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**A NOTE ON
THE CONCEPT OF RISK**

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The logo consists of the letters 'BI' in a bold, white, sans-serif font, centered within a dark blue square. The square is positioned in the bottom left corner of the page.

BI

Centre for Monetary Economics
BI Norwegian School of Management

A note on the concept of risk

The concept of risk that we typically apply in finance has important limitations, and sometimes it can even be a misconception. For long-term investors, volatility (price fluctuations of an asset) and beta (riskiness of an asset relative to the overall market) are poor guides to risk, defined as a permanent capital loss. Another proposition is that diversification is not always good because it takes away focus on the fundamentals. However, illiquidity can make good harvest for long term investors, but current regulations do not encourage institutional investors to hunt this premium. Also, I argue that “man” is better than “machine”, and that you should be sceptical towards investors that base their investment decisions solely on mathematical models and forecasting. Finally, I give some examples of the investment philosophy applied in Oslo Pensjonsforsikring (OPF).

Introduction

This paper is about risk and about a critical view of the risk concepts we normally apply.¹ That said, my ambition is not to launch a formal criticism of theoretical aspects of risk in financial markets, nor to make you believe in one particular investment style or product. My intention is primarily to make people reflect on some of the things one often take for granted, and also to be a bit more sceptical of some of the risk measures portfolio managers typically apply when making investment decisions.

When I first started to work with this paper, during the spring of 2007, I did not know how hot a topic this was going to be just a few months later. The market turmoil that escalated during the 3rd quarter of 2007 far exceeded almost everybody's expectations. Adding to that the market correction that started in December, the second half of 2007 and the beginning of 2008 must be considered an event - the existing perceptions of financial market risk proved inadequate. Even though most market participants felt that market conditions were deteriorating, few had enough conviction and foresight to act in a timely manner.

Markets are fascinating. They always carry the potential to surprise you.

Proposition: Forecasting is not a trading strategy

The complexity and unpredictability of price movements in asset prices remain a puzzle. It is also a circular argument because if we assume that someone has built a working model, it will by definition not be a market anymore. Nevertheless, model building is still a dominant occupation in the financial industry.

¹ I am grateful to Halvor Hoddevik at Arctic Securities for important comments to an earlier version, and to Jens Kristian Bøe and the rest of our fantastic crew at Oslo Pensjonsforsikring for comments and valuable discussions.

One reason might be the tradition for ranking analysts and managers according to their forecasting abilities. Few argue against the best prophets. This is probably because we all want to have foresight and because it is difficult to criticise someone when you yourself do not have anything better to offer.

I do not believe in gurus that can project the future, and I do not think there are models that we can rely on to do consistently better than the famous random walk, at least not in efficient or near efficient markets. (Apparently we sometimes know a bit about the near future, but that could also be related to normal time adjustments or frictions). Thus, if you want to make excess returns on trading in markets with close to perfect competition like in currencies, credit markets or commodities you are probably unable to make money in the long run just by relying on your forecasting skills. A common example of this is when talented investment bank traders break out from the trading desk and fail because they no longer have access to all the flow information.

The most important source of forecasting failure is that reality changes (Lucas critique). How obvious it might seem, I do not stop wondering about how much effort is being put into forecasting based on historical relationships. We assume that the relationship between risk and return is constant; we assume that correlations are constant; and we assume that there are patterns in the market and the economic cycles that repeat themselves more or less. This again is a key element in asset allocation, in trading strategy and in risk control. When these things suddenly change, people have to start calibrating their models once again, just until the next chock happens and the models again become obsolete.

Proposition: Man is better than machine

The 3rd quarter of 2007 illustrates how changes in risk behaviour suddenly can change the concept of risk. Taking a look at the drivers behind what many describes as a market dislocation in the credit market thus seems worthwhile.

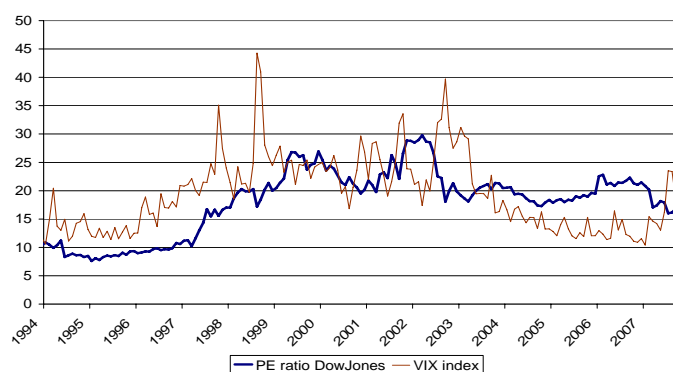
From my experience, the first phase of the correction did not emerge from observable changes in macro variables or in stock market related excesses, but rather from abrupt changes in risk aversion related to second round effects of the subprime crisis in the US housing market. When analysing market behaviour during the first phase of the correction (third quarter of 2007) we find clear indications of profit taking and a rise in risk aversion. First, a negative relationship between year-to-date return pre-correction and relative performance during the correction indicates that investors typically sold out of positions with unrealized gains, and retained positions in losing stocks. Second, negative relationships between year-to-date volatility and performance during the period of correction indicate that investors sold out stocks with high volatility.

The turmoil started with a sudden increase in risk aversion related to a crisis in a growing, but still a rather minor part, of the US credit market. An extremely low level of credit spreads might have been a disturbing factor. Part of what we saw was a realignment of credit risk to a more normal level. But it nevertheless happened in a situation where at least corporate credit losses were stable at low levels. The main change in the market was probably that investors suddenly came to believe that the price of credit risk was too low and demanded a much higher risk premium and a higher level of transparency, covenants and collateral.

In the later phase of the turmoil (December 07/January 08), fundamental factors became more pronounced, it all emerged into a more classical type of equity market corrections related to lower growth expectations.

Another important factor was that implied volatility in equity markets increased significantly and from very low levels. This increase appears even more pronounced when taking into account that there are arguments suggesting that expected volatility has decreased over the past years. One illustration is the possible relationship between volatility and PE-levels in the stock market. It is not unreasonable to assume that a low level of PEs compared to a historical average, which we have today, normally would imply that price fluctuations are smaller because the market price then would react less to changes in expected future earnings compared to a situation where multiples are stretched (figure 1).

Figure 1. Volatility and Price-Earnings Ratio for the Dow Jones Industrial Average Index.
Source: Bloomberg

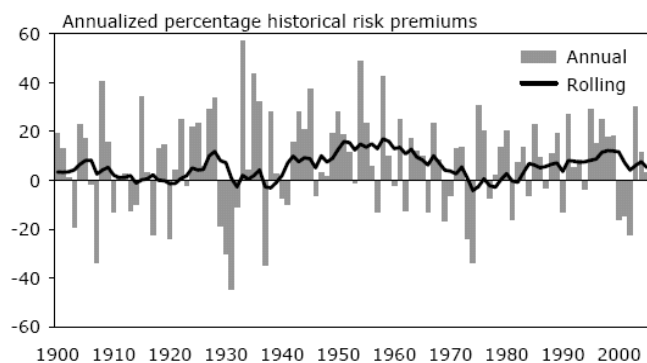


This argument is also indirectly supported by the literature of economic cycles where several people suggest that the level of volatility in economic cycles has decreased, and that global economic cycles will be softer and less dramatic than before². This will normally suggest that cyclical swings in corporate earnings have decreased correspondingly. If all this is true, we might draw the conclusion that the increase in equity market volatility during the correction was dramatic. This could serve to explain why the impact on certain trading strategies became so devastating.

In contrast to the big swings in expected volatility, the stock market behaved surprisingly well during the first phase of the correction. In fact, 2007 ended with a gain in the US equity market. Figure 2 illustrates the volatility of the stock market, measuring the annual ex post equity risk premium in the US over the past 105 years. 2007 (not in the chart) gave a small positive reading as the stock market yielded 5,5 % against a money market return of around 5,0 %. So, while investors lost a lot of money on credit spreads, higher risk aversion did not immediately transform into a higher ex ante risk premium in the equity market.

² See for example Bernanke (2004)

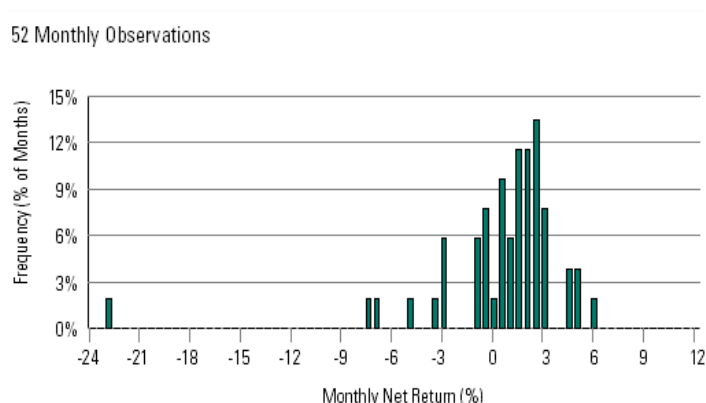
Figure 2. Annual and Rolling Ten-Year U.S. Premiums Relative to Bills, 1900–2005.
Source: Elroy Dimson, Paul Marsh, and Mike Staunton (2006)



However, the rise in risk aversion was felt by some large and professional players. Figure 3 is, without naming names, an example from real life, illustrating my point about changes in risk behaviour. The chart illustrates monthly return in a hedge fund that made use of a variety of quant based trading strategies to create excess return. The fund had a reasonably good track record with a performance distribution that appeared to be well packed around a positive number. Thus, the fund should be categorized as a relatively low volatility fund. It goes without saying that this was before the final observation down to the left appeared. This month alone wiped out all historic gains. How was it possible to deliver a result so far off the mark without any pre-warnings?

One important reason was strangely enough one of the main selling point for this fund, target volatility.

Figure 3. Performance in a real life Hedge Fund. Monthly observations up until August 2007.



The concept of target volatility is indeed appealing, taking the best out of rebasing strategies and securing a constant level of risk for the investor. However, this framework turned into a

mouse trap in August 2007.³ What went wrong? First, target volatility is simple to understand. The manager sets a level of risk for the total portfolio so that the desired risk level is higher than what comes out of the active positions alone. Then, he leverages the risk up to the desired level. When the risk level changes, he will just change gearing and keep total risk constant. Unfortunately, sometimes the manager has taken most of his bets in assets with low liquidity in order to enhance performance and harvest an illiquidity premium. When volatility suddenly increases, he is not able to deleverage fast enough because it is impossible to sell out of the long positions. Next, he is forced to either violate his target volatility, or to force the assets out in the market with correspondingly negative effects on performance.

Behavioural finance has taught us that an investor typically hold on to his positions for too long because it is human to keep what you think is a good asset. Losses are further enhanced because people find it is hard to sell an asset for a price below cost. A computer trader will not do these mistakes. The most sophisticated programmers will even claim that it is important to remove the human factor completely from the investment decisions. This is part of what happened in August 2007. Several of the fantastic quant funds, where humans had been replaced by equations, did not listen to common sense. They were programmed to sell good assets in order to keep target volatility low, and buy the bad ones. As most modellers have access to similar data and methodologies, they started to chase the same deals, probably continuing to dislocations in the market.

Proposition: Diversification is not always right

The Government Pension Fund – Global in Norway has received international recognition for its work on diversification. Simply stated, the Fundamental Law of Active Management⁴, which is the term often used to describe the investment philosophy of the fund, states that you can increase the information ratio⁵ by increasing the number of uncorrelated bets with positive expected excess returns. This is well in line with common teaching and also well in line with most regulations that encourage fund managers to diversify their portfolios as much as possible. Concentration means higher risk in their opinion. So far so good. But correlations change, as they did during the recent market turmoil, and as they will do in the future, and even assets with low historic correlation can align under some market conditions.

A Warren Buffet quote comes to mind: “Wide diversification is only required when investors do not understand what they are doing”.

For mutual funds, a concentrated portfolio is typically considered to consist of 100-200 positions. I find it hard even to find 100 acceptable investments in a normal portfolio universe. Why should one invest in 80 mediocre companies when one has already invested in 20 good companies? Why does it take hundreds of stocks to achieve the desired diversification as long as you can find fewer stocks with unequal fundamental drivers? I believe there is an optimal trade off somewhere between the number of holdings and the expected excess return in the portfolio, probably somewhere between 20 and 50 positions.

³ The Government Pension Fund – Global in Norway seems to have walked straight into such a trap.

⁴ See http://www.norges-bank.no/Pages/Article_42409.aspx

⁵ Information ratio is the annual excess return divided by the annual relative volatility (tracking error).

Diversification is good because it can increase the risk adjusted return in a portfolio. However, holding stocks for diversification purposes only makes no sense to me and gives no guarantee that the risk level is low. It is better to look for diversification across asset classes, rather than within.

Proposition: Risk is not volatility or beta, but the permanent loss of capital

The concept of risk as price swings or volatility has strong support in the financial industry. Value oriented investors, however, are critical of this definition perceiving risk as *a permanent loss of capital*. I find that critique appealing. A few examples illustrate the difference between the two ways of perceiving risk.

First, we could consider a stock with a low market cap and a high level of free float. The investor base is widely diversified and there are no lead investors in the firm. As a consequence the share is subject to a lot of trading and has a high turnover. The firm is on the other hand delivering a stable cash flow and operates in a market with little macroeconomic risk. The volatility in the share price here is probably not reflecting the fundamental risk in the company.

Second, we could consider a share with a large lead investor that completely dominates the company. Traders find the share uninteresting and analysts do not care much. The company however, is operating in a very risky market, is highly leveraged, and has an inexperienced management. This might be a situation where the operating risk is higher than what is reflected in the share price volatility.

Value investors typically are less concerned about share price volatility, and more concerned about fundamental changes in the company. The investor should invest in companies where the share price does not fully reflect the intrinsic value of the company. How the investor might arrive at the intrinsic value is of course not irrelevant, but not at the heart of this discussion. The view is that the markets at times are out of line with fundamental values. Again I found a relevant quote from Warren Buffet: “Look at market fluctuations as your friend rather than your enemy; profit from folly rather than participate in it.”

At this point critics might argue that volatility, given that the distribution of outcome is symmetric around the mean, is a pure reflection of the risk of a permanent capital loss and that there should be no contradiction between the two concepts. However, in order to validate this view one has to make a number of assumptions that generally apply in the CAPM-model⁶ framework. Typically, this well established framework for analysing asset and portfolio risk, assumes efficient markets, normal distributions, rational expectations and perfect information. In real life, this is rarely the case. Price fluctuations in an asset can reflect a number of inefficiencies like asymmetric information, speculation (trend following strategies creating overshooting), scarce liquidity, corporate actions, fraud, political decisions and so on. Market volatility (and beta) does not distinguish between the reasons for price swings.

⁶ CAPM (Capital Asset Pricing Model) states that the risk to an asset is generated from systematic risk (market risk) and idiosyncratic risk (risk related to the specific asset and that can be diversified away). There is a trade-off between risk and expected return where the assets “beta” or riskiness relative to the overall market (that has a beta of one) determines the rate at which the assets future cash flow should be discounted. A higher beta implies a higher discount rate, which is in line with intuition.

Another important distinction is that measured betas may be quite misleading as models often do not discriminate between significant and insignificant betas. This way co-incident can happen to represent the risk level of an asset.

The CAPM framework is essential in understanding why the concept of diversification has such a strong support. In this model, diversification reduces the idiosyncratic risk⁷, and the investor ends up with a more efficient way of accessing systematic risk⁸. This is probably why diversified portfolios have become so popular. However, when you diversify a lot, you typically end up with a portfolio that will perform in line with the benchmark for that universe. Thus, diversification encourages investors to stop thinking and virtually hand over the investment decisions to the provider of the benchmark index. This is very far from controlling risk. What if systematic risk is a misconception? What if beta calculations are misleading? A well diversified portfolio will achieve a lower tracking error⁹, but that does not make investors rich and should not make them sleep better at night. Targeting a low tracking error could easily wipe out the positive effects of diversification because this implies that the fund must give a large weight to stocks that have already rallied, regardless of fundamentals.

While I believe diversification within an equity mandate is of less relevance, diversification at the level of asset classes is much more important. However, outside the equity and bond space it is difficult to find truly uncorrelated assets. This is acknowledged by the fund industry, and a lot of effort is being put into bringing new types of assets with low correlation to equities on to the market. Some of these vehicles work rather well, particularly in the hedge fund space, but also within infrastructure, real estate, commodities, and different types of risk trading in for example longevity risk or in natural disasters (!) Unfortunately, regulators around the world, Norway included, are typically considering many of these vehicles to be dubious and risky, and the lack of transparency makes them more demanding for the individual investor. However, as the industry matures and regulators become more familiar with the products, such investments will be of greater importance for portfolio managers.

Norway has currently a strict cap on alternative investments for pension fund managers, and, as a consequence, these managers are forced to channel their risk budget to equity, bonds and real estate. More timely regulations to improve potential asset diversification effects one can hope for.

Proposition: Illiquidity is a good harvest for long term investors

Typically, assets that are difficult to trade will trade with a premium because investors will demand compensation for the risk of not being able to sell at any given point in time. I believe this illiquidity premium is a very attractive premium to harvest. To my surprise however, investors with a short time horizon tend to go after this premium. When investing in illiquid assets, the investor must be patient and wait for the right entry and exit opportunities. An investor with strong liquidity constraints could under certain conditions turn out to be a forced seller, something which is normally incompatible with this premium. So hedge funds are not the ideal vehicle to take on a lot of liquidity risk. Long term investors are.

⁷ Risk related to the specific asset that can be diversified away

⁸ Market risk

⁹ Tracking error is the volatility of the difference in return between a portfolio and its benchmark index.

One example illustrates my point. As I suggested above, high volatility stocks and stocks with recent strong performance were sold off first during the market turmoil in the fall of 2007. Fundamental factors were harder to observe. As traders had to deleverage their positions, shares were forced out in a market where risk aversion had increased significantly. Part of the rise in risk aversion might have been taken out as a rise in the liquidity premium (something I should have, but haven't yet analysed) and so the forced seller might have taken bigger losses in liquid shares (which is by the way also according to the CAPM framework).

Illiquidity does not necessarily mean higher fundamental risk; it only means that you have to have a longer time horizon on your investment. Perfect for a pension fund, but not too good for traders.

Again, pension fund managers are typically held back by regulators to invest in illiquid assets like private equity and unlisted stocks, while they probably are the better investors for these assets.

Conclusions

Several of the points I have made are rather basic criticisms of the CAPM model. Even though these arguments are well known, the investment community continues to develop models based on standard CAPM methodology, fund managers try to optimize their portfolios using Markowitz, and we keep analysing stock risk premiums using 'beta' models. Why? Probably because it is simple and because it is a consistent and well known framework where you can obtain clear cut conclusions and where most of the people you talk to recognize the analysis. That is why we probably will continue to make similar experiences in the future when correlations change, when history does not repeat itself, when distributions are not normal, and when there is asymmetric information or there are sudden changes in liquidity conditions.

Professor Lars E .O. Svensson, in discussing the optimal interest rate path for a central bank, argues that "it has to look good". That goes for investments too. If the model tells you something that does not look good, it probably is not.

The market will repeat previous errors. Here are a few to watch out for:

1. When we remove the possibility of human error, we also remove common sense.
2. Forecast based trading is not a stable source of alpha, particularly not in efficient or near efficient markets.
3. Historical relations do change. Do not base your investment models on them.
4. It is impossible to target volatility in difficult markets.
5. Academics are not managers. The real world is different.
6. Diversification is good, but works best across asset classes.

I would like to illustrate how we at OPF implement our thinking in some of the asset classes. First, it is possible in Norway to book equity at historical cost rather than mark-to-market. OPF has made some very concentrated investments in a few Nordic companies categorized as "hold-to-maturity stocks". The total return from these stocks in the accounts is then simply the dividend yield plus realized returns. The trade off for OPF is that we give away liquidity (because we have to hold the stocks to "maturity" defined as more than 12 months), and in

return are able to take a longer view. In this way we have incentives to invest in companies with a similar long term horizon for their operations. Typically our portfolio consists of companies with a stable cash flow and high dividends. Regardless of accounting principles, I believe that these are sound investment criteria for a long term investor. We know our companies rather well, we have the capacity to engage in our investments, and we can construct a portfolio with attractive risk characteristics even though it might look risky from a pure diversification point of view.

Another important investment for us has been in the infrastructure space. These investments are typically organized as a limited partnership. Again, these types of vehicles are subject to rather strict regulations while ordinary equity funds are not, the reason being that limited partnerships historically have been associated with higher risk, and probably also because they are not operating on regulated markets. This is unfortunate. The liquidity premium in these funds should on the contrary be a very *attractive* harvest for long term investors. Remember diversification *between* asset classes is far more effective than diversification *within* an asset class.

Finally, we have in OPF engaged in real estate investments and have recently increased our exposure here significantly. Again we focus on long term returns and low operational risk. What we find particularly attractive is the excellent hedge against inflation risk and the low capital depreciation rate of real estate. In fact, one could argue that the depreciation rate is lower than the discounting rate because land is a scarce resource that will have a positive inflation adjusted return over time. To further reduce our risk we focus on tenants with superior credit quality, long duration of contracts, high net discounted value of property and excellent location. In this way we are able to invest in an asset class that provides limited risk of a permanent capital loss, low ownership costs, and stable returns above the risk free rate.

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