Suggestions for Papers in Finance

This paper contains a few topics for research in finance and related areas according to my personal taste. Interested students might wish to contact me by email: `philippe.mangold@unibas.ch`. Of course, these topics are subject to discussion and reinterpretation, and are also conditional on approval by the professor. Note that I refer to some preliminary literature in a very sloppy way; you are supposed to do this properly. Do not hesitate to ask me if you are not able to find the literature indicated or wish to be referred to more (for several topics there are no references, again, please contact me if you are interested!). This document will be updated on a regular basis.

Who is the trend-setter? Rating agencies or markets?

In view of the current financial market turmoil, there has been much discussion of the role of the rating agencies. Due to law and industry practice (as set, for example, by the BIS) many parties relied on rating agencies. This gives rise to important questions in finance. For example, we may observe yields of fixed-income assets as well as a rating on the same assets. But which causes which? Can this be determined? I conjecture that the grades depend on – and can be quite well forecast – by observing the yields (i.e. the spreads over the risk-free rate). This is an empirical question and has important policy implications.

Extraction of risk neutral density functions from option prices

Under risk neutrality, we can write the price of a call option with strike price K and expiration date T as

$$C_{K,T} = \frac{1}{1+i_{t,T}} \int_K^\infty (S_T - K) f(S_T) dS_T \ ,$$

where $f(S_T)$ denotes the risk-neutral density function of stock price S_T. Upon differentiating twice with respect to K we obtain

$$\frac{\partial^2 C_{K,T}}{\partial K^2} = \frac{1}{1+i_{i,T}} f(S_T) \ .$$

Therefore, we can estimate *risk-neutral* probability densities for some time to maturity and some underlying provided the data on the options is good enough. Risk-neutral densities vary from probability densities due to risk considerations; nevertheless they are useful: From these densities market expectations can be extracted and observed over time (Campa, Chang, Refalo (2002), Bates (1991), Jeanne (1997), just to name a few). Also, one might be able to draw inference on the underlying (aggregate) utility function. Jondeau and Rockinger (2000) describe alternative methods to infer risk-neutral probabilities.

Volatility Indices, Derivatives and Portfolio Diversification

This topic is concerned with recent developments of *volatility products* on financial markets. VIX, for example, measures implied volatility of S&P500 index options over the next 30-day period. It is considered to be a good measure of market sentiment (e.g. uncertainty about the future when the index is high), although I can think of a few arguments against it:

- it is averaged over very heterogenous markets (since its underlying is the S&P500)
- it is only available for 30 days into the future
- most liquidity for equity options is usually found for the 2- to 6-month maturities, therefore it is very uncertain how good the 30-day approximation is
- tilt of volatility smile (i.e. differential of implied volatilities between put and calls) is "averaged out"

Another claim is that derivatives on volatility, for example futures, are good instruments to further diversify equity portfolios. The reasoning to use it for means of diversification is the following: Decreasing equity value increases a company's leverage, hence the risk and the volatility. The investor can hedge against this by taking a long volatility position.

There are several questions arising:

- How are equity portfolios performing when blended with these products?
- How do these volatility products differ from volatility swaps, or more interesting to me, simple home-built straddle / strangle-like positions which are also long volatility?
- For a measure of market sentiment I propose to calculate these indices separately for calls and puts. Are after large drops in value the indices more asymmetric than otherwise? How do these relate to each other in specific situations, i.e in distress vs. calm periods?
- How are volatility indices related to credit risk prices?
- Implied volatility is not the same as realized volatility. From my point of view the above arguments regarding diversification rather apply to realized volatility (due to the timing of events, as I imagine). This would speak in favour of volatility swaps and also home-made products as described above.

Thirdly, Ang, Hodrick, Xing and Zhang (2006)[1] show that VIX innovations are significant pricing factors for equity returns cross-sectionally; Bollerslev and Zhou (2007)[2]

[1] "The Cross-Section of Volatility and Expected Returns", *Journal of finance* 61

[2] "Expected Stock Retunrs and Variance Risk Premia", *Federal Reserve Board Finance and Discussion Series*, 2007-11

suggest that the volatility risk premium, defined as the difference between the VIX and realized volatility of the S& P500 index, forecasts equity returns better than other often encountered fundamental variables.

Of course, this topic is very open on what you would like to focus.

Short-selling prohibition and put option premia

During some period of time during the recent credit crunch the SEC prohibited short-selling of assets of some companies. I presume this has the effect of increasing prices of put options for two reasons. Firstly, dynamic hedging of the short put position becomes much more difficult, or even impossible, hence increased risk may lead to an increased option premia. Secondly, constraining short selling may result in higher volatility of the underlying stock price because agents anticipating bad news are limited in their ability to take advantage of it by selling short. Thus, the stock price cannot be depressed sufficiently to acutally reflect expectations. When the bad news eventually arrives the price decline is much more severe than otherwise.

Now, it would be very interesting to assess how put option prices of different companies (on the list and off the list) did behave during the credit crunch.

Drawdown measures

We know it is difficult to devise metrics to quantify *risk*. Apart from using volatility (in terms of standard deviation of returns) it might be sensible to use some **drawdown** measure. Drawdown can be defined as the largest negative return occuring over pre-specified intervals. This might be a good basis to compare, for example, mutual funds and to assess their structure, or risk-taking attitudes.

One possibility is to develop measures similar to the Sharpe ratio but using drawdown as relevant quantification if risk. This is then a tool to directly evaluate performance relative to a benchmark.

Marketing [sic] / new business models

Chris Anderson (Book: *The Long Tail*) provides an excellent analysis of new business models in the 21st century (primarily due to new distribution channels such as the internet). The notion that many important variables are not normally distributed but rather follow a distribution from the *Pareto stable distributions* class has profound implications for business and finance. A corporate finance / valuation perspective would be how to put a value on such businesses because the uncertainty of the future seems to increase. I find it noteworthy that according to Taleb (2007)[3] of the 500 largest U.S. companies in 1957 only 74 are still sticking around forty years later (and only a few of them can be attributed to mergers).

[3] Book: The Black Swan

Literature besides Anderson: How power laws may shape the face of corporate strategy by Wolfang Amann, Cuno Pümpin and Didier Sornette.

Metrics in finance

Risk in financial applications is, most of the time, measured as something like standard deviation of past returns, lower partial monents and the like. One question is how well these measures are understood (I doubt there is a good grasp of the basic concepts among so many practitioners, and maybe also among some academics). A second one is how useful they are in first place, and the third question might be whether we can design better suited metrics.

Regarding the last question I can think of a functional form to estimate *risk*[4]:

$$\hat{v} = \sum_{i=1}^{n} |x_i - \bar{x}_+|^I + \sum_{i=1}^{n} |x_i - \bar{x}_-|^{\alpha(1-I)} - n \ ,$$

where I is an indicator funciton which equals one when $x_i \geq 0$ and 0 otherwise, α is something like risk aversion and x_+ and x_- denote the arithmetic mean given the returns are positive or negative, respectively. Is it possible to find better ways to measure *risk* in order to improve financial advice (for private banking purposes) by including risk aversion? Of course, different functional forms have different implications and it might be worthwile studying these issues.

Lust, gluttony, greed, sloth, wrath, envy, pride

An analysis of how the seven deadly sins are related to investor's psychology, behavioral finance and financial market investments. This theme can be divided into several different topics and questions. Questions might be: Are they important? Are there (in a regime switching sense) times in which one investor's sentiment is dominating (for instance bubbles versus crashes)? Is there any detectable regularity over time or over markets?

- Greed / Lust / Gluttony (as opposed to fear) might provail over different periods of time (e.g. Nasdaq bubble, market crashes, recent commodity rally)
- Envy: Is it true that household portfolios are related to each other due to geographical distance (Hong, Kubik, Stein, 2005)[5]. If so, then this might explain the home bias found by behavioral finance.
- Sloth: Behavioral finance discovers that investors are reluctant to adjust portfolios, most of the time.

[4]It is not actually risk, it's more like volatily, but then again this term is somewhat reserved for standard deviation (or variance) which is clearly distinct from what we want to develop here.

[5]Title of the paper: Thy Neighbors Portfolio: Word-of-Mouth Effects in the Holdings and Trades of Money Managers.

- Wrath, Pride: [maybe you can come up with an idea]

Analysis of a selection of these topics (or just one) might be as good as a "survey".

Pension funds / alternative assets

Pension funds traditionally invested in equity shares and property, nowadays they put more and more weight on private equity and hedge fund investments. The latter ones may be labeled as *absolute return* investments in the sense that they are supposed to deliver returns above the risk-free rate irrespective of market movements.

The question is whether this new investment policy is sensible, because after all pension funds are precisely the ones that are able to handle fluctuations of higher volatility investments (due to the theoretically infinite time horizon).[6] Or is it rather the opposite?

Since pension funds are typically wealthy they also should consider replicating hedge fund returns by simpler instruments in order to save on fees. Hasanhodzic and Lo (2007) show how this might be done using exchange traded instruments at much lower cost.[7] Related to this question is whether alternative assets are really alternative; maybe the success proved to be a *winner's curse*.

Financial market time (versus calendar time)

We measure the passage of time in a linear manner[8] but stylized facts from financial time series suggest (due to conditional heteroscedasticity which tends to appear clustered over calendar time) that a *natural measure* for financial market time might be related to inverse realized volatility.[9] In other words, in periods of high volatility time passes slower compared to periods of relative tranquility. In academic literature other measures of time have been proposed, for example *psychological time* (Allais, 1974) or the *transaction clock* (Mandelbrot and Taylor, 1967) related to transaction volume and Dacorogna, Gencay, Müller, Olsen, Pictet (2001) suggest a time measure based on seasonality.

This supposedly has several practical implications. For example pension funds (as well as mutual funds, but I presume it's less of an issue there) report annually to authorities and often evaluate their strategies on an annual basis, in terms of calendar time. One might argue this is not sensible and that fixed passage of financial market time should be used to determine when to conclude one 'year'. Similarly, this idea should be applicable to performance measurement.

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[6] There is an interesting article in The Economist called *Catch two-and-twenty* from May 22, 2008. This may serve as a first reference.

[7] Hasanhodzic, J. and Lo, A.W., "Can Hedge-Funds Returns Be Replicated?: The Linear Case", *Journal of Investment Management*, Vol. 5, No. 2, (2007), pp. 545.

[8] I presume linearity is a reasonable approximation for the passage of time for the matter under consideration. I do realize that there are theorems suggesting this is not true universally.

[9] A first reference to a similar idea is Stock (1988), Estimating continous-time processes subject to time deformation.