**MFE 237H Quantitative Asset Management**

**2016 Take Home Midterm**

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1. If a manager has a true alpha of 2% and runs a tracking error of 5%, how many years would it take, on average, to convince investors that his alpha is at least 1%? Please carefully show all steps and reasons.

Answer:

To convince the investors that we have an alpha of at least 1% we have to statistically test that our alpha generated is statistically greater than 1%, this can be done using a one tailed t test.

Now, the t test is:

We fail to reject the Null if the t stat is greater that the critical value at a given significance level. Now at a significance level of 5%

This should be greater than the critical value

Therefore

Hence n = 67.6, i.e, he has to perform this way for 67.6 years to convince the investors.

1. If a manager has a –1% Fama-French alpha, would you expect the manager to underperform or outperform the S&P500 on average over time? Please explain carefully.

Answer:

The Fama-French equation is:

It gives us the relation between the returns of the Fama- French portfolio, the excess returns are given by

Now if is negative ( in this case) we cannot tell for sure if the manager has underperformed or outperformed the S&P500, we have to know the other factors as well to come to a conclusion, even with -1% true he might outperform the S&P500

1. What are the Sharpe Ratios of the S&P500, the Fama-French value, size and momentum factor portfolio?

Why do people say that the very high Sharpe Ratios for value and momentum mean that they cannot be entirely risk-based in nature?

Sharpe Ratios

|  |  |  |  |
| --- | --- | --- | --- |
| S&P500 | FF Value | FF Size | FF Momentum |
| 0.31 | -0.12 | 0.04 | 0.2 |

1. Why might the momentum strategy be risky and require a high premium?

Though the standard deviation of Momentum portfolio is not too high the tail risk involved is high. For example during the 2008 period momentum portfolios had drawdowns close to 70% .

1. According to Markowitz’s MVA analysis, we can construct an efficient frontier from a universe of the 500 largest U.S. stocks (essentially the component stocks of the S&P500). If given a risk free rate, we can also easily identify the tangency portfolio. Would we expect the S&P500 to be on the efficient frontier? Would we expect the S&P500 to be the tangency portfolio?

According MVA analysis, if we have only these 500 stocks to invest and nothing else then S&P500 will be on the efficient frontier and tangent portfolio.

This is because the investors have homogenous expectations and when they invest in the available stocks finally everything will be consumed (demand = supply in equilibrium) and the portfolio will finally become value weighted.

1. According to CAPM, why would the market portfolio be the tangency portfolio as well?

What might this market portfolio look like, if CAPM is indeed correct?

Would we expect the S&P500 to be on the efficient frontier or be near the tangency portfolio? What about the MSCI Global index portfolio?

1. Describe the modern asset allocation practice employed by most consultants and pension funds.
2. When making manager hiring decisions, why do investors not focus on the Sharpe Ratio of the investment portfolio?
3. When combining two investment portfolios with high Sharpe Ratios, would the resulting portfolio also have a high Sharpe Ratio? Please give an example or derive carefully your explanation.

Let’s consider two portfolios with excess returns and standard deviations of . Now Sharpe ratios are:

Now the Sharpe ratio of the combined portfolio is

Now this is greater than the minimum of , Hence even the resulting portfolio will have a high sharp ratio.

1. When combining two investment strategies with high information ratios relative to the S&P500 benchmark, would the resulting portfolio have a higher IR? Again, give an example or derive carefully your explanation.
2. What is the difference between hedging and diversification?

Answer:

Diversification is reducing the non-systematic risk by investing in multiple asset classes where s Hedging is protecting against a loss by taking positions in negatively correlated asset, i.e, protecting the loss against systematic risk also.

1. According to consumption CAPM (CCAPM), shocks to our aggregate consumption (or aggregate wealth) are risks that are priced. A proxy which captures shocks to our aggregate consumption is the S&P500 portfolio. Please explain why the S&P500 might be a proxy for aggregate consumption shock?

In the context of CCAPM, why is beta relative to the S&P500 a measure of risk?

1. Explain APT in the context of the CCAPM.

Why are covariance’s with different “APT” factors measurements of risk?

1. Please use the LSV argument to explain the momentum, long horizon mean-reversion, and the value effect.

Carefully explain why long horizon mean-reversion might be the same thing as the value effect.

1. How might one interpret the Fama-French 2007 paper as a support for the LSV argument for the value effect?

Submission:

Submit your solution to the CCLE dropbox under week 6 by midnight on Sunday May 8. If you have issues you may e-mail your submission to the TA at: [nimesh.patel.1@anderson.ucla.edu](mailto:nimesh.patel.1@anderson.ucla.edu).