy.
- Leadership in the trucks market, especially in the US were the Ford F-Series was the best-selling truck for 35 consecutive years.
- Strong engineering capabilities which allow the company to easily upgrade existing production line while expanding product portfolio.

ESG compliance =

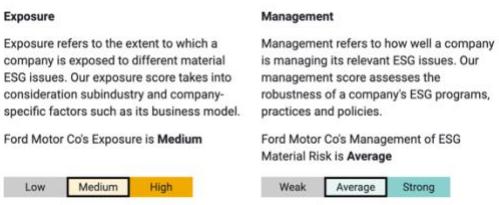


FIGURE 83 RISK EXPOSURE AND MANAGEMENT

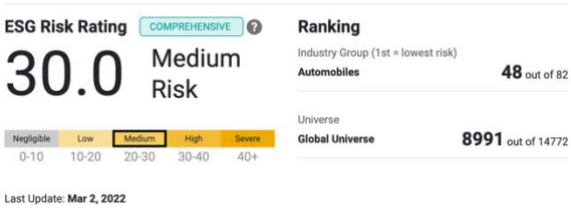


FIGURE 82 ESG RISK RATING

[34] McKinsey report

Longevity of the company in the market = Ford Motor Company was founded in 1903.

Presence of the founder or family descendants in the capital of the company= William Ford, the descendant of Henry Ford, is the Executive Chairman and Chairman of the Board of the company. Ford main idea behind has been passed down from generation to generation, making it easier not to lose sight of the long-term perspective.

Managers'/ directors' valuation and main shareholders' ownerships = The CEO and President Alan Mulally joined Ford in 2006, after spending 37 years in Boing, a complementary industry. Lewis Booth, CFO, joined Ford in 1978, maturing a deep knowledge of the sector.

All the members of the Board have many years of experience matured in Ford and in complementary fields.

PRODUCT AND SERVICE LEVEL		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Brand image	3.5	40%
Cyclicity of the product and its components	1	20%
Product's replacement time from customers	1	20%
Predictability of the product performances	2	20%
TOTAL SCORE	2.7	100%

Brand image = Ford owns one of the most known brands in the automotive industry that permitted to reach important market shares in the market in which it operates, taking into consideration the high level of competition. In order to be more effective in the operational activities, salesforce and marketing, in the previous year there was a concentration of company's effort towards Ford and Lincoln. In fact, the other brands like Aston Martin, Jaguar Land Rover and Volvo were sold during the previous years. Within the remained two brands there is a wide range of products that, maintaining a high level of quality, earned high satisfaction from customers globally. The Ford Fiesta was defined the most appealing sub compact car in the JD Power and Associates APEAL study in 2011. The same recognition was given to the Ford F-150 and the Taurus in their segment. The Lincoln brand, according to company's annual report, was the most trustworthy of all the brands offered in the United States. The company's globally enforced quality standards have resulted in better quality and owner satisfaction.

Ford was Europe's fifth largest carmaker and the second one in US at the end of 2010.

	2011 Full-Year Plan	2011 Full-Year Results
Industry Volume (million units) (a)		
–United States	13.0 – 13.5	13.0
–Europe (b)	14.5 – 15.5	15.3
Operational Metrics		
Compared with prior year:		
–U.S. Market Share	Equal / Improve	16.5% (up 0.1 ppt.)
–U.S. Retail Share of Retail Market (c)	Equal / Improve	14.0% (equal)
–Europe Market Share (b)	Equal / Improve	8.3% (down 0.1 ppt.)

FIGURE 84 FORD 'S MARKET SHARES

Cyclicity of the product and its components= during the years, with the higher market and demand volatility it became more difficult to plan economies of scale in the long run. Moreover, the reduced life cycle of a single vehicle and the mass customization requests, forced the car manufacturers to be more flexible and outsource most of the final product. This increased the dependance to the suppliers for important components and being subject to problems along the supply chain.

The lack of chips needed to regulate everything from powertrains to digital safety systems has been the most serious issue in the recent years (from 2020). As a result, several businesses have closed or reduced production.

Vehicles that develop their electronic content and capabilities compete not just with other vehicle manufacturers, but also with other sectors that require the same resources.

Historically, as reported on the company annual report, there is a seasonal fluctuation of the demand that increase during the spring and summer period. For this reason, the company has to prepare the production process in the first months of the year to meet these requests.

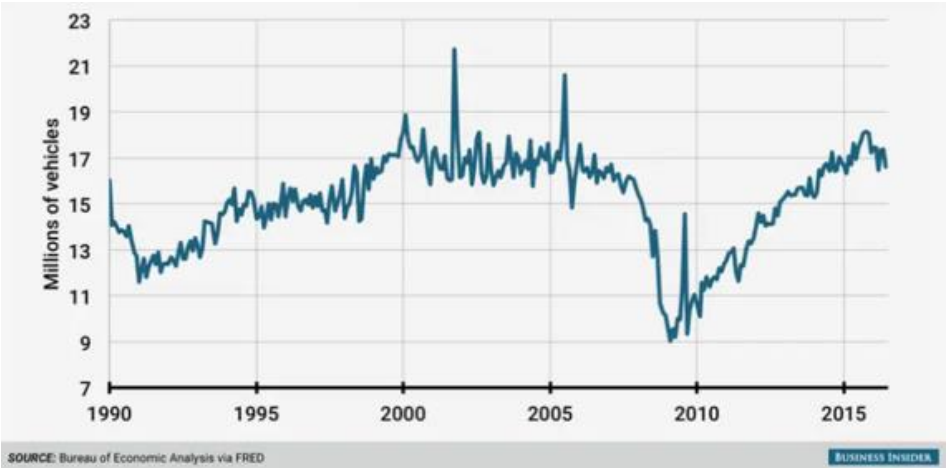


FIGURE 85 CAR AND LIGHT TRUCK SALES

Product's replacement time from customers= the vehicles are products that have a demand that can be subject to economic condition. If an economic depression or recession occurs, people tend to postpone the repurchase or substitution on their vehicle, that is not being considered a basic necessity.

Predictability of the product performances= Ford uses licenses and patents to protect its brand name from the competitors in the market. Anyway, the brand is protected from external uses but in most of the cases the technology or the production process can be applied by other car manufacturers.
The profitability of a single vehicle will be determined by the satisfaction of the requests of the customers under the quality, price and design specificities. Moreover, the marketing and commercial campaign is fundamental for an increased profitability. For this reason, the success is not assured or better is difficult to forecast with certainty.

FINANCIAL STATEMENT ELEMENT		
EVALUATION CRITERIA	SCORING 2011	WEIGHT
Level of margins	1.5	30%
Cash conversion	2	20%
Capability to increase/mantain the same level of ROCE	1.5	30%
Cash flow to debt ratio	0.75	20%
TOTAL SCORE	2.03	100%

	N° of firms considerd	**Gross Margin**	**EBITDA margin**	**EBIT margin**
Automotive (US market)	12	21.59%	12.50%	6.99%
Total Market (US market)	5891	40,23%	22,68%	17,24%

Margin by Industry by Stern University Jan.2012

Levels of margins:

- Gross margin: 16.22%; EBITDA margin: 8.22%; Operating margin: 5.4%

The result in 2011 are slightly lower respect the US Auto&Truck industry values. Moreover, due to industry's characteristics the margins of Ford are strongly lower than the total market values.

Cash Flow Conversion = 9784 / 15402 = 0.635

Capability to increase/maintain a good level of ROCE:

The level of ROCE in 2011 is 11146 / (15071 + 100184) = 9.67%.

Cash flow to debt ratio = amount of time necessary to pay back the debt (the months are calculated dividing 1 by the ratio found).

Ability to cover short term debt with the operating cash flow: 1/ (9784 / 17629) = 1.8 *(12 moths) = slightly less than 22 months 2011 and 1/ (15477/15456) = 1 * 12 = 1 year in 2009.

Ability to cover short- and long-term debt with operating cash flow: 1/ (9784 / 99488) = 10 years in 2011 and 1/ (15477/131635) = 8.5 years in 2009.

List of figures

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